The Wallace Site (25GO2) in Context: Spatial Analysis of a Middle Plains Woodland Camp and an Evaluation of Its Relationship to Other Central Plains Sites

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THE WALLACE SITE (25GO2) IN CONTEXT:
SPATIAL ANALYSIS OF A MIDDLE PLAINS WOODLAND CAMP AND AN
EVALUATION OF ITS RELATIONSHIP TO OTHER CENTRAL PLAINS SITES

by

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B.A., San Francisco State University, 2005

A thesis submitted to the
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This thesis entitled:
The Wallace Site (25GO2) in Context: Spatial Analysis of a Middle Plains Woodland Camp and an Evaluation of Its Relationship to Other Central Plains Sites
written by Nicole Sauvageau Rockwell
has been approved for the Department of Anthropology

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Date_________________

The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.
This thesis explores the utility of cultural taxonomic systems, specifically those used on the Central Plains of North America during the Middle Plains Woodland period, through comparison of the Wallace site, a seasonal Middle Plains Woodland residential camp in south-central Nebraska, to other Middle Plains Woodland sites. To accomplish this, chipped stone and spatial analyses are performed to clarify and explore site structure at the Wallace site, resulting in interpretation of the site as a cold-weather seasonal camp that was likely reoccupied. These analyses also result in identification of activity and refuse areas, details of the structure and use of the house basin, and conclusions about behavioral patterns that contributed to the site structure. Comparison of the Wallace site to other temporally and geographically related sites demonstrates that shared traits are better represented as a continuum than through separation of the sites into mutually exclusive categories like those used in cultural taxonomic models and that the differences highlighted by the use of taxonomic systems may be attributable, at least in part, to the limited sample size of Central Plains sites from this period.
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CHAPTER 1: INTRODUCTION

This thesis is concerned with understanding site structure and the behaviors likely to have contributed to that structure at the Wallace site (25GO2), a seasonal Middle Plains Woodland residential camp in south-central Nebraska, then using interpretations from the site to evaluate the effectiveness of the cultural taxonomic system currently in use for Central Plains sites dating to the Middle Plains Woodland period, which spans the period from approximately 100 B.C. to A.D. 500. I use a three-tiered approach to accomplish these goals. First, chipped stone and spatial analyses are used to clarify and explore site structure and related behaviors. Then, interpretations and data from these analyses are used in comparisons between the Wallace site and other sites from the Middle Plains Woodland period. Finally, this information is used to evaluate the Wallace site’s fit within defined taxonomic categories and assess the usefulness of the cultural taxonomic system and phase definitions.

These analyses ultimately lead to the conclusion that the use of the current taxonomic system for Central Plains sites from the Middle Plains Woodland period highlights differences that have more to do with the diffusion and dilution of ideas from east to west across the region than with marked differences between distinct cultural groups, as is implied by the taxonomic system.
PROBLEM STATEMENT

There are two main problems that this thesis seeks to address. The first is quite simple – chipped stone and spatial analysis of the Wallace site will add additional data to the sparse record of Middle Plains Woodland period sites that have been excavated on the Central Plains. The second problem is a bit more complex. A need for more taxonomic refinement has been cited as a research weakness for the Middle Plains Woodland period in Nebraska (Bozell and Winfrey 1994). The primary emphasis of previous research, much of which took place in the early to mid-20\textsuperscript{th} century, was on the organization of sites into culture-historical units, viewed as discrete categories. A call for more taxonomic refinement assumes that taxonomic classes are the best way to describe sites’, and their inhabitants’, relationships to one another. Few attempts have been made to understand the technological and social relationships between different sites, instead simply categorizing the sites as one phase or another based on limited defining characteristics. Thus, this research explores the utility and limits of these taxonomic systems.

PURPOSE

The purpose of this study is to place the Wallace site into the proper context, that being a continuum of cultural adaptation rather than a bounded taxonomic class based on limited defining characteristics. Many different ways of life were pursued in the Central Plains during the Middle Plains Woodland period, and, although the Wallace site has been categorized as a member of the Valley variant based on the presence of Valley Cord-Roughened ceramics, it also contains characteristics that are considered fairly typical of Keith variant sites. Thus, the site and
its artifact assemblage are compared to other Valley and Keith sites, as well as sites attributed to other, related cultural units.

Before these larger considerations can be addressed, more data are needed for the Wallace site. Previous spatial analysis undertaken for the site focused on post-depositional processes and the determination of occupation duration and frequency (Winfrey 1991). Although limited conclusions were drawn about the behavior and activities of the site’s occupants, only some artifact classes had been analyzed at that time and could be included in the analysis. Thus, the current project includes analysis of the chipped stone assemblage, as well as analysis of additional aspects of the spatial distribution of artifacts to add detail to the previous analysis and to address the current research questions.

**OBJECTIVES**

My hypothesis is that few Middle Plains Woodland sites, including the Wallace site, fit into just one of the accepted phase definitions. Comparison of approximately contemporaneous sites will show that the boundaries are not as clear-cut as implied by the majority of research performed in the area; the sites will actually fall along a continuum in terms of technology, settlement patterns, and subsistence strategies.

More detailed spatial analysis at the Wallace site will test Winfrey’s (1991) conclusion that the Wallace site represents a single occupation. The mapping of charcoal and burned artifacts, as well as the refitting of chipped stone tools, will give a greater understanding of the mixing that has gone on at the site, and should help to further define activities taking place and identify activity and refuse areas used by the inhabitants, leading to interpretations about the
behavior of the site occupants. These analyses are also useful for evaluating the appropriateness of comparisons of the Wallace site to other Middle Plains Woodland sites. This study will assess the ways that the Wallace site fits the pattern of “typical” Valley phase sites and the ways that it may also fit into other phases, as well as exploring the utility of this approach to site classification.

**Organization**

This thesis is organized into five chapters. The second chapter provides background information for the key concepts behind this research. It begins with an overview of the defining features of the Middle Plains Woodland period and the relevant taxonomic categories within that period, including the Valley, Keith, South Platte, Kansas City Hopewell, and Besant phases. The chapter then discusses the theory behind spatial analysis and associated behavioral models.

Chapter 3 presents an overview of the Wallace site, including information about the location and surrounding environment, its archaeological history, and the previous research conducted using artifacts and data from the Wallace site. In particular, this chapter details the conclusions and supporting arguments from Winfrey’s (1991) previous analysis of the site, which are the starting point for the current analysis.

Chapter 4 presents the analysis undertaken to answer the current research questions. It begins with the chipped stone analysis goals and methods, followed by a discussion of the results, then the spatial analysis goals, methods, and results. The chapter ends with a discussion and interpretation of the analysis results and conclusions drawn about the site structure at the Wallace site.
In Chapter 5, the data and conclusions from Chapter 4 are compared to information from other Central Plains sites dated to the Middle Plains Woodland phase. The sites used for comparison represent a wide variety of residential occupations on the Central Plains, incorporating sites from a number of Middle Plains Woodland cultural phases. Chapter 5 ends with conclusions about the limited utility of cultural taxonomic systems and recommendations for future research.
CHAPTER 2: BACKGROUND

This chapter presents theories and information that form the basis of the research questions and contribute to the structure of the analyses performed in later chapters. There are two main sections. The first details the defining characteristics of the Middle Plains Woodland period and describes the cultural taxonomic system currently in use on the Central Plains for this period, including the definitions of the primary phases relevant to this thesis. The second section describes the theories and supporting ethnoarchaeological fieldwork behind most approaches to intrasite spatial analysis.

THE MIDDLE PLAINS WOODLAND PERIOD

The Woodland period is one of significant technological and social change. Hopewell populations in the Eastern Woodlands had a significant impact on the Great Plains region during this period, and the development process in the Central Plains was complex, likely involving diffusion, migration, and large-scale communication and sharing of concepts and technologies across significant distances (Logan 2006).

Although Woodland developments in the Central Plains, particularly the eastern portion, mirror changes taking place in the Midwest in many ways, differences in environment and other circumstances make for differential adoption of Woodland traits. Thus, the term “Plains Woodland” is used to differentiate the range of cultural adaptations on the Great Plains from those in the Eastern Woodlands.
In terms of material culture, the term “Woodland” refers to prehistoric sites that have elongate pottery vessels with conoidal bottoms, corner-notched projectile points, and burial mounds, which are the diagnostic features of the Woodland archaeological period in the eastern U.S. (Johnson and Johnson 1998). “Plains Woodland”, then, refers to sites on the Plains that exhibit some combination of these traits due to unique adaptive responses in the different environmental setting of the Plains. The manifestation of typical Woodland traits tends to decrease from east to west across the Plains.

The period is divided into three parts: the Early, Middle, and Late Woodland, although these divisions are less meaningful on the Plains than in the Midwest (Bozell 2006). The Middle Plains Woodland period is the focus of this project and extends from about 100 B.C. to A.D. 500 on the Central Plains (Bozell and Winfrey 1994). However, despite this defined time period, Woodland populations in the west were relatively stable around A.D. 500 when the shift from Middle to Late Woodland was clearly taking place in the east (Bozell 2006). Middle Woodland economy, material culture, mortuary customs, and settlement patterns persisted until as late as A.D. 1100 in some places.

Defining Features of the Middle Plains Woodland Period

The Middle Plains Woodland is a time of critical change; it is seen by some as the first period on the Great Plains in which there is real subsistence, social, and technological change from what had been a relatively static pattern of Plains nomadic foraging (Logan 2006). It is characterized by the appearance of the first pottery in the region, agricultural experimentation, and increased sedentism (Bozell and Winfrey 1994). There is a lack of elaborate artifacts in
Nebraska that are found in other places, and mortuary customs in Nebraska are less complex than in other areas. The transition from the Middle to Late Plains Woodland is generally defined by bow and arrow use, based on the idea that Middle Woodland people infrequently used the bow and arrow, whereas Late Woodland people usually did, as well as by agricultural and ceramic differences. In the Late Woodland, ceramic form is retained but decorative treatment is lacking or restricted to the lip (Logan 2006).

The Late Woodland is also characterized by a dramatic increase in the number of sites along stream valleys (Logan 2006). This has been interpreted as a response to demographic pressures that began during the Middle Plains Woodland, when larger groups depleted resources in the vicinity of long-term base camps.

*Social.* Plains Woodland social systems are based on small groups or single family units (Bozell and Winfrey 1994). An increase in population in the Middle and Late Plains Woodland is evident by the greater number and density of sites over this time period (Logan 2006). Johnson and Johnson (1998), however, postulate a reduction in societal size from east to west across the Plains. Village and burial mound sizes support this hypothesis. The process of development in the Woodland period was probably facilitated by a fluid kinship system (including fictive kin ties and adoption), that is difficult to document archaeologically (Logan 2006). Household size has consistently been interpreted as 15 or fewer people (Benn 1990).

*Subsistence.* Subsistence systems during this period on the Central Plains vary temporally and regionally. The temporal variation is largely due to increased domestication; the regional variance is more poorly understood (Bozell and Winfrey 1994), although it has been
suggested that a diminishing resource base to the west may be a contributing factor (Johnson and Johnson 1998). The Woodland period is characterized by increased precipitation, and the moist conditions may have encouraged horticultural experimentation in some areas (Bozell 2006). Lifestyles in this period range from nomadic bison hunting to semi-sedentary hunting and gathering. Plains Woodland people confronted issues of supporting an expanding population on a fixed resource base with incremental increases in productive efficiency of tools and food sources (Benn 1990). However, exploitation of horticulture came slowly due to the contradiction between the new mode of production and traditional hunting and gathering social structures. Plains Woodland peoples of western Kansas and Nebraska and eastern Colorado and Wyoming possessed a lifestyle more similar to the preceding nomadic or semi-sedentary Archaic hunter-gatherers, while populations in the Kansas City area showed much more similarity to Eastern Woodland societies (Bozell 2006).

Settlement. Bozell and Winfrey (1994) describe three categories of Middle Plains Woodland sites: hamlets, burials, and resource procurement sites, stating that there is little evidence for true “villages” during the Middle Woodland. Kansas City Hopewell phase sites, which will be described shortly, are the exception to this. Hamlets, by their definition, are small, semi-permanent stream-side residential sites including one or more households. These sites were occupied on a seasonal basis, and reoccupation was common (Benn 1990)

Material Culture. Plain-surfaced pottery with decorative motifs in zones, including classic Hopewell decorative elements characterizes the Middle Plains Woodland period (Logan 2006). Although there are regional differences in ceramic temper, this may simply reflect
available resources rather than major cultural differences (Logan 2006). As mentioned previously, vessel form is typically elongated with a conoidal bottom.

Projectile points from this period are also distinctive. Both darts and arrows were in use in many areas during the Middle Plains Woodland. Regardless of size, projectile points are most commonly corner-notched. Other aspects of material culture are more variable, and those variations will be described in more detail below.

*Cultural Taxonomy*

The culture-historical approach became popular in the 1930s. Proponents of the approach believed that cultural dynamics must be viewed in terms of interaction among many social groups and saw continuity of material traits as the way to get at this archaeologically (Binford and Sabloff 1982). The artifact, then, is the basic unit of observation and cultures can be defined based on traits that co-occur frequently. The goal of this approach was cultural identification, not an understanding of internal differentiation or variability. The Midwestern Taxonomic Method was presented as a way of reaching this goal.

In the Midwestern Taxonomic Method, types defined by archaeological materials and features were billed as “the only taxonomic basis” for classification (McKern 1939:303), and initially the taxonomy only included these materials and features; geographic and temporal aspects were added to the definitions later. This method is still commonly used for classifying prehistoric Great Plains cultures.

McKern proposed five divisions for cultural taxonomies. From specific to general, they are focus, aspect, phase, pattern, and base. Focus refers to a recurring complex of traits among
sites, these traits being suggestive of a shared cultural identity. An aspect consists of multiple foci that have more in common with each other than they do with other foci. Multiple aspects are then grouped as a phase, multiple phases make up a pattern, and patterns stem from a common base.

Later, Phillips and Willey (1955) recommended changes and additions to McKern’s method. Their system replaced McKern’s “focus” with “phase”, a concept that included McKern’s definition but also had a “stronger temporal implication” (Phillips and Willey 1955:620). Their new system also included “horizons”, the distribution of stylistic traits over a geographic area, and “traditions”, large-scale continua with cultural, spatial, and temporal continuity.

Both of these classification methods are mentioned here for two reasons. First, a significant portion of Middle Plains Woodland sites were excavated prior to Phillips and Willey’s taxonomic system and utilize McKern’s terminology. Second, and probably partially owing to the first point, the terms “focus” and “phase” are often used interchangeably to mean “phase” in Phillips and Willey’s definition. The term “variant” is also used in the same way. In this paper, the terms are all used to mean “phase” in Phillips and Willey’s definition.

There are a number of cultural taxonomic units defined for the Central Plains during the Middle Plains Woodland period (Figure 1). The most relevant for the Wallace site are the Valley and Keith phases. Other units defined in Nebraska around this time are Kansas City Hopewell and South Platte phases. All of these share attributes of the ceramic and lithic technologies of Eastern Woodlands Hopewell (Logan 2006). Bozell and Winfrey (1994:125) have pointed out that, despite these taxonomic classifications “[a] clear, widely accepted picture of Middle
Woodland occupations in Nebraska continues to be elusive”. The five Middle Plains Woodland phases used for comparisons and examples later in this thesis are described in more detail below.

**Valley Phase.** The Valley variant ranges from central Nebraska to western Iowa and from southern or central South Dakota to northern Kansas (Johnson 2001; Bozell and Winfrey 1994). Valley represents the initial development of a ceramic complex and the inception of social and economic changes that eventually lead to the appearance of village horticulturalists in the Central Plains. Valley peoples likely influenced the spread of Woodland developments to the west (Bozell 2006).
Within the Valley focus, there are minor temporal, spatial, and material culture distinctions, particularly in terms of burials and ceramics, but they have not been considered sufficiently defined to warrant separation. The development of the Valley phase may have involved a coalescence of Eastern Woodland immigrants and Late Archaic bands, and its emergence is viewed as a response to increasing population, requiring more efficient subsistence and settlement strategies (Bozell and Winfrey 1994). Valley variant material culture continued expanding west until at least A.D. 400.

The Valley focus definition is largely based on the Schultz site (25VY1), which is the type site for the category (Bozell and Winfrey 1994). The defining characteristic of the Valley phase is the presence of Valley Cord-Roughened ceramics, also called Valleyware. In addition, Valley settlements typically have one or more circular to oval structure(s) with shallow, basin-shaped exterior pits (Bozell and Winfrey 1994). Structure diameters range from two to seven meters, built over an excavated basin or unprepared ground, with or without a central hearth. Daub with wattle impressions has been found at some Valley sites, including the Schultz (Hill and Kivett 1940) and Wallace sites, suggesting a wattle and daub covering over poles and skins or mats.

Faunal assemblages at Valley sites are defined as consisting primarily of bison remains, though other fauna are also represented in the remains. Valley projectile points are typically larger, corner-notched points with expanding stems, and some are serrated (Bozell and Winfrey 1994). Smaller points occasionally occur, primarily in the western part of the Valley geographic area. These small to medium corner-notched points are similar to the Scallorn type found in the Midwest (Johnson and Johnson 1998). Other typical tool types include scrapers, wedges, ovate
or rectangular knives, drills, retouched/utilized flakes, grinding stones, hammerstones, celts, and atlatl weights (Bozell and Winfrey 1994).

*Keith Phase.* Archaeological representations of the Keith phase are very similar to Valley phase sites, although the origins of the Keith phase are unknown. Keith phase sites are found on the Central Plains, centered in the Republican River valley of Nebraska and Kansas, with sites also present in the Solomon, Saline, Smoky Hill, and Arkansas river drainages (Bozell 2006). The type site for the Keith focus is the Keith site (25FT18). The defining feature of Keith phase sites is the presence of Harlan Cord-Roughened ceramics (Johnson and Johnson 1998).

Keith settlement patterns include larger villages and small hunting and gathering camps (Johnson 2001). Known Keith phase sites are typically small, generally well under an acre. The houses are very similar to those defined for the Valley phase, generally circular to oval basins excavated 12-18” into sterile soil with central hearths (Johnson and Johnson 1998). Internal fireplaces are often poorly defined archaeologically, and outside hearths and storage pits are common. Although a broad range of fauna are found in Keith variant sites (Johnson and Johnson 1998), the dominant species represented by faunal remains are deer and antelope, with less bison than Valley sites (Bozell and Winfrey 1994). Keith variant projectile points are highly variable, although sites typically contain a higher proportion of small arrow points to large dart points, suggesting a shift from the use of darts to arrows during this time (Johnson and Johnson 1998). Other tools include hunting, butchering, and grinding implements, and most artifacts are of local materials.
**South Platte Phase.** The South Platte phase is present on the High Plains and also includes the Ash Hollow and Parker taxa (Bozell 2006). Geographically, it extends from the Nebraska Sand Hills through western Nebraska and at least northwestern Kansas and into a large area of northeastern Colorado and portions of eastern Wyoming and southwestern South Dakota. Although the South Platte phase has many similarities with the Valley phase, it persists longer, continuing well into the Late Plains Woodland period. This phase is not well-defined, and it has been argued that it does not warrant taxonomic segmentation (Bozell and Winfrey 1994).

Horticulture does not appear to have been an important component of South Platte Phase subsistence, and it lacks the elaborate burial practices of areas to the east (Butler 1998). Ceramics are cord-marked with straight to slightly inverted rims and conoidal bases, and typical projectile points include small corner-notched arrow and dart points, and small triangular side-notched and tri-notched arrow points. Expanding-based drills are also common.

**Kansas City Hopewell (KCH) Phase.** KCH is the taxa most closely related to the Eastern Woodlands Hopewell. KCH sites are found along the Missouri River area in northeastern Kansas, northwest Missouri, and far southeast Nebraska. Most of the known KCH data is from sites in northwestern Missouri, but Kansas KCH sites show greater variability than those in Missouri (Logan 2006).

KCH settlement patterns include continually-occupied villages with special-purpose camps (Johnson 1976). Villages span anywhere from two to 15 acres, while camps are smaller than two acres. Although horticulture is a major feature of Eastern Hopewell subsistence, cultigens are not believed to have been a significant portion of KCH subsistence. The principal
foods exploited by these groups include deer, turkey, fish, nuts, acorns, and seeds of amaranth and marsh elder.

Ceramic decorative treatments and projectile point styles parallel those in Illinois (Logan 2006). KCH sites exhibit a sequence of ceramic decoration from rims decorated with cord-wrapped stick, dentate, or plain stick impressions to rims decorated with cross-hatching or punctuates followed by rims lacking decoration or with crenulations (Johnson and Johnson 1979). Changes in projectile point style follow a similar trajectory, with small triangular corner-notched projectile points introduced towards the end of the KCH sequence (Johnson 1976). The influence of KCH groups on Nebraska groups is unclear (Bozell and Winfrey 1994).

Besant Phase/Sonota Complex. The Besant Phase is the primary Middle Plains Woodland phase recognized for the Northern Plains. The Besant and Valley phases are related (Bozell and Winfrey 1994). The Sonota Complex is a subdivision of the Besant phase, and consists of burial mounds and one associated site in southern North Dakota and northern South Dakota (Johnson and Johnson 1998).

Besant includes the introduction of ceramics and burial mounds to the Northern Plains, although the frequency of pottery decreases to the west. Besant subsistence is centered on bison hunting, including the use of traps and jumps, and there is no evidence of horticulture (Johnson and Johnson 1998). Sites were occupied seasonally, and reoccupation was common.

Besant projectile points are broad, side-notched dart-size points, and they are most often made of Knife River Flint, the preferred material even in sites hundreds of miles from the quarries in west-central North Dakota (Johnson and Johnson 1998). Pottery is grit-tempered and cord-roughened, and the form is elongated, neckless, and shoulderless.
**Issues with Taxonomy**

There are important issues with using the taxonomy just described. Cultures are viewed as distinct and discontinuous “based upon a seemingly unproblematic division of space” (Gupta and Ferguson 1992:6). A number of archaeologists have recently criticized the use of these kinds of taxonomies on the Plains (Bamforth 2011; Bernardini 2005; Logan 2006). Taxonomies can lead to a search for differences in the archaeological record and an emphasis on minor regional variability that inherently characterizes any widely distributed population, causing researchers to lose sight of the importance of common factors (Bamforth 2011; Logan 2006).

Taxonomic systems have also been criticized for their overemphasis on spatial and temporal boundaries to the exclusion of crosscutting and historical linkages between groups (Bernardini 2005). The social landscape is thus divided into blocks with certain material traits presumed “to reflect the common character of the population”, like a tribal identity (Bernardini 2005:31). To improve the discovery and understanding of cultural identity in the past, there is a need to escape the confines of “place-based” approaches to archaeology (Bernardini 2005:31); the emphasis should be on time, not space. However, despite these criticisms, a more effective system has yet to be proposed.

**Intrasite Spatial Analysis**

This section reviews important concepts and ethnoarchaeological research relating to intrasite spatial analysis, with an emphasis on human behavioral processes that contribute to the archaeological record. Archaeological sites are created through the interaction of human
behavior and natural processes (Bamforth et al. 2005). However, the natural processes are not
presented in depth here because they have been addressed extensively in James Winfrey’s thesis
on the Wallace site (1991), work that this thesis seeks to build upon to answer new research
questions.

Definition and Goals of Spatial Analysis

An archaeologist’s view is stationary, but past behavior was mobile (Binford 1980). Thus, a site presents a “limited, biased picture” of a wide range of activities (Binford 1980:109),
and methods must be developed and utilized to link archaeological context material to behavioral
and organizational hypotheses and elements (Schiffer 1971). Spatial analysis, then, involves the
analysis and behavioral interpretation of spatial patterning of artifacts, features, and fauna in
archaeological sites based on recognized clusters of variables that determine much of the way
behavior at different locations was organized. (Carr 1984; Binford 1980).

The goals of spatial analysis are multi-tiered. At the overarching level, the main purpose
is to define the site structure, the arrangement of artifacts, features, and structures in an
archaeological site. At the inferential level, goals of intrasite spatial analysis have been to define
the spatial limits of activity areas and to define the organization of artifact types into tool kits
(Carr 1984). The tool kit concept is the subject of some debate that will be addressed later in this
chapter. The information generated by this analysis can be used to reconstruct the kinds,
frequencies, and spatial organization of activities, which in turn may shed light on the season(s)
of occupation, site function, community population, group composition, patterns of household
interaction, community kinship and social organization, and other behavioral and ecological phenomena.

At the operational level, intrasite spatial analysis has four goals: determining whether artifacts of each recognized functional type are randomly scattered, aggregated into clusters, or systematically aligned; clarifying the spatial limits of a given type cluster, where relevant; examining whether artifacts of different types are often in association; and determining spatial limits of multitype clusters when they occur.

Key Concepts

Context. There are a number of factors that must be kept in mind in the interpretation of spatial patterning. Most important is that the context of an artifact or feature within an archaeological site must be differentiated from the system in which it was utilized. Schiffer (1971) uses the ideas of archaeological and systemic context to describe these, while Carr (1984) uses similar concepts of archaeological and behavioral domains.

In Schiffer’s (1971) model, systemic context is includes elements participating in a behavioral system, while archaeological context consists of materials that have passed through a cultural system and are now objects of investigation to archaeologists. Each cultural element has a life history that accounts behaviorally for production of the archaeological record. In the systemic context, the history of a durable element goes through five processes: procurement, manufacture, use, maintenance, and discard. Consumable elements are subject to four processes: procurement, preparation, consumption, and discard. Other problems that must be considered are storage and transport, as well as reuse, recycling, and lateral cycling, since these last three
processes feed items back through the system. There are specifiable spatial locations for each process through which an element passes.

Post-discard items are refuse. Primary refuse is discarded at its location of use, secondary refuse is discarded somewhere other than its location of use, and de facto refuse is lost or abandoned (Schiffer 1971). With increasing site population and/or site size, there will be a decreasing correspondence between use and discard locations.

Carr (1984) differentiates between activity sets and depositional sets based on the former’s occurrence in the behavioral past and the latter’s in the archaeological present. Thus, an activity set consists of the artifact types that are used or produced together by a site’s occupants, and the depositional set is comprised of the artifact types that are most often found together when a site is excavated. Depositional sets, then, are alterations of activity sets, with archaeological formation and disturbance processes linking the two. Activity areas and depositional areas are differentiated in the same way.

Carr’s model differs from Schiffer’s in that “depositional set” and “depositional area” do not specify the processes by which associations and aggregations are generated. These processes could be behavioral, geological, biological, or agricultural. Carr also differentiates between an activity area and a use area, the latter term used to describe locations with the implication that the location was used for artifact manufacture, use, storage, or disposal, but not specifying which.

Site-wide depositional sets and activity sets often exist in polythetic and overlapping organization, so correlation and simple association are not accurate measures of the strength of relationships (Carr 1984). Deposition sets, then, are polythetic and overlapping in organization because they derive from these activity sets. Many other factors involving behavioral, site formation, and disturbance processes, as well as processes of recovery and analysis, contribute to
depositional sets having more in common than the activity sets they originate from. Behaviorally, these may include the time of deposition within life-history of the artifact; size-sorting; curation and differential wear and breakage rates of artifact classes; the multipurpose nature of tool types, which can only be deposited with members of one activity set of which it is a part; and recycling of artifacts.

Other complications are presented based on archaeological decisions. Incomplete recovery of artifacts is a major potential issue in the field. In terms of analysis, classification of artifacts using attributes that are not functional ones can lead to functionally equivalent items in the same activity set being classified as separate types. Overly diverse artifact classification and misclassification of artifacts are also issues. These all must be considered when evaluating spatial analytic techniques and results.

The distinction between activity and deposition sets and areas is necessary because they may differ in their defining attributes and organization, in their relations with other entities, and in their behavioral meanings (Carr 1984). From a behavioral perspective, materials found together may have been produced or used together, but could also result from secondary refuse, storage for later use, or reflect a social rather than functional context. Fluvial transport, rodent activity, contemporary farming and other factors can also result in clustering. An area where tools and debris cluster could be a trash dump, storage area, social gathering area where multiple activities are performed, or the result of natural processes (Carr 1984).

Although post-depositional processes are also very important in the creation of archaeological assemblages and site structure, Winfrey (1991) has already addressed this background information and its relevance for and application to spatial patterning at the Wallace site. His findings are summarized in the next chapter.
**Phases of Site Use.** An important factor to be considered in spatial studies is the phase of site use. The kinds and amount of refuse generated, as well as their distribution patterns, are different in different phases of use. Stevenson (1985) has defined three phases of site use: the initial phase, the occupational or exploitational phase, and the abandonment phase. The initial phase includes activities that will be necessary for comfort and survival in the occupation phase and includes activities like shelter construction, or refurbishing in the case of reoccupation, and manufacture or repair of necessary equipment.

In the occupational phase, the emphasis shifts to processing and maintenance activities. Finally, in the abandonment phase, site-focused activities decrease and there is an increasing awareness of projected future needs. This could mean decreased care of facilities not likely to be used in the future and an increase in manufacture of items that would be needed at the next site. The abandonment phase is accompanied by an increased rate of discard. Items of value are unlikely to be left behind when sites are abandoned unless they are particularly cumbersome to travel with; most tools are carried (Yellen 1977). This model highlights issues involved in treating site debris as a single behavioral unit.

**Site Structure and Activities.** Sites are composed of facilities, surfaces, and items (Binford 1980). Facilities on a site direct the flow of people and goods. They are the “skeleton” around which activities are organized. The arrangement of facility features is the site framework. The organization of site structure includes strategies for labor organization and anticipated use of a location. Most variability in site structure is a function of differences in
reliance on food storage, seasonal weather variability, household population size, and the length of time activity areas are in use (O’Connell 1987).

Activity areas are defined as places, facilities, or surfaces where technological, social, or ritual activities occur, while activities involve an integrated set of tasks that are generally performed in a relatively uninterrupted sequence (Binford 1980). Certain tasks may be incorporated in multiple activities. For instance, cutting meat occurs in butchering and processing, as well as in food preparation and consumption.

Analyses and interpretations of patterns of distribution and organization have typically been based on three assumptions: activities are spatially segregated; activities often produce characteristic co-variant sets of artifacts and refuse in proportion to the frequency of the activity; and artifacts and refuse associated with an activity are deposited at or near the place of performance (O’Connell 1987). All of these assumptions have been shown to be flawed on some level.

Spatial segregation of activities is not realistic; some activities almost always take place in certain locations, but most vary at least somewhat, and the degree to which activities are spatially separated can vary based on the number of different activities being simultaneously performed by different people (Binford 1978). Some activities interfere with others, some take more or less space, more or less time, and more or fewer participants (Binford 1978). Yellen (1977) also points out the importance of the social context of a site, that is the relationship between areas belonging to an entire group and areas belonging to one family, in the spatial segregation of activities.

The second assumption, that activities produce covariant sets of artifacts and refuse, brings us back to the toolkit concept mentioned earlier. This assumption supports the inference
that objects found close together were used together in the same activity or set of activities, implying their association as a “toolkit”, or a set of tools used to execute a task.

Ethnoarchaeologists, however, have shown that activities do not necessarily produce co-variant sets of artifacts in proportion to the frequency of performance; and refuse produced by an activity is not necessarily deposited at the point of production. The relationship between tools in an archaeological “toolkit” is only related to social context (Yellen 1977).

There are four primary characteristics of activity areas that are relevant for spatial analysis: size, shape, artifact densities, and artifact compositions (Carr 1984). Carr adds areas of low-artifact density surrounded by zones of higher density; possible differences in internal homogeneity of artifact composition; and the crispness of borders.

In addition to factors related to the spatial distribution of activity areas, there are a number of factors that can affect the size, shape, and artifact density of an activity area itself. These include the facts that different kinds of activities may produce different amounts of debris, creating different densities of artifacts within the areas where these activities are performed; that different kinds of activities may require different amounts and shapes of space, producing activity areas of different sizes and shapes; and that different kinds of activity areas may be used repeatedly for different lengths of time (Carr 1984). Variation in size of artifact clusters is largely dependent on household population and length of occupation (O’Connell 1987). The longer a site is occupied, the more clusters will coalesce. Distinguishing between activity areas and discard areas may be difficult in some cases but can also be very important in interpreting spatial organization.

Other important factors are the degree to which an activity requires much time and space, produces much debris, and creates obnoxious byproducts, such as smoke or animal residues.
These factors may determine where the activity is performed, and that placement of an activity may constrain the size, shape, and artifact density of the area (Binford 1980; Carr 1984). The nature of the activity, prevailing weather conditions, composition of the household, and size and composition of the group present at the time also affect the distribution of activities (O’Connell 1987).

*The Contribution of Ethnographic Observation to Spatial Analysis*

The goal of archaeology is to understand the behavior of humans in the past, so ethnographic studies of human behavior and the material patterns that result provide important insights for examining spatial relationships between artifacts and features on a site. A number of studies were used to inform interpretations of the Wallace site, including Binford’s (1978, 1991) work with the Nunamiut, O’Connell’s (1987) work with the Alyawara, and Yellen’s (1977) field research with the !Kung. These groups all rely primarily on hunting and gathering for subsistence, as the inhabitants of the Wallace site did based on the available evidence. An archaeological example by Bamforth et al. (2005) highlights additional considerations in the use of ethnographic models.

*Types of Activity Areas Observed.* O’Connell (1987) defined six kinds of activities for the Alyawara: cooking, eating, talking, card playing, sleeping, and the manufacture and maintenance of tools and equipment. Aside from sleeping and hearth-centered activities like cooking or certain manufacturing tasks, activities were observed to occur anywhere in the
activity area. It was also noted that domestic activities were often repositioned in response to short-term changes in wind direction and velocity and air temperature.

Three kinds of activity areas were noted among !Kung: communal, nuclear, and special activity areas (Yellen 1977). There was no spatial distinction between subsistence and manufacturing activities; they occur in the same place.

*Outdoor Activities.* All three groups – Alyawara, Nunamiut, and !Kung – exhibit a common pattern in the organization of residential base camps; refuse is concentrated in clusters representing former locations of activity or secondary refuse areas (O’Connell 1987). Variation in size, content, and internal organization of these are based on the organization of subsistence, especially the relative importance of food storage; degree of seasonal weather variation, especially its effect on shelter needs; length of occupation; and size of the group occupying or using the area. Archaeologically observed patterns included gaps in artifact density marking paths to other parts of the settlement (O’Connell 1987). A site with two residences may have a zone of activity areas around each (Carr 1984). Hierarchical arrangement of these spaces may derive from social segmentation and organization of occupants, the degree to which some activities are contingent on others, and site topography.

It was also noted that tasks performed from a standing position, including animal butchering and hide working, create large, extensive debris scatters and that activities monopolizing large amounts of space were generally located away from areas used intensively on a day-to-day basis (Binford 1980). Also, children tend to go where they like and scatter debris, so their presence on a site can obscure some aspects of artifact distribution (Yellen 1977).
Use of Indoor Spaces. It should be noted that of the ethnoarchaeological research used, Binford (1980) is the only one whose fieldwork took place in a cold area. He noted that spatial organization is constrained by the limited amount of sheltered living space and that some activities are more permanently segregated than others. For example, sleeping and domestic activities are fairly permanently situated during an occupation. Both sleeping and storage are closely tied to main shelters. The size of beds has to do with the number of people in a bed, size of people, whether they sleep in clothes or under a cover, etc. (Binford 1980). The bedding area is often not exclusively for sleeping; it is conceived of as a private, personal area (Binford 1980). Beds as personal spaces creates a different distribution of material than might be expected from a bed used only for sleeping. Beds may have a small midden or waste deposit around them from eating and working in bed. Cached items are less common in domestic space, since these spaces are regularly cleaned, but small caches located in sleeping areas is an exception.

Also, the organization of space within a house tends to be based on heat and light. Craft and food preparation are best with light and warmth, while eating and sleeping need less light.

Hearth-Centered Activity Areas. When people are working at a task that requires use of a hearth, “they tend to carry out the task according to a spatial pattern which appears to be universal” (Binford 1980:149). Most sit obliquely to the fire, rather than facing it, since facing the fire would leave inadequate workspace. Binford observed that when a group of people is working around a hearth, the pattern differs from when it is only one person. Then, there is a circular arrangement around the hearth, farther back from the fire so that everyone has adequate workspace. Similar, but parallel, actions of multiple individuals creates overlapping distributions of artifacts.
There is almost always a vacant side of the hearth, depending on wind direction. Thus, there is relatively dense debris on one side of the hearth, and lower density on the other (Binford 1978). Binford (1978) suggests that organization and seating around an inside hearth would likely work the same way as with an outdoor hearth, although a lower density side could signal the location of sleeping areas and a toss zone, the area that objects tossed over the shoulder for discard tend to land in, is unlikely to occur. The drop zone, that is the area in which items tend to be dropped to the floor during activities, would be pretty similar for both indoor and outdoor hearths. Aside from eating and talking in a semicircle around the hearth, activities were typically conducted in a different place and in a different pattern of association (Binford 1978).

The distribution of artifacts around a hearth may indicate whether the activity took place in a house or outside (Binford 1980). Maintenance tasks undertaken inside a house tend to be different from outside contexts. Inside hearths are more likely to be stone-lined to prevent floor mats/skins from burning and to help keep ash concentrated in the hearth. With outside hearths, rather than changing the side of a hearth they are sitting on when the wind changes, people most often just build a new hearth (Binford 1980).

All of these observations depict only part of the behavioral aspect of the creation of archaeological sites. Post-depositional processes such as cleaning and refuse disposal, reuse, and natural processes complicate these models.

**Refuse Disposal.** Binford’s (1978) observation of a short-term occupation site revealed five acts that resulted in items occurring on surfaces within the site: dropping, tossing, resting, positioning, and dumping. Dropping typically occurred when elements were detached from an item held in the hand, the most frequently observed being in the context of cracking marrow
bones. “Fumble” dropping, an item accidentally dropped during the course of an action, was rare. Tossing was very common, most often occurring upon completion of some action, like cans after eating or articular ends of bone after marrow removal (Binford 1978). Tossing removes the item from its area of use. Dropped items were generally within 20 cm of the front or side of a man sitting cross-legged. Tossed items typically went over the shoulder.

Binford classified something as resting when the item was set down. This most often occurred in unpacking on entry to camp, temporary abandonment of a task due to interruption, or laying out tools needed to accomplish a general task. Positioning items was the category used if there was an attempt to aggregate several items, unobtrusively place them so as to not interfere with ongoing activities, and insure their easy retrieval at a future date, a very similar concept to “caching”. The difficulty with this category is that it assumes motive – temporary placement of an item in anticipation of future use.

Dumping occurred infrequently, but consists of accumulation of dropped or resting items, usually in a container, which is then picked up and removed, often to the periphery of the site, and dumped, resulting in a recognizable high density aggregate distribution. Dropped, tossed, and dumped items became part of archaeological record, but most items rested or placed were removed from the site (Binford 1978). Dropped items consisted of different kinds of things than tossed and both differed from dumped items.

Two types of acts resulted in reposition of items already at rest within the site: brushing aside, observed to occur before sitting down or in preparation for drawing a map in the dirt, and before butchering an animal; and searching, where items were moved while trying to find another missing item (Binford 1978).
Different disposal modes may be used in different sites or site types and may be culturally influenced. For instance, among the Eskimo, items commonly tossed or dropped at a site, such as articulator ends and bone splinters, are most often placed in small piles in specific places within a house, in anticipation of women cleaning up after (Binford 1978).

There is a regular set of relationships between the form and size of items and modes of disposal, and different disposal methods may be employed for the same items in different contexts (Binford 1978).

Items disposed of at the site show a clustered and peripheral distribution to the rest of the site (Binford 1978). Clusters are adjacent to the least used areas, implying biased disposal into low use-intensity areas, which in turn presupposes an overall understanding of use patterns of the site as a whole rather than a particular pattern present only at the time of disposal (Binford 1978). Binford misses an important possibility here, though. Rather than presupposing an understanding of use patterns, it is also plausible that use of an area for disposal would cause that part of the site to be used less for other activities, in which case activity locations are conditioned by disposal patterns rather than the other way around.

Among the Alyawara, O’Connell (1987) notes a strong pattern of size sorting, with large items tossed onto the nearest part of the midden and small items dropped at or near their location of last use, though they may subsequently be swept to the edge of the midden. Many small items remain in the activity area, though not necessarily at the spot they were dropped. Size sorting has a potentially very important effect on the association of objects in archaeological context, relative to their association in use (O’Connell 1987). For the Alyawara, soft drink cans have a very different distribution than their tabs, a function of the size sorting effect of refuse disposal.
Variation in size of midden area should be related to household population, length of activity area use, size of refuse items, and rate at which they are produced, although this variation is not well-controlled.

Refuse distribution patterns are controlled by two factors: redundancy in location of activities, which varies directly with association with facilities and inversely with temperature and wind direction variability, household composition and number of visitors; and size sorting in connection with refuse disposal (O’Connell 1987). The expectation is for minimal localization of debris categories, except for a high concentration of refuse in shaded or sheltered areas, although this expectation may not be met if some areas are cleaned, thus altering the pattern.

Cleaning can result in an activity area with lower artifact density than the surrounding area (Carr 1984). Whether an activity area is cleaned typically depends on the degree to which space is limited – if an activity cannot be moved, the area is likely to be cleaned; the degree to which the area is valued, whether due to the presence of a structure, shade or other protection, or even just a nice view; and the degree to which the refuse generated is messy or unhealthy. Yellen (1977) notes that fewer debris items are left in public areas.

Limits of ethnoarchaeological models. Although the observations and models just presented are very useful for interpreting some aspects of past human behavior and its contribution to the creation of archaeological sites, they only represent a portion of the processes responsible for the archaeological record as seen by archaeologists, the remainder being the processes that occur after the site is abandoned, or even between occupations or upon reoccupation. Some of the factors that may complicate these models include the size and composition of the group occupying the site; physical features of a site that may change the way
it is used, such as topography or vegetation; and the previous and future movements of the group (Bamforth et al. 2005). Spatial patterns can also be blurred by shifts in use of different areas of a camp during long occupations or upon reoccupation.

Other complications are added by the nature of ethnoarchaeological and archaeological research. Ethnoarchaeological research cannot provide appropriate analogs for some aspects of the archaeological record. For example, there are few modern examples that accurately reflect the kinds and amounts of sharp debris produced during flaked stone tool production (Bamforth et al. 2005). This activity may have created a need for more regular cleaning of archaeological sites, or at least of relevant activity areas, than occurs in modern hunter-gatherer camps.

In addition, archaeologists must account for the fact that excavations rarely include an entire archaeological site, so the observations and data are limited by the bounds of the excavation area, skewing interpretations towards the structure and activities present in the portion of the site that was excavated to the exclusion of the portions that were not.

As mentioned at the beginning of this section, a large number of natural processes also contribute to the creation of archaeological sites. These can include a blurring of spatial patterns due to erosion or rodent burrowing, the disturbance or destruction of artifacts and features through trampling by large mammals, and the removal of portions of a site through erosional processes, among many others. These and other natural processes are presented in more detail in James Winfrey’s (1991) thesis on the Wallace site, and therefore are not discussed in more detail here, although they are taken into account for the current analysis.
**Summary**

The theories and observations discussed here are important for understanding the spatial distribution of artifacts and features at the Wallace site because they speak to the behavioral processes that help in forming the archaeological record. The differences between systemic and archaeological context (Schiffer 1971) and the differences between activity sets and depositional sets (Carr 1984) are crucial contextual concepts for interpreting spatial patterns at the site. Phases of site use and other concepts behind the organization of site structure and activity areas are also important considerations. Finally, specific ethnographic observations and models based on them, such as Binford’s (1980) drop-toss zone model provide support for the key site structure concepts presented earlier in the chapter, as well as additional considerations that are not included in other models. As mentioned previously, specifics of post-depositional processes were not reviewed here because another research project (Winfrey 1991) has already addressed post-depositional processes relevant to the Wallace site. The conclusions of that research are discussed in the next chapter and are used as the basis for the current research.
CHAPTER 3: THE WALLACE SITE (25GO2)

LOCATION

The Wallace site is a small residential camp on private land in northeast Gosper County, Nebraska (Figure 2). The site is currently located in an agricultural field on the north bank of Plum Creek, a tributary of the Platte River (Figure 3), although a Proton magnetometer survey conducted in 1989 revealed that the Plum Creek channel has shifted, and it likely ran on the north side of the site at the time of occupation (Winfrey 1991). Artifacts discovered beneath 30 cm of clay in the northernmost excavation units support this conclusion. The site lies on a terrace in a steep-walled valley about ¼ mile west of where Plum Creek joins the Platte River floodplain. At the time of occupation, the creek ran seasonally, although damming of the creek to create Johnson and Phillips Lakes has since changed that. This location is typical for a Middle Plains Woodland winter habitation (Benn 1990).

The site lies in the Loess Hills Mixed-Grass Prairie ecological zone as defined by Johnsgard (2001), an area of rolling hills and ridges with intervening lower areas traversed by streams. This ecological zone extends across the southern half of Nebraska into the Flint Hills of Kansas, and it is characterized by an aeolian-deposited loess mantle overlying limestone and sandstone, which outcrops in areas where the loess has eroded away, although none of these outcrops exist in Gosper County. Gosper County, specifically, is underlain by the Pliocene-age Ogallala Formation, which consists of sandstone and conglomerate (Wahl 1981).
Figure 2  Google Earth image of the Central Plains and surrounding area

Figure 3  Google Earth image of the Wallace site
Soils in the site area are silty and well-drained, having been formed in the loess of the uplands (Chapman et al. 2001). Soil at the site is Hord silt loam, a dark grayish brown to pale brown soil typical of stream terraces along Plum Creek. These soils are generally nearly level or very gently sloping. Underlying material may also include a grayish brown silty clay loam (Wahl 1981), and downward leaching has created heavy calcium accumulations starting about three to six feet below the ground surface in this area (Johnsgard 2001:62), although neither of these was observed at the Wallace site, possibly because the excavation was not deep enough to encounter these deeply buried phenomena. Pocket gophers, ground squirrels, and prairie dogs all contribute to site disturbance in these soils, as have a number of now-extinct rodents (Johnsgard 2001).

The plant community of this ecological region is dominated by tall and mid-stature grasses such as side-oats grama and big bluestem, with an understory of low grasses, often blue grama (Johnsgard 2001). A number of perennial forbs are found here, and shrubs like chokecherry, buffalo currant, wolfberry, and poison ivy may occur in draws and ravines, while yucca may appear on hilltops or in uplands. Hackberry seeds were found in the Wallace site occupation level, indicating that the local woody vegetation may not have changed significantly since the time of occupation (Baenzinger 1990:83).

The nearby Platte River Valley would also have provided significant resources for inhabitants of the Wallace site. The valley is a major lithic source, with numerous gravels originating in Colorado and Wyoming having been deposited here by the river (Johnsgard 2001). Although seasonal flooding historically scoured the valley, inhibiting hardwood riparian growth, the river valley was a source for wood and plant resources that may not have existed in the immediate vicinity of the Wallace site (Chapman et al. 2001). Wetlands along the Platte are also
important habitat for waterfowl due to their location in a major migration corridor, the North American Central Flyway. Naturally, numerous other faunal species are drawn to the river valley as well.

Regional temperatures are largely known based on temperature and precipitation data recorded at the Canaday Steam Plant between 1961 and 1976 (Wahl 1981). The average temperature in winter in these years was 27 degrees F, and the average summertime temperature was 73 degrees. About 80% of the area’s precipitation falls between April and September, and it has an average of 25 inches of snow in the winter, accumulating in ravines and valleys (Johnsgard 2001:63). However, during the time of occupation, conditions on the Central Plains were likely wetter in summer and stormier in winter than today (Wedel 1986). The growing season in this part of Nebraska is about 150 days (Johnsgard 2001), and winds in this area are almost constant. The Wallace site’s specific location would have afforded the inhabitants protection from weather from the north and to an extent from the south.

SITE HISTORY

The Wallace site is named for Clyde Wallace, the farmer who discovered it on his land. It was identified as a Woodland period site in the 1950s, when Wallace sent a pottery sample to the Nebraska State Historical Society to be analyzed by Marvin Kivett (Winfrey 1991). The site area has been in cultivation since at least the 1940s, and through most of the site, the upper levels showed significant levels of disturbance from having been plowed. For some time, part of the site area was also used as a hog pen. The precise location of the pen in relation to the excavation area is unclear.
In 1988, excavation of the site was undertaken by the University of Nebraska, Lincoln, field school under the direction of Dr. Douglas Bamforth. A detailed account of the excavation methodology can be found in Winfrey (1991), as only the key points are summarized here. A thorough surface survey was undertaken, followed by excavation of a total of 46 sq m in four blocks, designated A-D (Figure 3). Test units measured 1 m x 1 m and were excavated in 10 cm arbitrary levels. The majority of the excavation was undertaken using trowels, with the exception that the plow zone levels were removed using shovels once the depth of the plow zone was determined. Excavated material was sifted through one of three types of screens depending on context: 1/8” dry screens were used for plow zone material; 1/16” wet screens were used for units containing features or in close association with features; and 1/8” wet screens were used for the remainder, with the exception of a sample of non-feature units that were 1/16” water screened “to gain a comparative sample of the non-feature deposits” (Winfrey 1991:66). Excavation reached depths of approximately 100 cm (Baenzinger 1990). Soil and flotation samples were taken from the features and other areas of the site for comparative purposes (Winfrey 1991:66).

RESULTS OF EXCAVATION AND PREVIOUS ANALYSES

Stratigraphy

The stratigraphy of the site is relatively straightforward. Cultural material was found throughout the dark grayish brown upper layer, while the underlying pale brown silt loam did not contain cultural materials (Winfrey 1991). Clay content increased on the northern edge of the
Figure 4 Excavation plan view showing block designations
Figure 5  East wall profile of Block D (from Winfrey 1991:75)

site, where the stream channel is believed to have been at the time of occupation. The transition between the cultural level and the subsoil is clearly visible. The cultural level reached a depth of 60-70 cm across most of the site with the exception of the north end. There, the transition drops to about 110 cm below surface (Figure 5). There was minimal soil development in the sediments on the site.

The top 10 to 20 cm of most units were in the plow zone. Although the plow zone contained artifacts, these artifacts were not in situ. Soil profiles also showed disturbance in the form of numerous rodent runs throughout the site.

*Site Dating*

Both relative and absolute dating techniques have been used to place the Wallace site in time. The presence of Valley Cord-Roughened and Harlan Cord-Roughened ceramics implies a date in the Middle Plains Woodland period. Archaeomagnetic dating from the hearth feature at the site resulted in a date between A.D. 500 and 600 (Winfrey 1991). In addition, two charcoal
samples were taken from the hearth and submitted to Beta-Analytic for radiocarbon dating. The first sample returned a determination of 1450 ± 60 radiocarbon years B.P. (Beta 28990), and the second a determination of 1600 ± 50 (Beta 28991) (Winfrey 1991:76). The calibrated calendar age range for these is A.D. 561-657 and A.D. 415-542, respectively (Bozell and Winfrey 1994).

Artifact Assemblage and Features

The artifact assemblage that resulted from surface survey and excavation includes ceramics, chipped stone debitage and tools, faunal remains, charcoal, shell, daub, fire-affected rock, and historic material.

Very limited ceramic analysis has been performed, but the attributes of the 35 rim sherds and 16 vessel bottoms have led to the identification of Valley Cord-Roughened, Harlan Cord-Roughened, and Ash Hollow Cord-Roughened types (Winfrey 1991). Vessel form is assumed to be conical with pointed bottoms and fairly straight sides. These traits and vessel types support a site date in the Plains Woodland period. All of the ceramics are cord-impressed and exhibit little or no rim decoration. Most are tempered with sand, but a small proportion is tempered with crushed calcite. Holes drilled through sherds have been interpreted as an attempt to extend vessel uselife by lacing cracked vessels together. A sample of the pottery was tested for the presence of opal phytoliths; none were found, indicating pottery was probably not used for plant material (Baenzinger 1990:111). Ceramics were thus likely used for bone grease manufacture or boiling meat.

The chipped stone collection includes debitage, projectile points, bifaces, and endscrapers, although some other tools, such as drills and perforators, are also present in limited
numbers. No formal lithic analysis has been previously performed, although it was determined that the almost exclusive presence of arrow points over dart points indicated a Middle or Late Woodland period occupation (Winfrey 1991). Results of chipped stone analysis performed for this thesis are included in Chapter 4, and further discussion of this observation can be found there.

Faunal remains found at the site represent numerous species, including bison, antelope and deer, canids, rabbits, small carnivores, birds, turtles, fish, and rodents (Winfrey 1991). Antelope and deer remains are the most frequent. Accumulations of both burned and unburned bones were found at the site (Baenzinger 1990). Bone at the site is highly fragmented, suggesting a high level of processing, with the most fragmented bone found at the lowest levels in the site. Baenzinger also suggests, though, that the small unburned bone fragments at the site may be a result of trampling. There is some evidence of carnivores having chewed on some bones, and the majority of bison remains, as well as all of the prairie dog bones, are extremely weathered. Interestingly, though, approximately 95% of deer and pronghorn remains showed little evidence of weathering. Based on this evidence, Baenzinger concluded that the deer and pronghorn remains are from different occupations than the bison remains. Later spatial analyses by Winfrey (1991; described below) demonstrate that the site represents a single occupation level, and he stated that a single season of use was more likely than reoccupation since reoccupation would be more likely to obscure the spatial patterns observed.

Craft production taking place at the site was primarily focused on bone ornaments, particularly beads. The beads present in the assemblage are made from the foot and leg bones of rabbits and other small animals (Bleed 1991). A number of bone fragments that appear to represent bead production failures are also present. Bleed used the bone bead data from the
Wallace site to demonstrate the potential for using event tree models in archaeology. Based on this analysis, he determined that the Wallace site inhabitants had an approximately 61% success rate in the manufacture of the beads. In addition to bone ornamentation, one bone awl tip was also recovered.

Features discovered during excavation included a hearth-centered depression about two meters across (Figure 6) with an intensely used hearth measuring approximately 60 x 40 cm. Archaeomagnetic survey and later spatial analysis revealed a larger depression around the smaller one, showing what appeared to be a house basin with a diameter of about six meters. The only other features identified at the site were two possible storage pits, one of which was evident only in profile in the trench. The other pit contained a large concentration of deer and bison bone, a small biface, and turtle shell fragments.
Bison Bone Chemistry and Carbon Isotope Analysis

Baenzinger (1990) used faunal material from the Wallace site excavation to conduct research into the resource environment around the site. Her analyses focused largely on bone chemistry, with carbon isotope and opal phytolith analysis used to support the bone chemistry data. Her goal was to evaluate the kinds of plants the bison were eating in order to determine the likely kinds of hunting locations used by inhabitants of the Wallace site and the ramifications for site selection based on hunting locations. Comparisons showed that other Plains kill sites and sites containing butchered fauna show similar characteristics; they are on bends in streams or creeks, at slump-rock areas, and at springs and headwater locations.

The bone chemistry indicates some bison at the Wallace site consumed primarily C3 plants, while others consumed mostly C4 plants, suggesting that a variety of herds are represented in the remains (Baenzinger 1990). Climate during the period of site occupation was wetter than today, so trees and C3 grass might have been most prevalent in the site area (Baenzinger 1990:135). Carbon ratios indicate bison could have been migratory and that some may have spent much of their lives in one region.

Both young and adult bison were present in the remains (Baenzinger 1990). The proportions may indicate the taking of cow-calf units. Mineral supplements are crucial for the survival of young bison, and females also require mineral supplements around calving time and in the fall and spring when cool-season grasses are increased in the diet. Lick/wallow areas are a significant source of these minerals. Thus, animals aggregate at lick/wallow areas during the colder months of the year, possibly extending into the spring and early summer, making these
areas a convenient hunting place. This means that in winter and spring it is relatively simple to predict the location of fauna, providing a predictable hunting location.

Prairie dog bones at the Wallace site show butchering marks that Baenzinger interprets as evidence that a prairie dog town existed at or near the site (Baenzinger 1990:92). Such a location is ideal for bison wallowing and as a lick for other fauna represented in the site assemblage. Locations of licks and wallows thus play an important role in predicting areas of faunal aggregation. This conclusion may have ramifications for the current research, since the presence of a lick/wallow area at the site at least partially accounts for the high levels of damage in the artifact assemblage.

Comparison of high utility and low utility skeletal elements indicate that butchering took place close to the site. Carbon isotope analysis and examination of opal phytoliths support the hypothesis that fauna were hunted near the Wallace site (Baenzinger 1990:95).

Spatial Analysis

Previous spatial analysis was undertaken by James Winfrey (1991). This thesis seeks to build on his work to answer new research questions. Winfrey’s examination of soil profiles and artifact distributions identified a number of post-depositional processes that were potentially relevant for the Wallace site, including sediment deposition, creek channel movement, rodent activity, agricultural disturbance, and trampling. Magnetometer survey undertaken at the site revealed an old stream channel just north of the excavation block. During excavation, the northernmost unit was found to contain artifacts oriented on the original slope with about 30 cm of clay over them, indicating that this stream channel was the location of Plum Creek at the time.
of occupation. Winfrey concluded that this fossil channel meant that the deposition of sediment over the occupation level was likely the result of creek flooding, explaining the accumulation of sediment at the site.

Winfrey’s (1991) conclusions about sediment deposition and channel movement did not, however, explain the distribution of cultural material throughout the darker soil stratum. To solve that mystery, Winfrey looked at size sorting of cultural material by level and found that the smaller material was relatively evenly distributed throughout the stratum, while the distribution of larger items increased sharply in levels 5 and 6, near the base of the cultural strata. Winfrey interpreted this vertical size sorting as a result of disturbance by burrowing animals pushing the smaller items through the accumulated overbank deposits. He also cites Erlandson (1978) and Bocek (1986) as support for his conclusion that horizontal movement of artifacts by rodents is minimal and that accurate identification of horizontal patterns is still possible despite significant amounts of rodent burrowing at the site. He further concludes “that all of the cultural material from the site was initially deposited at or near the contact between” the cultural strata and underlying subsoil (Winfrey 1991:96).

Next, Winfrey looked at agricultural disturbance on the site. The top approximately 20 cm of the site matrix are in the plow zone. Plowing greatly increases lateral displacement of artifacts within the affected zone. Winfrey discussed the fact that plowing would also increase visibility of large artifacts, making them more likely to be collected by the landowner and points out that this is precisely how the site was originally discovered. However, based on Winfrey’s previous analysis of rodent disturbance and size sorting, the cultural materials at this level were moved there by rodents and were already size-sorted. Thus, size-sorting was enhanced by
collection by the landowner, but the artifacts had already been moved from their culturally deposited locations.

Finally, Winfrey looked at potential trampling issues at the site, based on the area’s previous use for a pig sty. He concluded that affects from trampling by the pigs would be minimal since any *in situ* artifacts were well-buried due to sediment accumulation prior to use of the area for this purpose. Thus, it was “assumed that trampling has had little effect on the distribution of material” (Winfrey 1991:9).

Winfrey’s (1991) examination revealed that disturbance as a result of post-depositional processes at the site was primarily vertical. Based on that, he decided to collapse all excavation levels of each excavation unit into a single cultural unit for purposes of his analysis of horizontal distributions, which he used to attempt to determine the range of activities taking place, the duration and intensity of site use, and identification of features, activity areas, and refuse areas.

In terms of activities, Winfrey (1991) identified chipped stone tool production and maintenance, food preparation, hide working, craft production in the form of bone beads, and bone grease manufacture. The latter was based on the presence of severely crushed bone and a high proportion of charred bone. The presence of a structure was inferred from excavation and magnetometer survey results; the distribution of material observed by Winfrey supported this inference in that there were breaks in cultural material along the edge of the outer depression where the structure walls were expected to be based on the soil profile. Craft production appeared to be concentrated within the structure, south of the hearth. In addition, Winfrey identified Block D and the southern end of Block A as likely refuse areas because his analyses showed these areas to be more homogeneous in terms of the size and types of artifacts present. It should be noted, though, that this was based on artifacts as identified during excavation, before
chipped stone analysis. Chipped stone analysis and results are presented in Chapter 4 of this thesis, and the current results do alter the interpretation of Block D as a refuse area.

Winfrey (1991) concluded the site represents a single, relatively long-term seasonal occupation. The heterogeneous clumping of material is one of the reasons he cites for it being a single occupation, since reoccupation or long-term use of the site would make for a more homogeneous distribution. Also, he believed that reoccupation of the site using the same features is unlikely based on his cited ethnoarchaeological evidence. He concluded the site was a late fall or winter occupation because there was an interior hearth and near absence of fish bones. This conclusion is supported by Baenzinger based on the presence of hackberry seeds in occupation levels (Baenzinger 1990:83); hackberry trees bear fruit in the fall and dry berries stay on the tree through the winter. The presence of what appeared to be distinct refuse disposal areas suggested to Winfrey (1991) that the occupation of the site was fairly long-term.

Winfrey also deduced that the group occupying the site was small due to the structure size. Based on comparisons to other Middle Plains Woodland sites in Nebraska, he suggests that cold season sites may be determined by larger structure size and more refuse, while warm season sites may have smaller structures and less garbage as a result of shorter occupations. This pattern was also recognized by Binford (1991:46) in his ethnoarchaeological field research with the Nunamiut. In terms of mobility, Winfrey (1991) interpreted the presence of all elements of animals as suggestive that the resources were acquired relatively near the site, while he believed the range of lithic materials suggested the group either moved within a vast range or interacted between groups localized in several different areas of the Plains. This last conclusion is also re-evaluated in Chapter 4 of this thesis.
SUMMARY

The Wallace site has been disturbed by post-depositional processes that include disturbance by burrowing animals, the changing course of Plum Creek, sediment deposition from overbank deposits, and agricultural use of the land. Winfrey (1991) determined that trampling due to modern use of the site area for a hog pen had no affect on the site. The effects of trampling due to the location of a nearby bison wallow, as suggested by Baenzinger (1990), has not been evaluated. Despite this disturbance, previous spatial analysis led to the interpretation of the site as a single cold weather occupation by a small group. Archaeomagnetic and radiocarbon dating place the time of occupation between approximately A.D. 400 and 700.
CHAPTER 4: WALLACE SITE ANALYSIS

This chapter addresses the first part of the current research question, regarding site structure and behavioral processes at the Wallace site. There are two parts to the analysis. First, the chipped stone analysis section describes the analysis undertaken, as well as the goals, expectations, and results of the analysis. The spatial analysis section follows the results of the chipped stone analysis. That section describes the different aspects of feature and artifact distribution examined and details the resulting interpretations.

CHIPPED STONE ANALYSIS

Goals

The primary purpose of the chipped stone analysis was to develop a dataset that would be useful for spatial analysis, as well as for the comparative analysis to be undertaken in Chapter 5. This goal guided the chipped stone categories and definitions used, as well as the attributes recorded. Therefore, chipped stone artifacts have been categorized based on morphology and likely primary function, using categories that are common among other Middle Plains Woodland sites: projectile points, bifaces, scrapers, and “other”. The expectation is that the vast majority of tools will fit into one of the first three categories, and that the “other” category will consist primarily of tool fragments that are simply too small to allow for identification of tool type.
Categories and Definitions

The categories used in this analysis include debitage and the four tool categories just mentioned – projectile points, non-projectile point bifaces, scrapers, and other tools – since these are the categories used in most other analyses performed for Middle Plains Woodland sites on the Central Plains. No attempt was made to record usewear since only macroscopic methods were used for the analysis, so there is no category for artifacts that may have been modified by usewear only.

Tools are defined for this project as those artifacts that have been intentionally retouched. The intentionality of the retouch is judged based on the retouch consisting of long enough flake scars and uniformity of retouch to rule out usewear or edge damage. This definition was used due to the difficulty in distinguishing between retouch, usewear, and edge damage using macroscopic methods.

Projectile points were defined for this project as bifaces with a haft area that are used as projectile tips (Andrefsky 2005). Since the function cannot be confirmed based on the fact that none of the points were attached to shafts at the time of excavation, projectile points at the Wallace Site are defined as relatively small, triangular, bifacially flaked tools that fit the typical size and shape parameters of hafted points used in conjunction with atlatls or bows.

Non-projectile point bifaces, then, are bifacially flaked tools, larger than projectile points, that may or may not exhibit haft elements, although in the case of the Wallace site none did. It is plausible that some of the artifacts defined as bifaces would have become projectile points if they had been completed, but no attempt has been made to distinguish this. Bifaces are often multipurpose tools used for a number of purposes, including cutting, chopping, and similar
functions (Andrefsky 2005:31), but specific function is difficult to discern macroscopically and is not attempted for this thesis.

Morphologically, scrapers are defined for this project as flakes with steep retouch along one or more edges. Although the primary expectation is for unifacial flaking, bifacial retouch may be present and would not exclude an artifact from the category. Endscrapers are defined as those scrapers for which the distal end is used for scraping and retains the steepest edge angle, while for sidescrapers, the working edge is a lateral margin. Scrapers, as implied by the name, are often used for scraping other materials, most often animal hides.

The “other” tool category includes tools that do not fit in the projectile point, non-projectile point biface, or scraper categories and whose quantities by category were not large enough to warrant significant analysis as a separate group. The expected tool types in this category included drills or perforators, gravers or burins, and edge-modified flakes, based on the artifacts found at similar sites.

Drills and perforators are generally flake or bifacial tools bearing a tip used, often in a rotary motion, to perforate materials (Andrefsky 2005:255). Gravers or burins are flake tools produced by removing two flakes at right angles to each other to create a sharp edge (Andrefsky 2005:254). They may have served a number of purposes, including engraving, cutting and scraping, as cores, and as hafting elements, in which the pointed part of the tool was the part hafted to some sort of handle (Barton et al. 1996). Although microwear analysis would probably hone in on the likely uses of these potential perforators and burins, it is outside the scope of this project. Edge-modified flakes are defined for this project as flakes that bear clearly intentional retouch along one or more edges.
The debitage category includes stone flakes and shatter pieces detached during the reduction process, as well as the cores from which they were detached. Based on the size of the debitage collection, the expectation is that all of these categories would be well-represented at the Wallace site, indicating the occurrence of core reduction and tool manufacture processes.

Methods

Seven attributes were recorded for all of the tools, regardless of type: completeness, length, width, thickness, weight, raw material, and heat alteration. Completeness indicates whether length, width, and thickness measurements are complete, and the intended tool form is clear. It does not necessarily indicate that there is no edge damage to the piece. This attribute was recorded because for some aspects of the chipped stone and spatial analyses, differentiation between complete and broken tools was important. For example, in looking at the range of sizes of a given tool type, only complete tools are used since they are the only ones with complete measurements.

Length, width, and thickness are the maximum dimensions of the tool. For projectile points, the maximum width for all specimens is the shoulder width. All linear measurements were taken in millimeters using plastic-pronged digital calipers. These measurements are most useful for purposes of comparison to other sites.

All tools were weighed to the nearest 1/10 gram on a digital scale. Basic raw material type – chert, quartzite, etc. – was noted, as was the color. Colors were based solely on the analyst’s perception; Munsell color charts or similar aids were not used. The determination of raw material sources represented in the assemblage was not a focus of this project, but easily recognizable materials were documented by source as well. Approximately 57% of the raw
materials were identifiable, making the assemblage useful for analyzing some of Winfrey’s conclusions and for purposes of comparison to other sites.

Heat alteration was recorded based on the level of heat discoloration or damage. This attribute was recorded because the high level of disturbance at the site has caused significant movement of charcoal throughout the site. Since artifacts are somewhat more difficult to move than charcoal, heat alteration of chipped stone could be useful to the spatial analysis in that it may help in the identification of refuse areas or disturbed features.

Four levels of heat alteration were defined for this thesis: HA0 artifacts show no sign of heat treatment or damage; HA1 is for stone that is slightly discolored by exposure to high heat; HA2 is stone that is highly discolored and/or displays cracking, textural changes, and other similar signs of heat damage; HA3 was reserved for heavily damaged pieces that exhibit potlidding, breakage, and similar signs of intense or prolonged heat exposure. One potential issue in the determination of the HA1 level of heat discoloration is the fact that Smoky Hill Jasper, the most common raw material source represented in the chipped stone assemblage, first turns a shade of red that is macroscopically identical to red tones that occur naturally.

In addition to the other attributes recorded for all of the tools, neck width, haft type, shape, and any other potentially diagnostic attributes were documented for all projectile points, as well as whether the artifact was a preform or a finished point. Neck width was recorded initially because I believed it could be useful in defining the difference between arrow and dart points. Distinguishing darts from arrows is important for the Wallace site because the Middle Plains Woodland period marks the transition from exclusive use of atlatl darts to the use of the bow and arrow, and this transition is one of the defining features of certain phases within the
Middle Plains Woodland. However, cluster analysis based on the neck widths was inconclusive; there were not clearly differentiated clusters to represent arrows and darts.

Further research led to the use of shoulder width measurements to make the distinction between arrows and darts. Shott (1997) analyzed archaeological projectile points that were found still hafted and concluded that – of length, thickness, neck width, and shoulder width – shoulder width is the most important attribute for distinguishing between dart and arrow points. He determined that the shoulder width threshold between the two projectile types is 20.0 mm. Thus, that measure has been used to differentiate arrow and dart points in this analysis.

The difference between projectile point preforms and finished projectile points is that preforms are defined as small bifaces that do not display the finishing features of projectile points, typically lacking a finished haft element. Finished projectile points were further classified by the diagnostic point type they most closely resemble. There is no comprehensive and commonly accepted typology for Great Plains projectile points, so a number of sources were utilized to identify diagnostic types, or at least to determine resemblance to diagnostic types. This attribute is important because it allows comparison of these diagnostic types between sites using previously defined categories.

For non-projectile point bifaces, the primary attribute documented in addition to the standard attributes recorded for all tools was the biface stage. Bifaces were divided into four stages using Callahan’s (1979) guidelines. Callahan analyzes a number of features to place bifaces into stages, including edge angles, cross-section shape, lineal edge offset, regularity of outline, flake scar interval, and nature of flake scars. Expectations for the values of these different features were defined based on Clovis biface technology, and not all are necessarily
expected to hold for the Wallace site assemblage, but observation of a combination of these factors was used to place the bifaces into the defined stages.

Stage 1 bifaces exhibit clear evidence of minimal biface reduction. They are essentially unworked blanks intended for biface manufacture. Due to the potential for Stage 1 bifaces to be used in many ways other than biface reduction and the difficulty in recognizing them definitively (Bamforth 2007), it was decided that the Stage 1 category would be assigned only when there is clear evidence of minimal bifacial reduction. Stage 2 bifaces have sinuous edges and are flaked along the perimeters but not the entire surface of the biface. They exhibit a lenticular to hexagonal to irregular cross-section, irregular plan view, widely to variably spaced flake scars, and high variability in the nature of flake scars. They typically have some cortex or surface of the original flake blank in the center of one or more faces.

A Stage 3 biface exhibits facial flaking and has relatively straight edges. It is lenticular in cross-section and semi-regular in plan, while flake scars are closely to semi-regularly spaced with only moderate variability in the nature of the scars. A Stage 3 biface lacks fine finishing flakes. Lastly, a Stage 4 biface is a finished tool. It is characterized by straight edges, facial flaking, finishing flaking and may have a ground base. It is important to note, though, that classification of biface fragments is not completely conclusive. It is possible that, although a biface fragment appears to fall into one class, the reconstructed tool could fall into a different class (Bamforth 2007).

For scrapers, maximum edge angle was recorded for each piece, as well as noting which edge(s) exhibit retouch and whether the retouch is unifacial or bifacial. Edge angle was measured by impressing the steepest edge angle in clay, then placing the clay on polar grid paper to measure the angle. The edge angle is important because it can be an indication of what the
tool was used for. Hide-scraping is best performed with edge angles approaching 75-90°, while very acute angles are useful for cutting (Andrefsky 2005:161). Although Andrefsky (2005) cites 75-90° as the ideal edge angle for scrapers, the scraper assemblage at another Valley phase site, the Rainbow site (13PM91), exhibited an average working angle of 63° (Benn 1990). Thus, it was expected that the scrapers at the Wallace site may have somewhat more acute working angles than suggested by Andrefsky.

For the tools that fell into the “other” category, the additional attributes recorded were the location and type of retouch – unifacial or bifacial; the likely function of the tool or fragment, if distinguishable; and any other observations that could prove useful for determining the potential function of the tool.

In addition to the recording of these attributes, all of the tool fragments were compared to see if any could be fit together or were likely to have been from the same tool, based on raw material color and inclusions, size, and flaking patterns. I expected to find a number of refit pieces among the tool fragments, some of which could be separated by any amount of distance horizontally due to behavior by the site’s occupants or vertically due to the rodent activity and other disturbance at the site.

Attributes recorded for the debitage differed somewhat from those recorded for the tools, and included classification of the artifact as a flake, shatter, or core, and classification by size grade, presence or absence of cortex, material type, and level of heat alteration. Chipped stone debitage was separated into four size grades, which were defined during previous analyses performed at the site (Winfrey 1991). Size Grade 0 (SG0) includes all items under ¼”, Size Grade 1 (SG1) consists of items measuring between ¼” and ½”, Size Grade 2 (SG2) artifacts are between ½” and 2”, and Size Grade 3 (SG3) includes artifacts greater than 2”. Use of these
divisions was maintained for the current project so that results would be consistent with and comparable to those of previous analyses.

Presence or absence of cortex is a useful attribute because it gives an indication of the type of raw material source being used. For example, quarried raw materials will not typically have cortex, while raw materials in the form of river cobbles will have cortex on primary flakes. Even though, as mentioned previously, identification of raw material sources was not a focus of this thesis, this attribute could be useful for identifying activity areas, since the first stages of reduction of cobble sources would produce cortical flakes.

Material type and heat alteration were recorded for debitage in the same way that they were for the chipped stone tools and for the same reasons, although heat alteration was not recorded for SG0 flakes due to the difficulties of macroscopically identifying the signs of heat alteration on such small pieces. Once these artifacts were sorted by provenience and these attributes, debitage was weighed in groups, in which all pieces from a shared provenience with all other recorded attributes in common were weighed together.

The chipped stone analysis includes a number of tools and flakes that have been separated from their provenience information in the years since the site was excavated. Since Winfrey (1991) concluded that the Wallace site represents a single occupation, these artifacts are still relevant for determining aspects of technological organization and were included in the chipped stone analysis, though they are not included in the spatial analysis.

Results

Based on the above definitions, a total of 352 tools and tool fragments and 10,760 pieces of debitage were analyzed for this project.
<table>
<thead>
<tr>
<th>Point Type</th>
<th>Complete Points</th>
<th>Point Fragments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affinis Snyders</td>
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</tr>
<tr>
<td>Besant</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Non-diagnostic dart</td>
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<td>3</td>
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<tr>
<td><strong>Dart Total</strong></td>
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<td><strong>7</strong></td>
</tr>
<tr>
<td>Avonlea</td>
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<td>-</td>
</tr>
<tr>
<td>Scallorn</td>
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<td>7</td>
</tr>
<tr>
<td>Scallorn with concave base</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Scallorn - small</td>
<td>2</td>
<td>-</td>
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<tr>
<td>Unknown type</td>
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<tr>
<td>Preform</td>
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<tr>
<td>Non-diagnostic</td>
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</tr>
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<td><strong>Total Points</strong></td>
<td><strong>33</strong></td>
<td><strong>94</strong></td>
</tr>
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</table>

Table 1 Projectile points by type

**Projectile Points.** Thirty-three complete tools and 94 tool fragments fit the projectile point definition. Four of the complete points are preforms. Two of the complete points and six of the fragments lack provenience information. None of the fragments could be refit to any other fragments in the collection, indicating either that the missing fragments were too small to be recovered in the screen or, through either natural or cultural processes, that they lie in an area that was not excavated.

Twenty-eight complete points and 30 point fragments from the Wallace site have shoulder widths of 20.0 mm or less, making them arrow points based on Shott’s threshold (Table 1). One complete point and seven point fragments have shoulder widths over 20.0 mm, and thus can be defined as darts. Fifty-three of the point fragments were too fragmented to determine if their shoulder width was over 20.0 mm or not. Preforms were not included in this part of the analysis.
Seventy-three point fragments do not retain diagnostic characteristics. Two of the complete points are also considered non-diagnostic. One of these (Cat # 1853) has been reworked to the extent that the original form was not distinguishable and the new form did not fit any known definitions. The other (Cat # 1906) is poorly worked and extremely small; it may have been a toy. The preforms are also considered non-diagnostic since they are essentially unfinished points.

The majority of the points from the Wallace site resemble points of the Scallorn Cluster, as defined by Justice (1987:220-222). Scallorn Cluster points are defined as small corner-notched or expanding stem arrowheads with barbed shoulders and typically straight bases. They are broad to slender with straight to convex blade edges, though they may have incurvate blade edges. Some are serrated. This diagnostic type has a recognized geographic distribution that includes the southern Plains, the southeast half of Kansas and most of Missouri, placing it relatively near the Wallace site compared to other morphologically similar types. Johnson and Johnson (1998) have identified this point type as common in Valley phase sites.

The Scallorn Cluster includes both Scallorn points, dated to between AD 700 to AD 1100 in the Eastern Woodlands, and Sequoyah points, the most common form found at the Spiro site in Oklahoma and dated between AD 1000 and AD 1350. However, the differences between Scallorn and Sequoyah style points are minimal – Sequoyah are like Scallorn except they are often deeply serrated, often have elongated blades, and have somewhat narrower haft dimensions (Justice 1987:222). Issues distinguishing between the two have been cited by a number of researchers, possibly due to the lack of significant definitional differences between them, so for this project the term Scallorn is used to refer to the cluster, not the specific variety. It should also
Figure 7 Selection of Scallorn points demonstrating range of variation

be noted that the time frame given for these points is based on dating in Eastern Woodlands site and does not necessarily reflect their temporal distribution in the Central Plains.

Seventeen complete points and seven fragments are typical of the range of variation within the Scallorn definition (Figure 7). An additional four points and three fragments resemble the Scallorn definition except that they have a concave base. Another two complete points are smaller than the range defined for Scallorn but resemble the type in every other way. In all, these represent 79% of the complete points and 59% of the diagnostic point fragments.

The one remaining arrow-sized point (Cat #9999) resembles the Avonlea type. Avonlea is defined as a small, triangular side-notched arrow point (Kehoe 1961). The notches are typically low on the blade, and the corners of the typically concave base are rounded. Although
the point fits all other criteria of the type, the specimen from the Wallace site is slightly thicker than the normal range. Avonlea points are attributed to the period from A.D. 200 to A.D. 1300 (Dyck and Morlan 2001:125). Their geographic range, though, is typically thought of as being limited to the northern Plains.

The one complete dart point (Cat # 1028), as well as one of the dart point fragments (Figure 8), resembles the Besant type (Johnson and Johnson 1998). Besant points are named for the Besant phase on the Northern Plains, to which they are typically attributed, although they are found in other places on the Central Plains as well.

The remaining three dart point fragments resemble Affinis Snyders points, which are defined as broad-bladed, corner-notched points with bold shoulder barbs (Justice 1987). Affinis Snyders are a smaller version of Snyders points. The points in the Wallace site assemblage have
excurvate to straight blade edges and convex bases. Justice’s definition of these points includes a geographic range that does not extend further west than the Kansas City Hopewell area, but again, his research was based on the Eastern Woodlands.

**Non-projectile Point Bifaces.** There are 25 complete tool and 33 fragments in the Wallace site chipped stone collection that meet the criteria of the non-projectile point biface category. Of these, five complete bifaces and four fragments have been separated from their provenience information. As with the projectile points, no refits were discovered among the non-projectile biface fragments.

Based on the stage criteria presented earlier in this chapter, only one Stage 1 biface was observed in this collection (Table 2), while 16 complete bifaces and 13 fragments from the Wallace site belong to Stage 2. Six complete bifaces and 11 fragments are classified as Stage 3. Interestingly, only six biface fragments are classified as Stage 4; there are no complete Stage 4 bifaces in the assemblage.

**Scrapers.** There are 52 complete scrapers and fragments of another 45 scrapers in the Wallace site assemblage (Figure 9). All but one of the complete scrapers are endscrapers, retouched at the distal end, with 55% (n=28) of these also exhibiting retouch on one or both of the lateral edges. The sidescraper was retouched on one lateral margin. Although these tools fit

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<th>Biface Stage</th>
<th>Complete</th>
<th>Fragments</th>
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<tr>
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</tr>
<tr>
<td>Stage 2</td>
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</tr>
<tr>
<td>Stage 3</td>
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<td>6</td>
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<tr>
<td><strong>Total bifaces</strong></td>
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<td><strong>33</strong></td>
</tr>
</tbody>
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*Table 2: Wallace site bifaces by stage*
Figure 9  Range of variation in Wallace site endscrapers

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Standard Deviation</th>
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<tr>
<td>Length (mm)</td>
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<td>49.1</td>
<td>24.7</td>
<td>8.4</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>10</td>
<td>37.2</td>
<td>20.0</td>
<td>5.7</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>3</td>
<td>13</td>
<td>6.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Weight (g)</td>
<td>0.2</td>
<td>19.6</td>
<td>4.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Maximum edge angle</td>
<td>30°</td>
<td>85°</td>
<td>59°</td>
<td>14.4°</td>
</tr>
</tbody>
</table>

Table 3  Range of scraper measurements

morphologically into the scraper category, the majority of the tools are fairly small (Table 3), and the average edge angle is lower than typically expected for hide-scraping tools (Andrefsky 2005:161).

Other Chipped Stone Tools. There are a total of 17 complete tools, as well as 53 tool fragments, in this miscellaneous category. Morphologically, three of the complete tools and 11
of the fragments appear to be drills or perforators. Another two complete tools appear to be burins.

The remaining 12 complete tools and 29 of the fragments are edge-modified flakes. The intentionality of the retouch is based on the retouch consisting of long enough flake scars and uniformity of retouch to rule out usewear or edge damage. The last 13 tool fragments bear some form of facial and/or edge flaking, but they are too fragmented to be assigned to any particular category.

Chipped Stone Debitage

Of the 10,760 pieces of debitage at the Wallace site, 6823 artifacts are flakes, 187 are shatter, and six are cores (Table 4). Almost half of the debitage (46.49%) fall into the SG1 size category, while only one flake was large enough to be classified as SG3 (Table 5). The single SG3 flake likely indicates that raw materials were brought to the site in the form of primarily smaller cores and bifaces since larger pieces of raw material typically result in larger primary flakes.

In total, only about 11% (n=764) of the debitage retained cortex. This likely reflects the fact that over half the debitage (56% of SG1, SG2, and SG3) is Smoky Hill Jasper, a local material typically quarried from outcrops. It is also likely that some of the other chert debitage recovered are actually Smoky Hill Jasper, but due to the size or features of the particular piece it was not clearly recognizable as such. Smoky Hill Jasper is found in a wide variety of colors, ranging from greens to reds to yellows to browns with varying proportions of light or dark flecking. This does leave open the possibility that similar-looking exotic materials would be presumed to be Smoky Hill Jasper based on context. However, in this analysis, I believe that the
Table 4 Debitage type for pieces over 1/2"

<table>
<thead>
<tr>
<th>Debitage Type</th>
<th>#</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flake</td>
<td>6823</td>
<td>97.24%</td>
</tr>
<tr>
<td>Shatter</td>
<td>187</td>
<td>2.67%</td>
</tr>
<tr>
<td>Core</td>
<td>6</td>
<td>0.09%</td>
</tr>
<tr>
<td>Total</td>
<td>7016</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Table 5 Debitage by size grade

<table>
<thead>
<tr>
<th>Size Grade</th>
<th>#</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG0</td>
<td>3744</td>
<td>34.80%</td>
</tr>
<tr>
<td>SG1</td>
<td>5002</td>
<td>46.49%</td>
</tr>
<tr>
<td>SG2</td>
<td>2013</td>
<td>18.71%</td>
</tr>
<tr>
<td>SG3</td>
<td>1</td>
<td>0.01%</td>
</tr>
<tr>
<td>Total debitage</td>
<td>10760</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

actual percentage of Smoky Hill Jasper in the collection has been underestimated, and is likely significantly higher than reflected in the numbers of the apparent Smoky Hill Jasper artifacts.

There are a number of artifacts of a dark brown chert that are likely Knife River Flint or Scenic Chalcedony, both of which are found in Platte River gravels. Other recognizable materials include Flattop Chert, which would be available in the Platte River gravels near the site, as well as moss agate and Bijou Hills Quartzite. Florence Chert and Ogallala silicified sediment are also believed to be present, though these designations are more tenuous due to the analysts lack of familiarity with these sources. Cherts, quartzites, silicified sediment, and petrified wood from unrecognized sources are also present in the collection.

The final attribute recorded for the debitage was heat alteration. As mentioned previously, this attribute was not recorded for SG0 flakes due to the difficulty in assessing the extent of heat alteration on such small pieces. For the debitage larger than ½”, though, 46.68% (n=3275) exhibited no signs of heat exposure. Only 1448 flakes exhibited heat alteration at the HA3 level, and three-quarters of those are SG1 flakes. This could reflect one of two things.
First, it may simply reflect the fact that smaller flakes show extreme signs of heat alteration more quickly than larger flakes. Secondly, it could be due to the fact that this level of heat exposure causes breakage and these flakes have all broken into smaller fragments due to exposure.

Discussion of Chipped Stone Analysis Results

There are a number of interesting insights suggested by the chipped stone analysis. First, the ratio of projectile points and scrapers to other artifact classes is very high. Baenzinger (1990) has noted that bison remains from the site showed that bison were taken nearby, and the site itself may have been the location, or at least near the location, of a bison wallow. Hunting and hide processing were clearly important activities carried out at this location.

If the site does represent a single short-term occupation by a small group as suggested by Winfrey (1991), the number of large mammal remains found at the site is excessive. The minimum number of animals (MNI) calculated for the site include two bison, two deer, 17 antelope, and an additional six animals that could be either deer or antelope (Winfrey 1991:81). This is much higher than other short-term camps, even those that have been reoccupied, a point that will be discussed further in the next chapter.

The total lack of complete Stage 4 non-projectile bifaces is also interesting. The presence of fragments of a number of what appear to be completed bifacial “knives” means that there were finished bifaces on the site, so it is likely an indication that complete, finished tools were carried from the site at the time it was abandoned. The relative lack of cores, and very small size of the cores that are present, could mean that some of the earlier stage bifaces actually functioned as cores, although it may be an indication that the site’s occupants took cores with them when they moved on.
The use of primarily locally available materials may reflect an expedient strategy as defined by Nelson (1991), but it could simply reflect the distribution of these same materials throughout the territory in which the group lives. High quality cherts are widely available in this part of Nebraska due to the presence of the Niobrara formation, which is the source of Smoky Hill Jasper, and the nearby Platte River gravels.

**Spatial Analysis**

**Goals**

The goal of the current spatial analysis is to add detail to the previous analysis performed by Winfrey (1991), interpreting the current and reinterpreting the previous analysis in light of current research questions. The expectation is that this analysis will clarify the ways that site occupants used the site, particularly the behaviors that contribute to the site structure, and result in interpretations that can be used in comparison of the Wallace site to other sites.

**Methods**

Unless specified otherwise in the sections below, the analysis was completed as follows. The necessary data were collected from level forms, the artifact catalog, or artifact analysis spreadsheets and entered into separate spreadsheets specifically formatted to be used as shapefile attribute tables in ArcMap 10.0. Artifacts lacking provenience information were not included in the analysis. Also excluded were any artifacts recovered from the plow zone since they are likely to cloud, rather than clarify, the spatial results.
For most of the analyses performed, the final results are based on collapsing all levels of a unit into one analysis unit. This was done for a couple of reasons. First, less than 3% of the artifacts recovered during the excavation had point provenience data; the majority was recorded by level and unit, so that was the smallest possible unit of analysis for comprehensive spatial studies. In addition, Winfrey (1991) concluded in his analysis that, although there had been significant movement of artifacts by rodents and other natural processes, most of the movement was vertical, so a clearer picture of the site was gained by collapsing all levels of a unit into one analysis unit. After reviewing Winfrey’s data and performing a number of data comparisons using different strategies I opted to use this method as well. Once data were tallied by unit and joined to the excavation unit shapefile, numerous aspects of artifact distribution were visually compared. In some instances, these distributions were compared to distribution maps created by Winfrey (1991). Contour lines were not used in the graphic display of data since they can be visually misleading when the data is only provenanced to the 1 m x 1 m unit. 

Since Winfrey’s (1991) spatial analysis focused on post-depositional processes and interpretation of site formation from that perspective, the current analysis builds on Winfrey’s findings to draw conclusions about site structure and activity areas, and the behavior that may have led to the patterns seen. Data from the chipped stone analysis was used for the majority of the analyses, with the exception of the chipped stone artifacts lacking provenience information. For other artifact classes, Winfrey’s distributional data was used. Winfrey’s designations of Blocks A, B, C, and D were maintained for the current analysis.

Distributional maps generated for the current analysis include those of charcoal, debitage, and chipped stone tools. I was interested in the distribution of charcoal for a few reasons. First, reoccupation or long-term use of a site tends to obscure the boundaries of hearths, with
occupants spreading charcoal through their activities. Secondly, an absence of charcoal in highly used areas near hearths may indicate cleaning or ground covering. Finally, there is a possibility of identifying features that may not have been clearly identified during excavation because of rodent activity.

During excavation, charcoal was recorded by noting its presence on the forms for each level. The amount present was not quantified. Thus, charcoal distribution could only be spatially plotted based on its presence or absence. Making each excavation unit a single analysis unit was not particularly useful in this case, since charcoal was present in all but seven of the 46 units excavated. Thus, charcoal distribution was viewed in three other ways: 1) distribution by number of levels containing charcoal; 2) distribution by percentage of levels containing charcoal, an attempt to normalize for different numbers of levels excavated in different units; and 3) distribution based on presence or absence of charcoal in the lowest excavation level within the cultural deposit.

Next, I generated maps of the distribution of heat-altered debitage and tools. As discussed previously, four levels of heat alteration were recorded with HA0 being pieces that exhibited no signs of heat alteration and HA3 being pieces that were potlidded or otherwise broken due to extreme heat exposure; HA1 and HA2 levels fell between these. The expectation was for higher frequencies of heat-altered debitage in the units containing the hearth and in areas where hearth debris and other refuse were dumped because exposure to extreme heat is necessary to cause macroscopically recognized changes in stone, meaning the artifacts were likely in a fire or near one for an extended period of time.

Heat-altered debitage was plotted two ways. The first was a distribution of just the HA3 pieces, those most heavily and clearly heat-altered. These pieces would have had the
most prolonged exposure to extreme heat. The second was a weighted distribution. The value of each unit was calculated using the following formula:

\[
\frac{(\# HA3 \times 3) + (\# HA2 \times 2) + (\# HA1 \times 1)}{(Total \ number \ of \ HA0, HA1, HA2, \ and \ HA3)}
\]

It was expected that the weighted distribution would yield results very similar to that of the HA3 debitage alone, although a different pattern could shed light on practices related to cleaning or refuse disposal.

Next, debitage distribution was viewed by size grade and by the ratio of SG1 to SG2 flakes. Winfrey (1991) addressed vertical size sorting in his research, concluding that it was a result of rodent burrowing. He did not, however, look at horizontal artifact distributions to determine if horizontal size sorting was present. As discussed in Chapter 2, the presence of horizontal size sorting can indicate areas that have been cleaned because cleaning tends to result in the removal of larger items to refuse areas, leaving the cleaned areas with a higher proportion of small artifacts and fragments. The ratio of SG1 to SG2 flakes in the assemblage is approximately 2:1, so areas of the distribution map for which this ratio sharply differs will require explanation. Since there was only one SG3 flake recovered in the excavations, its usefulness in spatial studies is limited and it was not included in the spatial analysis.

After that, I looked at the distribution of chipped stone tools. Winfrey (1991) did look at the distribution of stone tools during his spatial analysis. However, analysis of the chipped stone artifacts had not yet been done, so his analysis included only those pieces recognized as tools in the field and relied on the field classification of the objects. During my chipped stone analysis, an additional 38 tools and tool fragments were found amongst the debitage and a number of tools were found to have been miscategorized in the field (Table 6). The spatial distributions of the
<table>
<thead>
<tr>
<th>Tool type</th>
<th>Identified in field, used by Winfrey (1991)</th>
<th>Identified and used for current spatial analysis</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectile Point</td>
<td>111</td>
<td>127</td>
<td>+ 14.4%</td>
</tr>
<tr>
<td>Non-projectile Point Biface</td>
<td>36</td>
<td>58</td>
<td>+ 61.1%</td>
</tr>
<tr>
<td>Scraper</td>
<td>60</td>
<td>97</td>
<td>+ 61.7%</td>
</tr>
<tr>
<td>Other Tools</td>
<td>107</td>
<td>70</td>
<td>- 34.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>314</strong></td>
<td><strong>352</strong></td>
<td><strong>+ 12.1%</strong></td>
</tr>
</tbody>
</table>

Table 6  Comparison of tool classifications and quantities used by Winfrey (1991) and those used for the current analysis

tools were thus rebuilt using the updated information to see if they still support Winfrey’s (1991) conclusions and to provide insight into potential activity and refuse areas.

The chipped stone tool distributions were also viewed in terms of tool completeness, in part to test Winfrey’s (1991) suggestion that Block D and the southern portion of Block A were refuse areas, as well as to indicate any other activity or refuse areas.

*Charcoal Distribution*

As expected, charcoal concentrations were noted in Block A in the units containing the hearth and the outside storage pit (Figure 10). Very little charcoal was present in the units to the north and west of the hearth units, although relatively high concentrations are present to the east and south. Interestingly, though, the unit to the southeast of the hearth also exhibited very relatively low levels of charcoal. The lack of charcoal in units surrounding the hearth is unexpected in such a confined space. It likely indicates some sort of ground covering in these areas, possibly hides or mats of some sort.

Charcoal was relatively evenly distributed throughout the area from the hearth to about 2.5 meters east and southeast of the hearth, which aligns with the size of the outer house basin depression distinguished by the archaeomagnetic survey and trench profile observations.
Figure 10  Distribution of charcoal, weighted by percentage of levels
Charcoal content then increases greatly outside of this circle. The break in between is likely indicative of the location of the walls of the structure and supports Winfrey’s (1991) conclusions based on artifact distributions.

There is a relatively high distribution of charcoal throughout the northeastern portion of Block A and throughout Block B, decreasing into the northern portion of Block B and with low amounts in the southern portion of Block C. Although no hearth features were uncovered during excavation of these areas, the charcoal could indicate an outside hearth somewhere in the vicinity. An outside hearth would be open to the elements and is likely to spread more due to human activity, which may account for the amount of charcoal in these units. However, it may just reflect the spread of charcoal from the pit through natural processes.

Another concentration is exhibited in the southern portion of Block D. Winfrey suggested that this area could be a refuse area. The relatively concentrated distribution of charcoal here, though, appears to be indicative of a hearth in or near the southern end of Block D.

*Distribution of Heat Altered Chipped Stone*

As expected, the greatest concentration of HA3 debitage was around the hearth, though fewer HA3 pieces were found to the north and west of the hearth than in the other surrounding areas (Figure 11). Most of the northern portion of Block A and the southern two-thirds of Block B have a moderate to high quantity of HA3 debitage. The southern portion of Block A shows a relatively small number of HA3 artifacts, while almost none exist in Block C or the southern half of Block D. In the northern half of Block D, there is a small concentration of HA3 artifacts.
Figure 11  Distribution of the most heat-altered debitage
This pattern becomes more pronounced when a weighted distribution is mapped, with the number of flakes in each category weighted by the heat alteration level as described in the Methods section (Figure 12). Heat altered chipped stone tools followed largely the same pattern as the debitage, although more of them were present in the southern portion of Block D than the northern portion.

Debitage Distribution by Size

Only 12 of the excavated units had more than 10 SG0 flakes in them (Figure 13). Of those, the largest concentration, almost 1700 flakes, came from three units just southeast of the house basin, south of the storage pit. The second largest grouping of SG0 flakes includes about 320 flakes in the north end of Block D.

The only other sizeable concentration was excavated from the units just southeast of the hearth. The vast majority of these 150 SG0 flakes came from the unit adjacent to the hearth, which is also the unit in which Winfrey (1991) noted the largest concentration of bone beads (Figure 14). This concentration of SG0 flakes and bone beads are within the smaller but deeper depression surrounding the hearth. Another approximately 150 SG0 flakes came from the far south end of Block A. There were no other units or groups of units with more than 50 SG0 flakes. These units with smaller frequencies of SG0 flakes are likely a result of minor tool maintenance or simply redistribution of these smallest artifacts through site occupants’ activities or later post-depositional processes.

SG1 debitage was distributed throughout Block A (Figure 15). The highest density was in the northern portion of the block, in the area southeast of the house. The house had relatively even distribution inside, with slightly higher numbers about 1.5 m south-southeast of the hearth.
Figure 12  Distribution of heat altered debitage, weighted by heat alteration level
Figure 14  Distribution of bone beads in Block A (Winfrey 1991)

The density decreases steadily moving from the north to the south of Block A and moving from the northern part of Block A north through Block B. This probably indicates an activity area in the northeastern portion of Block A.

There is a clear break in debitage in Block C and the southern portion of Block D, with density increasing somewhat in north Block D. In and of itself, the implications of this pattern are not entirely clear, though this information will be coupled with distribution of other artifact classes later in this analysis.

The larger SG2 debitage was distributed somewhat differently than SG1 (Figure 16); its distribution was definitely not as smooth as the distribution of SG1. Within the house, the SG2
Figure 15  Distribution of Size Grade 1 debitage
Figure 16  Distribution of Size Grade 2debitage
distribution was very similar to the charcoal distribution. Few larger flakes were recovered from the units to the north and west of the hearth. A larger cluster of SG2 debitage was found just east of the house basin, in the unit that showed a significant drop in charcoal likely to represent the wall of the structure. As with SG1, there was a break in Block C and the southern end of Block D with increased numbers in the northern portion of Block D. The lack of both small and large flakes through this area may simply mean that this area was not used for tool manufacture or maintenance or for dumping refuse from those kinds of activities.

Distribution of the SG1 to SG2 ratio (Figure 17) clearly shows that there are far fewer SG2 flakes in the areas north and west of the hearth, in the units immediately north of the outside storage pit and in Block B. Charcoal distributions already suggested that the area north and west of the hearth may have been covered, which could also account for the relative lack of larger debitage. For the units around the storage pit and in Block B, this may reflect cleaning of the possible activity area.

There is also a large concentration of debitage immediately east of the house basin, in which SG2 debitage is far more prevalent than SG1. This is likely a refuse area, potentially the location where refuse cleaned out of the house was placed due to its location essentially against the outside of the house wall.

Despite the relative break in flakes in Block C, there are more than twice as many SG1 flakes as SG2 flakes in that block. This is, however, approximately the same ratio in which the flakes are present in the assemblage as a whole, so this does not seem to reflect any size sorting of materials.

The distribution of debitage by size in Block A is very similar to Winfrey’s (1991) distribution of bone by size (Figure 18). As with the debitage, all sizes of bone drop
Figure 17  Ratio of Size Grade 1 to Size Grade 2 debitage
Figure 18 Distribution of bone in Block A (Winfrey 1991)

significantly on the north and west sides of the interior hearth. The bone also showed the same drop in density at the northeastern corner of Block A as the debitage. Both SG2 bone and debitage were significantly less dense than SG1 bone and debitage in the units encompassing the outdoor storage pit and in Unit 61 (10N 97E). This size-sorting may be due to cleaning of this area.
Chipped Stone Tool Distribution

The spatial distribution map created using updated data from the chipped stone analysis showed the highest quantities of chipped stone tools in the units within the house basin, just east of the house basin, and in the northern part of Block D (Figure 19). Although this means the areas are being used, a more complete picture comes from looking at the individual artifact classes.

The biggest change between Winfrey’s tool distributions and the current one was in the non-projectile point biface class. Winfrey had shown only one biface in the area around the hearth (Figure 20), whereas the current analysis shows four bifaces or biface fragments in the unit containing the majority of the hearth, with one biface in each of the units to the north and south and one to the west (Figure 21). There are also more bifaces in the area to the southeast of the house than previously noted.

Among scrapers, the distribution is similar to what Winfrey showed, although the overall numbers are higher (Figure 22). The highest density of scrapers and scraper fragments is still in the area immediately east-southeast of where the house is believed to be. The projectile point numbers, and thus distribution, are nearly identical to Winfrey’s findings, with a higher density of points inside the house than outside of it (Figure 23). The distribution of arrow-size points and dart-size points were also compared. Only one fragment of a dart-size point was found in the house basin, where the arrow points were most common, and all of the dart-size points were in Blocks A and B. The presence of both dart and arrow points inside the house basin implies that both types of technology were being used at the same time, since it is unlikely that reoccupation of the site would include use of the same house basin.
Figure 19  Distribution of chipped stone tools
All tool types are also represented in Blocks B, C, and D. There are no significant spikes or drops in tool density in Blocks B or C. The northern part of Block D has higher concentrations of all tool types than Blocks B or C. Scrapers in particular represent a greater proportion of the assemblage in Block D than in any other area. This may signify use as either an activity area or refuse area.

*Distribution of Chipped Stone Artifacts by Completeness*

The distribution of chipped stone tools was also viewed in terms of the completeness of the tools (Figure 24). Winfrey suggested that Block D may have been a trash dump. Interestingly, though, over 50% of the tools in Block D are complete tools, including 12 of 19
Figure 21 Distribution of non-projectile point bifaces
Figure 22  Distribution of scrapers
Figure 23  Distribution of projectile points
Figure 24  Distribution of chipped stone tools by percent unbroken
scrapers, 4 of 9 bifaces, and 4 of 8 projectile points. In fact, it is the only excavation block with more complete tools than tool fragments. Although it is plausible that the inhabitants of the site may have discarded unbroken scrapers, it is less likely that complete bifaces and projectile points would end up together in the trash pile in such high proportions. After Block D, the northern portion of Block A has the highest proportion of complete tools. The southern portion of Block A is actually the part of the site with the lowest proportion of complete tools, supporting Winfrey’s conclusion that this area was used for dumping refuse.

Discussion of Spatial Analysis Results

The level of post-depositional disturbance at the site makes it difficult to assess some of the factors discussed in Chapter 2, as does the fact that most artifacts are only provenanced to the 10 cm level and unit. Thus, certain aspects of spatial analysis proved impossible. Overall, however, the analysis was successful in further defining the site structure and adding detail to the previous analysis.

Block A. The current analysis supports Winfrey’s conclusion that the northwestern portion of Block A was the location of a structure. Based on the current analysis, the doorway of the structure was likely on the southeast side of the house. The profile of the north wall of Block A shows the edge of the inner depression of the house basin in 13N 97E (Unit 48). Unit 29, immediately west of Unit 48, had one of the few concentrations of SG0 flakes on the site, as well as a significant concentration of bone beads which are of similar size. Light is very important for such fine craftwork, and a location near the doorway would provide the most light of any indoor area. This interpretation is supported by the relatively uniform charcoal and debitage
distributions in the area south-southeast of the hearth, reflecting a low likelihood of a semi-permanent structure covering in this area.

Winfrey (1991) suggested that this site was a winter occupation based on the faunal remains. This is supported by the presence of a large interior hearth since it would create a very warm indoor space. A doorway on the south or southeast side of a structure also makes sense for a cold-weather occupation because it would bring in the most winter sunlight, providing both light and warmth.

The collection of the relatively large quantities of the smallest bone and stone artifacts in the deeper inner depression around the hearth indicates that this area is not as disturbed as some other areas of the site, since artifacts of this size are those most easily moved. This concentration could represent a drop zone similar to those defined by Binford (1980), although it could also be a result of items collecting in the more deeply depressed part of the house. It is likely that this inner depression was not cleaned as regularly as other parts of the house basin, if it was cleaned at all. This is supported by the relatively high quantities of SG1 and SG2 debitage in the units immediately south and southeast of the hearth as well. The close proximity to the hearth may be a factor in the lack of cleaning of this area.

The units opposite the hearth from the doorway (Units 63 and 64) had a number of inconsistencies from the other units in the north half of Block A. Unit 64 was one of the few units with absolutely no charcoal recorded, while Unit 63 had a limited amount of charcoal in just one level. Given how easily charcoal is tracked or blown around an area, it is likely that these units had some kind of covering over the floor. This was probably the sleeping area.

For the most part, a lack of artifacts in Units 63 and 64 support this idea. These units have the lowest quantities of bone within the house and have the lowest quantities of SG2 and
SG3 artifacts in all of Block A. Unit 64 has the highest number of tools of the excavated units in the house and is the only unit with more complete tools than tool fragments. These tools include a mix of complete and fragmented scrapers, projectile points, a biface, and an unidentifiable tool fragment. There are two possible explanations for this. Binford (1980) indicated that, in his ethnoarchaeological fieldwork, sleeping areas were often used as personal space. This may be the case at the Wallace site, in that these tools may have been stored in this area and accidentally left behind when the inhabitants moved on. Conversely, it may be a result of abandonment behavior; they may have been tools that were not deemed likely to be necessary in or on the way to a new camp and may have been left behind intentionally.

Immediately east of the house basin is a concentration of SG2 chipped stone, with some SG1 pieces. The location, essentially against the wall of the structure, and the size-graded nature of the assemblage indicates that this was likely a refuse area. This may have been where items swept out of the structure were placed.

The area southeast of the house basin in Block A, around the storage pit, appears to have been a multi-purpose activity area. The high proportion of SG1 to SG2 flakes compared to other portions of the site may reflect cleaning of this area, with larger debris being removed to a refuse area. It is likely that this was a social space, based on its location just outside the structure, and a range of activities were performed here. All tool types found on the site were represented in this area.

Finally, the southern portion of Block A was previously interpreted as a refuse area (Winfrey 1991). This conclusion is supported by the current analysis. The southern portion of Block A is has the lowest proportion of complete tools of any part of the site, as well as a relatively high proportion of broken flakes.
The size-sorting between activity and refuse areas noted by O’Connell (1987) were not apparent in the different areas of Block A. This may, however, be due to a combination of abandonment behavior in which cleaning does not happen towards the end of an occupation, and the fact that the occupation was relatively short-term.

Blocks B and C. This analysis did not provide any conclusive information about Blocks B and C. This may, in part, be a reflection of the fact that they contain fewer excavation units than Blocks A and D. It seems most likely, though, that this area was not used often or intensively by site occupants. Even the smallest artifacts, most often left behind when an area is cleaned, are minimal in these units, so it is unlikely that the lack of artifacts is due to cleaning. It does appear that the activities of the Block A outdoor activity area spread into the southern portion of Block B to some extent, though this could simply be due to the spread of artifacts and charcoal by site use and post-depositional processes.

Block D. Block D was the other area of the site, in addition to the southern portion of Block A, that Winfrey (1991) concluded was a refuse area. However, that does not seem to be the case based on the current analysis. Block D is the only area of the site with more complete than incomplete tools, more than in the house basin or the activity area outside of it. Over half of the tools in Block D are scrapers; twelve of them are complete tools. It seems more likely that this area was used for other activities.

Archaeomagnetic studies performed in 1989 did not reveal any other likely house basins in the area included in the study. This, combined with the likelihood that the creek ran along the north end of Block D at the time of occupation, essentially rules out any likelihood of Block D
representing an activity area associated with another house. Thus, it seems likely that this area was used for activities that warranted some distance from the living space. The fact that the creek channel would have run just north of this area at that time may have made this an attractive area for outdoor activities when weather allowed it. For an activity like hide-scraping, the creek may also have been a convenient way to get rid of byproducts of the activity.

Activities that require large amounts of space, particularly activities that necessitate standing, are often located away from more intensively used areas of a site (Binford 1980; Carr 1984), as are activities that typically involving standing since they tend to take a lot of space (Binford 1980). Hide scraping activities fit both of these scenarios and the extremely high number of scrapers in Block D supports the interpretation of the area as being used extensively, though not necessarily exclusively, for hide-scraping. The faunal remains at the site represent a minimum of two bison, two deer, 17 pronghorn antelope, and another six animals that could be either deer or antelope, also supporting the need for a large amount of space for hide-scraping activities.

It is also possible that a hearth was at one time present in or near the south end of Block D. No feature was observed in the excavation units, but a number of rodent runs may have obscured the feature or brought the charcoal in from a unit close by. This could be an indication of an earlier occupation at the site, since subsequent occupations would not likely reuse the same features, instead obscuring them through the use of the area for other purposes. A more homogeneous distribution of artifacts in this area than in other parts of the site supports this possibility.
SUMMARY OF CONCLUSIONS

The technological strategies used by site inhabitants likely included the curation of finished bifaces, carrying these tools with them to another site. Projectile points and scrapers, on the other hand, were left behind in large numbers, potentially signaling a decreased need for them at the next site or an awareness of available raw material resources at or near the next camp location.

Many of the projectile points were found in the house. There are a couple of possible explanations for this. This could be attributed to either abandonment behavior, a minimal effort attempt at caching, or simply the collection of points in the inner depression around the hearth. The latter seems unlikely given that the points were dispersed fairly evenly through the house.

Technological analysis indicates the presence of both dart- and arrow-size projectile points in the house structure which means that, assuming the site was not re-occupied using the same house, both the atlatl and bow and arrow were in use concurrently. The relative lack of dart points compared to arrows may mean that the atlatl was falling out of favor, though it is also possible that the occupants took dart points with them when they abandoned the site – only one dart point was found in the house basin.

The current analysis supports the presence and location of the house basin as defined by Winfrey (1991). The area to the north and west of the internal hearth was likely covered with skins or mats, and was probably used as personal space and a sleeping area. The door of the structure appears to be on the southeast side of it, which would provide winter light for the bead-making and fine flintknapping work that was taking place just inside the door. A sizeable, multi-purpose activity area lies outside the house to the east and southeast. This activity area spreads
into the southern portion of Block B, as well. Immediately east of the house basin is a sizeable refuse pile, likely the area where refuse was placed when it was cleaned out of the house.

Winfrey’s interpretation of Block A as a refuse area is also supported by this analysis. It does not, however, wholly support his inference that Block D was a refuse area. Block D has the highest proportion of complete tools, and a very high number of scrapers. It was likely another activity area used for hide-scraping, as well as other activities. Since hide-scraping is an activity that takes a lot of space and is messier than some other tasks, it is often performed away from the main living areas of a site (Binford 1980; Carr 1984). There is also potential for a hearth near the southern end of Block D, though the evidence for this is more limited.

Winfrey’s (1991) conclusion that the site represents a single occupation is also not supported by the current analysis. The high frequency of charcoal in areas of Blocks B and D where no features have been identified and that do not otherwise appear to be refuse areas could indicate the presence of earlier hearths that have been obscured by subsequent occupations. In addition, the quantity of large mammals represented in the faunal remains - two bison, two deer, 17 pronghorn antelope, and another six animals that could be either deer or antelope – is quite high for a small group’s seasonal camp, particularly given that 36 smaller invertebrate species are also represented. Baenzinger’s (1990) analysis of the site’s faunal collection also noted differential weathering on faunal remains, indicating that some were exposed on the ground surface substantially longer than others, which is also a sign of reoccupation.

It should also be noted that it is not known if areas south of the excavation area were used by site occupants because the modern channel of Plum Creek now runs through that area. It is possible that other houses could have existed there during the Middle Plains Woodland period, when the creek was instead running along the north end of the excavation area.
CHAPTER 5: THE WALLACE SITE IN CONTEXT

In the previous chapter, a clearer picture of the Wallace site emerged based on chipped stone and spatial analyses. The interpretations drawn can now be used to compare the Wallace site to other Middle Plains Woodland sites to place the site within a larger cultural and geographic context and determine its relationship, if any, to other relevant sites. To test the utility and accuracy of the defining features of the cultural taxonomic phases, sites from each of the phases discussed in Chapter 2 are compared side-by-side without regard to which phase they are assigned. The results of these comparisons are then used to evaluate the utility and limits of the cultural taxonomic system.

COMPARING MIDDLE PLAINS WOODLAND SITES

Goals

The goal of the comparisons is to evaluate the utility and seeming accuracy of the cultural taxonomic system currently in use. To do this, I examine how the compared sites are grouped together when viewed from the perspective of a number of different attributes, which sites have the most in common based on all of the different attributes, then compare that to the actual cultural phase groupings to which the sites have been ascribed.
<table>
<thead>
<tr>
<th>Site</th>
<th>Site location</th>
<th>Phase</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow (13PM91)</td>
<td>Plymouth County, Iowa</td>
<td>Valley</td>
<td>Benn 1990</td>
</tr>
<tr>
<td>Renner (23PL1)</td>
<td>Platte County, Missouri</td>
<td>Kansas City</td>
<td>Roedl and Howard 2005</td>
</tr>
<tr>
<td>Ash Hollow Cave (25GD2)</td>
<td>Garden County, Nebraska</td>
<td>South Platte</td>
<td>Champe 1946</td>
</tr>
<tr>
<td>Wallace (25GO2)</td>
<td>Gosper County, Nebraska</td>
<td>Valley</td>
<td></td>
</tr>
<tr>
<td>Massacre Canyon (25HK13)</td>
<td>Hitchcock County, Nebraska</td>
<td>Keith</td>
<td>Kivett 1952</td>
</tr>
<tr>
<td>Feye (25PT9)</td>
<td>Platte Valley, Nebraska</td>
<td>Valley</td>
<td>Kivett 1952</td>
</tr>
<tr>
<td>Doyle (25RW28)</td>
<td>Red Willow County, Nebraska</td>
<td>Keith</td>
<td>Grange 1980</td>
</tr>
<tr>
<td>Schultz (25VY1)</td>
<td>Valley County, Nebraska</td>
<td>Valley</td>
<td>Hill and Kivett 1940</td>
</tr>
<tr>
<td>Stelzer (39DW242)</td>
<td>Dewey County, South Dakota</td>
<td>Sonota</td>
<td>Neuman 1975</td>
</tr>
</tbody>
</table>

Table 7 Sites used for comparisons in this chapter

Methods

A total of nine sites are used for the comparisons in this chapter, including the Wallace site. The reason for using nine sites is to compare a range of sites that include sites that are both geographically close and geographically distant within the Central Plains, as well as incorporating sites from each of the cultural taxonomic phases most closely related to the Valley phase. The sites chosen thus include the Wallace site, three other Valley phase sites, two Keith phase sites, and one each from the Kansas City Hopewell, South Platte, and Sonota phases (Table 7). Six of the sites are located in Nebraska, plus one each from Missouri, Iowa, and South Dakota.

Although there are admittedly sample size and other potential issues with comparing just nine sites, this is in part a function of the low sample size of Valley sites overall. Of 26 Valley focus sites tested or excavated in Nebraska as of 1994 (Bozell and Winfrey:126) only eight, including the Wallace site, are occupation sites with available datasets, four of which are being used here. Of the remaining 18 sites, six are burials, four are unpublished, three are reported
without artifact counts and/or separation of multiple cultural levels, one consists of intrusive Valley pottery in a non-Plains Woodland cultural level, one is missing pages with important data, and three could not be obtained. It is not clear when the unpublished sites were excavated, but 19 of the remaining 22 sites were excavated prior to 1960. Based on these types of issues, the specific sites chosen for the analysis are admittedly biased towards those sites with specific data available. In particular, I used occupation sites for which reports could be obtained, artifact counts were reported in detail, and a significant amount of the site was excavated, meaning more than a few square meters.

The criteria used for the comparisons are based primarily on the criteria used to define the taxonomic phases to which the sites are assigned. These include occupation type, ceramic styles, the presence of dart or arrow points, projectile point styles, and the primary species represented in the faunal assemblages, all of which are included in the definition of one or more of the applicable taxonomic phases. In addition, ratios of different artifact and feature categories are compared to identify any other trends or similarities between the sites, based on the idea that sites made up of similar proportions of features, artifacts, and other elements could reflect similar cultural ideals or ways of life. In addition, ratios can control for differences in overall feature and artifact quantities that are the result of differently-sized excavation areas and sites. The expectation, however, was that the ratios are more likely to reflect the types of activities emphasized at a given site rather than any potential cultural differences.

For each category, the data from each of the nine sites is compared, and the sites were placed into groups based on the results of that individual category. Once groupings were formed for each of the categories, all of the groupings were examined to determine which sites were most often grouped together. A modified Venn diagram was then created, with each site
overlapped somewhat with the two sites that it was grouped with most often. The expectation was that each site would have traits in common with each of the other sites and that the resulting Venn diagram would illustrate a continuum of cultural adaptations, rather than strict taxonomic units.

All information used for the comparisons is based on the interpretations of those who published information on the site, not on any new analysis performed during the current project, with the obvious exception of the Wallace site. The exception to this is the category for the presence of arrows or darts. For some of these sites, points were not interpreted in the reports as being arrow or dart points, so the distinction was made based on the measurements given, using the same criterion as used for the Wallace site – an artifact with a shoulder width more than 20.0 mm was categorized as a dart, while an artifact with a shoulder width of 20.0 mm or less was categorized as an arrow.

In addition, the ceramics are all listed as named in the site reports – analyzing the differences between the defined ceramic types is outside the scope of this project – and no effort was made to distinguish if these types reflect real cultural differences. For example, the only defined difference between Harlan Cord-Roughened and Massacre Canyon ceramics is the type of temper (Grange 1980), a distinction that may have more to do with a difference in resource availability than with any real cultural difference (Logan 2006), but the types are listed separately based on how they were reported for the sites in this analysis.

It should also be noted that four of the sites used for the comparisons – sites 3, 5, 6, and 8 – were excavated between 1930 and the mid-1950s, and the methods used for those sites are somewhat unclear. It is not known, for instance, whether excavated matrix was screened or not, which could have ramifications in terms of the numbers of small artifacts recovered.
<table>
<thead>
<tr>
<th>Site</th>
<th>Occupation type</th>
<th>House basins</th>
<th>Hearths</th>
<th>Storage pits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reoccupied long-term camp, warm season</td>
<td>5</td>
<td>7</td>
<td>Unknown</td>
</tr>
<tr>
<td>2</td>
<td>Permanent village</td>
<td>Unknown</td>
<td>Unknown</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Reoccupied seasonal camp</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Reoccupied winter camp</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Reoccupied summer camp</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Village</td>
<td>4</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>7</td>
<td>Repetitive seasonal occupation</td>
<td>1</td>
<td>5</td>
<td>Unknown</td>
</tr>
<tr>
<td>8</td>
<td>Permanent hamlet</td>
<td>9</td>
<td>Unknown</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Intermittent reoccupation</td>
<td>3</td>
<td>17</td>
<td>15</td>
</tr>
</tbody>
</table>

**Table 8  Site comparison by occupation type and features**

For the different comparative categories, the sites are referred to only by the number assigned to them in Table 7. The reason behind this is to avoid pre-conceived notions about the sites, making the comparisons less subjective. This same method was used during the analysis itself.

**Occupation Type and Features**

The first aspects of the sites that were compared were the occupation type and the numbers of house basins, hearths, and storage pits (Table 8). The only clear relationship in this category is that all of the sites were either interpreted as permanent occupations or reoccupied sites. None of these sites was interpreted as being the result of a single occupation. Other than that, there were no clear relationships observed between any of these categories – the sites with the most house basins include a permanent hamlet and a reoccupied seasonal camp, and there was also no correlation between the occupation type and the numbers of features, or between any two types of features.
Table 9  Site comparison by ceramic types

<table>
<thead>
<tr>
<th>Ceramics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arpan Punctate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ash Hollow Cord-Roughened</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feye Cord-Impressed</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feye Cord-Roughened</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harlan Cord-Roughened</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Havana</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Massacre Canyon</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renner Cord-Marked</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renner Plain</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renner Smoothed</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scalp Punctate</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Valley Cord-Roughened</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Ceramics

The artifact comparisons began with ceramics, since this is the defining artifact category for the Middle Plains Woodland taxonomic system. The primary ceramics identified from each site are plotted in Table 9. Only four ceramic types were present at more than one of these sites: Ash Hollow Cord-Roughened, Harlan Cord-Roughened, Massacre Canyon, and Valley Cord-Roughened. Both sites with the Ash Hollow Cord-Roughened type also had Valley Cord-Roughened. Valley Cord-Roughened ceramics, the defining feature of Valley focus sites, are present at six of the nine sites but only two sites have Valleyware as their only ceramic type. Harlan Cord-Roughened ceramics, the defining feature of Keith phase sites, are present at two sites, one of which also has Valley Cord-Roughened. Neither of the two sites with Massacre Canyon ceramics had Valley Cord-Roughened wares, although one did have Harlan Cord-Roughened. No other trends were detected in this category.

Based on these observations, a couple of site groupings could be made. The first consists of sites 1 and 8, the sites with Valley Cord-Roughened pottery exclusively. There also may be
some kind of relationship between sites 3, 4, 5, and 7 based on their combinations of Ash Hollow Cord-Roughened, Harlan Cord-Roughened, Massacre Canyon, and Valley Cord-Roughened types, although the nature of the relationship is not clear. It is also not clear how sites 6 and 9 fit in, since each has Valley Cord-Roughened pottery as well as other types not shared by any others in this group. Site 2 is an outlier – it is the only site that has no ceramic types in common with the others. This site is the Renner site (23PL1), the only KCH phase site included in the group.

The numbers of potsherds were also compared, as a relative measure of the number of ceramic vessels at each site (Table 10). Sites 1, 3, 4, 5, and 7 all have extremely low frequencies of potsherds. Interestingly, these are all sites that either contain Valley Cord-Roughened ceramics, or that contain a different type that is also present at a site that contains Valleyware. Sites 2, 6, and 8 have the highest numbers of sherds, and all have been interpreted as permanent villages. Thus, this measure seems to be tied to occupation type, not necessarily to cultural differences.

Table 10  Number of potsherds from each site

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of potsherds</td>
<td>44</td>
<td>1525</td>
<td>33</td>
<td>39</td>
<td>87</td>
<td>666</td>
<td>62</td>
<td>3384</td>
<td>337</td>
</tr>
</tbody>
</table>

Projectile Point Sizes

Next, I compared the point sizes between sites, specifically whether each site contained arrow-size points, dart-size points, or both (Table 11), since the transition between use of the atlatl and bow and arrow is considered an important feature of the Middle Plains Woodland. Sites 1, 3, 6, 7, and 8 had assemblages consisting entirely of arrow points; all but one of these contained Valley Cord-Roughened ceramics. Sites 2, 4, and 5 had a combination of darts and
arrows; none of these three sites had any ceramics in common. Only site 9 had a projectile point assemblage consisting entirely of dart-size points, making it an outlier in this grouping. This is the Besant phase Stelzer site (39DW242).

**Arrow Point Morphology**

Arrow point morphology was the next category for which the sites were compared (Table 12). Two sites are not included, though. Site 2 (Renner) did not include information on what style(s) the arrow points are, and site 9 (Stelzer) has no arrow points. Of the seven sites compared, two main groups are noted. Sites 3, 5, and 7 contain the same combination of styles: unnotched triangular and stemmed. These three sites were from the ceramic grouping whose relationship was unclear due to the varied mix of ceramic styles between them. The second group consists of sites 1, 4, and 8, all of which contain side-notched points in combination with other styles. Sites 1 and 8 had exclusively Valley Cord-Roughened pottery, while site 4 had Valley Cord-Roughened as well as two other styles. The relationship of site 6 to the others is
unclear; this is one of the sites whose relationship was also unclear based on ceramic styles since it had Valley Cord-Roughened ceramics along with other types not shared by any other site.

**Primary Species Represented in Faunal Remains**

Another factor that is used in the definitions of some of the taxonomic phases to which these sites belong is the dominant species in the faunal assemblage, so that factor was compared next. This information was not available for site 5. For the other sites, both types of animals were present at every site. Sites 1, 2, 4, and 6 all showed a primary reliance on deer and similar species, while sites 3, 8, and 9 showed a primary reliance on bison (Table 13). Site 7 is the only site for which there was no clearly dominant species represented by the faunal remains.

The relationships between groups based on this attribute and those from the other attributes are limited. If site 2, the Renner site, is excluded based on its being a ceramic outlier, the others in the group with a primary reliance on deer all have Valley Cord-Roughened ceramics. However, they do not share any arrow point style in common and have vastly different numbers of each feature type. The three sites with a primary reliance on bison all have Valley Cord-Roughened ceramics as part of their assemblage, but sites 3 and 8 have exclusively arrow points of mutually exclusive styles while site 9 has only dart points.

**Table 13 Dominant species represented in faunal remains at each site**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer, antelope, elk</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Number of Species

Next, I looked at the number of faunal species represented in each assemblage. This information was not reported for sites 5 and 6. Sites 3, 8, and 9 had the lowest number of identified species in their faunal collections (Table 14). Interestingly, these are also the three sites with a primary reliance on bison. The large quantities of meat available from a bison compared to any other species may be the crucial factor, although it should also be noted that two of these were also the earliest excavated sites, both from the 1940s, and that may also account for the lower number of identified species. This category is thus considered inconclusive.

Stone Tool Types Present

Variation in stone tools was used as an indicator of breadth of artifact assemblage, since they are the only material for which preservation is relatively standard. All sites had scrapers, and almost all had some form of knives or bifaces (Table 15). Differences in presence or absence of modified flakes may be due to differential reporting of the artifact class, so that was not taken into consideration for grouping sites. The most notable observation made in this category is that sites 1, 3, 4, and 6 contain no ground stone. All four of these have Valley Cord-Roughened pottery, and sites 1, 3, and 6 have only arrow points, and each site’s assemblage contains unnotched triangular points.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrapers</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Drills/perforators</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retouched flakes</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knives/bifaces</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Modified flakes</td>
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<td></td>
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<tr>
<td>Graver/burin</td>
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<td></td>
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<tr>
<td>1-2 ground stone types</td>
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<tr>
<td>3-5 ground stone types</td>
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<td></td>
<td></td>
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<td>6+ ground stone types</td>
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Table 15 Stone tool types present at each site

Artifact Ratios

Finally, relationships between the sites were viewed in terms of artifact ratios. Ratios involving potsherds were not used due to the incredibly low numbers of sherds at most sites, and ratios of different feature types to artifact types showed no trends. There were a couple of ratios, however, that showed positive correlations. These are presented graphically because the relationships are more clearly illustrated that way.

For the ratio of projectile points to scrapers, sites 1, 5, and 6 are clustered together, all with very low numbers of both artifact types (Figure 25). There is no apparent relationship between these sites based on any other attributes, though, so it is likely just a function of their all having very small assemblage sizes. Sites 7 and 8 are also clustered relatively closely together; again, however, there is no apparent relationship between these two based on any other criteria. Sites 4 and 9, although not clustered together at all, have far more points and scrapers than any other sites. These two do share Valley Cord-Roughened ceramics and the same style of dart points, but they are different from each other in every other regard.
The other interesting ratio is that of scrapers to species diversity. Sites 5 and 6 are not included because species information was not reported for those sites. Sites 2, 3, 4, 7, and 8 show a positive, direct correlation between species diversity and the number of scrapers present (Figure 26). Sites 1 and 9 are outliers here. They are also the sites with the most and least species diversity, respectively. Site 9, as mentioned earlier, is the Besant phase Stelzer site and the faunal assemblage shows an overwhelming emphasis on bison hunting, which is a major defining feature of the phase. This results in a very low number of species represented, as well as a high number of scrapers present. Site 1 is at the other end of the spectrum. This is the Rainbow site (13PM91), attributed to the Valley phase. The wide range of species present includes a high proportion of aquatic and amphibious species, accounting for the low number of scrapers. Thus, although these ratios present interesting results, they do not appear to be useful for the current research because they do not appear to have anything to do with cultural relationships between the sites.

Figure 25 Ratio of projectile points to scrapers at each site
Figure 26  Ratio of scrapers to number of species identified at each site

DISCUSSION

Looking at the different groupings from each of the preceding sections, it is clear that sites 2 and 9, the Renner and Stelzer sites, are different from any of the others, although Renner is more culturally removed from the others than Stelzer based on the criteria examined here. Based on the phase definitions for the KCH and Besant phases, these sites were expected to have less in common with the others.

Sites 1 and 6 had the most traits clearly in common – both had Valley Cord-Roughened pottery, both had exclusively arrow points at least some of which were unnotched triangular points, both relied primarily on deer, and both lacked ground stone artifacts. These are the Rainbow (13PM1) and Feye (25PT9) sites. Both have previously been classified as Valley phase sites. Although site 4 also has a lot in common with these two sites, including the presence of Valley Cord-Roughened ceramics, a primary reliance on deer, and a lack of ground stone, it is
different in that it has dart points in its assemblage and it lacks unnotched triangular arrow points. Site 4 is the Wallace site.

Site 8 also has quite a bit in common with this group without entirely fitting in. Like site 1, it has only Valley Cord-Roughened ceramics, and it has arrow points exclusively, as both sites 1 and 6 do, and the point types are similar to sites 1 and 4. This site differs, though, in that it has a primary reliance on bison and contains ground stone artifacts. This is the Schultz site (25VY1), the “type” site for the Valley phase.

Sites 3 and 7 seem to have a lot in common with each other, but are somewhat removed from the sites just discussed. Although they have completely different ceramic types present at each site, the types – Ash Hollow Cord-Roughened, Harlan Cord-Roughened, Massacre Canyon, and Valley Cord-Roughened – have been suggested to be related. Additionally, both sites have only arrow points and include both unnotched triangular and stemmed types as their only point types. Site 3 relies primarily on bison, while site 7 was fairly evenly split between bison and deer. The sites also had similar types of stone tools, although site 3 had no ground stone while site 7 did. These are the Ash Hollow Cave (25GD2) and Doyle sites (25RW28); the former is attributed to the South Platte phase, while the latter is defined as Keith.

Site 5 seems to be intermediate between sites 3 and 4. All three sites are included in the ceramics group for which the relationships were not clear. Sites 4 and 5 both have a combination of dart and arrow points, while site 3 had only arrows. Sites 3 and 5 had only unnotched triangular and stemmed arrow points, while site 4 was one of only two sites lacking unnotched triangular points. Site 5 also had three types of ground stone tools, while sites 3 and 4 have none. Site 5 is the Massacre Canyon site (25HK13), typically classified as part of the Keith focus.
These relationships are illustrated in Figure 27. As discussed in the methods section at the beginning of the chapter, this figure was created by evaluating how often different sets of sites were grouped together or showed the same trends based on each of the comparisons. The amount of overlap between each site’s circle is relative to the amount of overlap in traits. Thus, although the figure is not intended to be a precise model of interactions between these sites and does not represent all connections between all sites, it represents the strongest connections and the extent of overlap in attributes between them. It was also noted that the order of the sites from left to right unintentionally also represents the sites from east to west (Figure 28).

It is apparent based on this analysis that there is more going on here than simply a couple of different cultural groups, defined as taxonomic phases, living on this landscape at the same time. Although the sites assigned to the Valley phase based on the current taxonomic definition
did have more in common with each other than with the other sites, their similarities are not clear-cut and certainly do not seem to be representative of one cohesive cultural unit somehow removed from the other sites. It was interesting that the Schultz site, the “type site” for the phase, actually had the least in common with the other Valley sites.

The Wallace and Massacre Canyon sites seem to be intermediate sites, if the grouping of the Rainbow and Feye sites is viewed as “typical” Valley and the close similarity between the Ash Hollow Cave and Doyle sites is viewed as “typical” Keith. It is also interesting that the tight grouping of Ash Hollow Cave and Doyle consists of one site previously defined as Keith and another defined as South Platte phase. The small sample size makes it difficult to know the
extent of overlap that might exist between a larger sample of sites attributed to these phases when analyzed through this method, but these results do indicate the possibility of a very close relationship.

CONCLUSIONS

The categorization of sites in the Central Plains based on the Valley phase definition does seem to be more accurate than expected since the sites previously defined as being of the Valley phase were grouped together in this analysis, but the meaning of these similarities is not clear. Only two of the sites classified as Valley phase showed strong relationships to each other in terms of artifact types, styles, and ratios, while the other sites show less clear relationships. All of the Valley phase sites also had potentially significant attributes in common with non-Valley sites.

Relationships between sites previously attributed to the Keith and South Platte phases are even less clear. The apparent relationships between the Wallace and Massacre Canyon sites, and their similarities to and differences from the sites grouped as “typical” Valley and Keith using the current method, demonstrate that there is more going on in this period than simply two or more different cultural groups operating independently, as taxonomic systems imply by their nature. The similarities between sites appear to be governed more by their locations in the east or west part of the Central Plains than in relationships between distinct cultural groups. This exercise also demonstrates that a number of criteria used to define taxonomic phases may actually have little to do with cultural similarities or differences, instead being a function of available resources in different geographic regions.
There is clearly a complex set of relationships between these areas, relationships that are
obscured by the use of this regional taxonomic system. For example, when viewed in terms of
the continuum in Figure 27 instead of as bounded taxonomic classes, it seems clear that
occupants of these sites were communicating with others and that ideas were moving west across
the Plains.

The spread of ideas during the Middle Plains Woodland seems to be quite similar to the
spread of agriculture from Cahokia into the northern Plains during the Early Plains Village
period, likely a result of similar mechanisms. In Roper’s (2007) investigation of that topic, she
considered a number of possible models for the spread of agriculture, including standard
migration and diffusion models, demic diffusion, elite dominance and infiltration models,
concluding that the spread of agriculture was due to demic diffusion after it was introduced
through individual frontier mobility. The individual frontier mobility model is one in which the
movement of individuals and their relationships to one another bring new ideas, practices, and
materials to new places (Roper 2007).

Taken a step further, it seems likely that small groups such as those occupying most of
the known Central Plains sites during the Middle Plains Woodland could function in very similar
ways to the individuals in Roper’s model. It is known that these groups moved across the
landscape seasonally, and the assumption that separate groups did not meet or interact is not
logical. It is far more likely that groups met during their movements, passing on Hopewell
concepts and ideas that became more diluted with distance, explaining the east to west
continuum of cultural traits among the sites compared in this chapter. Thus, the preponderance
of taxonomic phases defined for this period likely has more to do with the differences
highlighted by the small sample size available on the Central Plains than with significant cultural
differences between distinct groups. There is no reason to believe that there were three or more
distinct cultural groups living on the Central Plains at this time. Instead, I suggest that there
were hundreds of small groups, whose composition changed over time as individuals formed
new groups or joined others in the area, and that these mobile individuals and the interactions
and sharing of ideas between both these individuals and the small groups of which they were a
part formed the archaeological record as we see it today.

The main issue highlighted by the results of this analysis is that the placement of sites
into taxonomic categories causes most archaeologists to look at each group individually, separate
from other groups. I fell into this trap myself when I began this project. This approach makes it
too easy to assume a certain level of similarity between sites within a taxonomic phase and a
level of dissimilarity between sites from separate taxonomic phases, when these distinctions may
not actually exist.

The relevance of this point goes beyond the Central Plains geography and the Middle
Plains Woodland period; similar taxonomic systems are used in many other geographic regions
and for many other time periods. For prehistoric cultures, as with modern cultures, there were
few boundaries across which ideas did not move and people did not interact. Cultural taxonomic
systems, then, place boundaries where they do not otherwise exist, often obscuring aspects of
mobility and interaction that are crucial to archaeologists’ understanding of the past. Thus,
although cultural taxonomic systems may be useful for a limited number of specific research
questions and analyses, they should not be relied upon to accurately portray cultural similarities
and differences, and their use should be avoided altogether in addressing most research
questions.
At the most general level, there is a need for more data from Middle Plains Woodland occupation sites. As mentioned at the beginning of the chapter, there is a very limited amount of widely available information on sites dating to this period, and the information that does exist is often outdated and does not include sufficient data that can be applied to new research questions. Even if excavation of new sites from the Middle Plains Woodland period is not feasible due to issues of access or funding, previously excavated collections should be revisited to develop comparable datasets that can be used to answer an array of research questions. In addition, information from more sites needs to be made available to the public, through publication or other methods.

Other useful research would involve the examination of the different ceramic types defined for this area to determine which aspects of materials and design are relevant from a stylistic standpoint and which may be a result of differential availability of materials, as well as clearer definition of types and possible elimination of redundant or unnecessary type names currently in use.

Finally, a larger-scale study that incorporates a significant sample of Middle Plains Woodland sites on and near the Central Plains to more thoroughly examine the relationships between them would be a valuable contribution to Plains archaeology. It could bring about a more comprehensive understanding of how different groups were interacting with each other during the Middle Plains Woodland period and the ways in which ideas spread.
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