THE MISSISSIPPIAN TRANSITION AT THE WASHAUSEN SITE: DEMOGRAPHY AND COMMUNITY AT A TENTH-ELEVENTH CENTURY A.D. MOUND TOWN IN THE AMERICAN BOTTOM, ILLINOIS

by

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ABSTRACT

This dissertation examines the development of the Washausen mound and village settlement in west-central Illinois, which was occupied during the tenth and eleventh centuries A.D. Results from a high-resolution geophysical survey as well as from excavations, artifact analyses, and radiocarbon dating provide information on how large farming villages were organized just prior to initial rapid growth of the massive Mississippian center of Cahokia. Casey Barrier presents a regional demographic trajectory demonstrating that large villages like Washausen formed through an ongoing process of population aggregations and dispersals by migrating residential groups. By taking a community-based approach informed by political-economic theories on kin-based agricultural societies, Barrier shows how coalesced corporate groups created new institutions that favored the development of larger nucleated settlements and regional integration.

CHAPTER 1
THE POLITICAL ECONOMY OF KIN-BASED AGRICULTURAL SOCIETIES: AN EARLY MISSISSIPPIAN CASE STUDY FROM EASTERN NORTH AMERICA

> *Historians have long been fascinated by the idea that human history is the story of how small family groups turned into nations: they imagine that identities were transformed, made, or remade in the process. But we have never stopped living in groups reminiscent of the families, clans, and tribes described by political anthropologists*.
>
> *Stiner, Earle, Smail, and Shryock* 2011:247

Introduction: The Origins of the Mississippian World of Eastern North America

The emergence and histories of late pre-Columbian Mississippian societies across the midwestern and southeastern United States has long been an object of study by archaeologists working in Eastern North America (Blitz 2010; Cobb 2003; Steponaitis 1986). Although scholars are now aware that complex social organizations were constituted in the eastern United States at different times and places stretching as far back as the Archaic Period, research on the origins of Mississippian is seen as the study of the development of large, complex agricultural societies that were similar in many ways to the numerous ranked and chiefly societies known from around the globe (Anderson and Sassaman 2012:152). Today, Mississippian archaeology benefits from a great diversity of research, ranging from examining the transition from egalitarian life to societies supporting a host of status differences and social inequalities, to research on migration, culture contact, gender, religion, and iconography (see Blitz 2010). As part of this long and rich body of scholarly work, my research presented here contributes to the comparative study of early complex societies through examination of how larger and more socially complex communities were constructed during the buildup to initial the Mississippian period in the American Bottom region of west-central Illinois.

The term Mississippian has been used in many ways. Initially defined as a pottery style by William Henry Holmes (1903), "Mississippian" was later used to refer to a cultural tradition, a distinct complex of artifacts, an adaptive strategy to a particular ecological niche, a period of time, and a macro-regionally shared form of political organization representative of the classic chiefdom (Blitz 2010:3). Mississippian has also been likened to a religion or ideology that was adopted and altered by local groups at various places throughout eastern North America (Anderson 1999; Emerson and Pauketat 2008; Pauketat 1997, 2004), and as an "ethnoscape" of peoples and ideas variously connected at a sub-continental scale (Pauketat 2007:85).

Although use of the term "Mississippian" can mask much of the social and historical variability that is now understood to have been present across the greater late-pre-Columbian Southeast, Mississippian is most often used to describe post-A.D. 1000 societies having largely sedentary populations that constructed platform mounds, relied heavily on maize agriculture, showed signs of status differentiation between groups and individuals, and shared to varying extents certain forms of political and religious structures, practices, and beliefs, among other things (Anderson 1994; Anderson and Sassaman 2012; Cobb and Garrow 1996; Cobb and King 2005; Muller 1997; Smith 1990).

An enduring research focus is distinguishing the origins of initial Mississippian in the central Mississippi River Valley from the later appearance of distinct but historically-related Mississippian cultural groups elsewhere in the American Southeast (Smith 2007). Although many scholars no longer focus on chiefdom organizations, David Anderson (1999) has effectively couched the problem as follows:

> care must be taken to differentiate between the evolution and spread of chiefdom organizational forms over the [Southeastern] region and the spread of Mississippian ideology… The former (i.e., chiefdom-like societies) appears to have emerged in the ninth and tenth centuries, if not before, in some areas. The latter (i.e., Mississippian ideology and religion) appears to have developed or crystallized in the tenth and eleventh centuries, after chiefdoms themselves had emerged in a number of areas, and Cahokia seems to have been the primary center where this took place. "Mississippian" increasingly is thus coming to be recognized as an ideological/religious system that a number of the region's chiefdoms participated in, and whose origin and spread owe a great deal to the early and dramatic emergence of Cahokia [Anderson 1999:227].

Still other scholars have provided models that distinguish between local in-situ developments of Mississippian culture and the movement of Mississippian sociocultural systems across the greater Southeast through multiple processes such as migration, interaction, competitive emulation, and acculturation (Blitz and Lorenz 2006; Boudreaux 2007; Cobb and Garrow 1996). For example, Blitz and Lorenz (2006; Blitz 1999) write that:

> [f]ollowing Jenkins (2003), we distinguish between emergent Mississippian and terminal Woodland. Emergent Mississippian is the autochthonous development of the Middle Mississippi cultural tradition from local, antecedent Late Woodland populations in the central Mississippi River Valley from A.D. 800 to A.D. 1000 (i.e., Kelly 2000). Terminal Woodland refers to Late Woodland populations that interacted with an intrusive Middle Mississippi tradition. This latter process of culture contact is sometimes referred to as "Mississippianization" (Cobb and Garrow 1996:21-22; Pauketat 2004:119-120) [Blitz and Lorenz 2006:124].

Models that distinguish different trajectories of Mississippian developments are useful, and research on early Mississippian developments within distinct regions of eastern North America shed light on multiple pathways taken towards complexity. Following Blitz and Lorenz (2006), Bruce Smith (2007:xxiii) suggests that the study of primary Mississippian developments in the American Bottom region of west-central Illinois may reveal a social trajectory that is distinct from later Mississippian transitions elsewhere. As Smith argues, historical changes that occurred in the ninth- through early eleventh-centuries A.D. in the American Bottom chart the development of greater regional social complexity developing from tribal-like organizations. Although many American Bottom researchers do not share entirely in Smith's view (see Pauketat 2007), knowledge of the growth and development of early Mississippian centers in the American Bottom region does contribute to a more thorough understanding of how local inhabitants (including recent immigrants from regions beyond) constructed larger and more complex communities that undoubtedly influenced the histories of social groups across much of greater Eastern North American for decades and centuries to come. Or, as recently stated by Anderson and Sassaman (2012:156-157):

> [a] pronounced crystallization of ideology, iconography, and religion, as well as aspects of material culture and community organization apparently took place in the American Bottom in the decades after ca. A.D. 1000, and the resulting constellation of features is what many now think of as Mississippian culture, and what is assumed to have spread [across the American Southeast] [Anderson and Sassaman 2012:156-157].

The research presented here is devised to more thoroughly understand how local groups were contributing to, and taking part in, sets of social processes involved with changes occurring with the Mississippian transition in the American Bottom floodplain. In this portion of the Central Mississippi River Valley, described in some detail in chapter 2, the florescence of Mississippian cultural expression is seen at the Cahokia settlement by the late eleventh century A.D. (Beck et al. 2007:842; Pauketat 2004). After its initial growth as a Mississippian center, Cahokia quickly grew to become the largest and most complex settlement in all of North America, north of central Mexico.

More specifically, I examine aspects of tenth-eleventh century developments in the American Bottom through an approach that explicitly examines the realm of community organization through consideration of the relationship between distinct, kin-based corporate groups and other developing institutions at the Washausen site in the American Bottom floodplain. Research at Washausen provides evidence for historical developments that occurred just prior to, and overlapping with, the rapid growth at Cahokia as it transitioned from being a large village to an expanding urban center (Brown and Kelly 2014; Pauketat 1994, 2004).

Alterations in community organization and the timing of regional settlement reorganizations remain major issues for understanding the rise of Mississippian Cahokia (Beck et al. 2007:843-844; Milner 2006:xx-xxi; Pauketat 2004). Archaeologists working at Cahokia have shown that changes there circa A.D. 1050 – including the reorganization of public, monumental, and residential space – coincided with the development of new Mississippian social structures and integrative institutions. Debate exists, however, concerning the extent to which the mid- to late-eleventh century reorganization signaled a complete social and political transformation, as well as the applicability of the Cahokia-model to other groups in the greater American Bottom region.

The Washausen site provides an extraordinary opportunity to examine the Mississippian emergence in the American Bottom because: (a) it was a relatively small and short-lived mound center and village, occupied for just a few generations during the decades bracketing the onset of the Mississippian period at A.D. 1050 (Kelly and Brown 2012:122-124); and (b) modern use of the landscape has only minimally affected the integrity of the buried pre-Columbian remains. As elaborated in chapter 2, earlier work at Washausen has included mapping and systematic surface collections, limited geophysical surveys, and excavations into the northern portion of the site

(Bailey 2007; Betzenhauser 2011; Chapman 2005; Kelly 2006b). More recently, I oversaw three phases of archaeological investigations as director of the University of Michigan-Washausen Archaeological Project (UM-WAP). This work included large-scale geophysical survey, excavations, artifact analyses, as well as AMS radiocarbon dating.

In this study, I examine how local changes within political-economic relations set in motion the development of early Mississippian societies in the American Bottom, while keeping in mind how these changes may have had long-term consequences for the histories of later Mississippian groups across eastern North American. I draw from the literature on the political economies of early farming societies, to consider how the development of new systems of land tenure and the control of agricultural labor involved the creation of corporate groups and were intertwined with many of the settlement changes we see archaeologically as larger and more populous complex communities developed.

In the remainder of this chapter, I lay the foundations for my work by presenting an overview of research about the political economies of kin-based agricultural societies. This background sets the stage for my analysis of the development and operation of Mississippian societies of eastern North America. I then review extant models that have been used to explain Mississippian origins in the American Bottom. Finally, the communities-based approach used in this research is laid out. I argue that such an approach allows information from sites like Washausen to contribute to knowledge about how local communities and corporate groups participated in and influenced broader changes associated with the Mississippian transition.

The Political Economy of Kin-Based Agricultural Societies

The growth of *political economy* as a scholarly discipline has followed a sinuous historical trajectory, from diverse academic and critical perspectives, resulting in a plethora of uses of the concept and term today (Muller 1997:2-10; Roseberry 1988:162-173). In the broadest sense, political economy can be defined as "an analysis of social relations based on unequal access to wealth and power" (Roseberry 1989:44, cited in Cobb 1993:44), but it also deals with central issues surrounding the organization of economic production and social reproduction (Muller 1997:vii). The development of political-economic theory, going back to Marx and even earlier economists, grew out of analyses of capitalist and state-level market economies. A majority of anthropologists and other social scientists and historians who currently use political-economic theories and analyses remain scholars of present-day nation-states, recent globalization, or the study of how capitalism spread across the globe. However, political economy has been utilized increasingly by archaeologists since at least the 1960s to study both state-level and non-state societies of the past (see Cobb 1993; Sinopoli 2003).

Stemming from its classic origins as a form of analysis in the study of economically class-based societies, political economic theory as adopted by archaeologists has likewise traditionally been used by those whose research is focused on early states or to study the beginnings of pronounced economic inequalities, markets, or non-capitalist forms of political finance. Earle (2002:1), for example, defines political economy as "the material flow of goods and labor through a society, channeled to create wealth and to finance institutions of rule." For Earle, like many others, political economies develop as a means to generate and funnel surpluses that support elite political activities and institutions.

Although suited to understanding how systems of heightened economic inequalities arose in the past, political-economic approaches within anthropology and archaeology have been developed to address a much broader range of questions that have been applied to the study of a greater range of human societies (McGuire 2002:80-83). Within archaeology specifically, there now exists a robust literature that considers the political economies of what Cobb (1993) has grouped as non-stratified societies. Archaeologists have contributed to the growth of political-economic theory by expanding our knowledge about the ways various social groups in the past organized their economic activities. Archaeologists are well-positioned to take an historical approach, a critical element of political-economic scholarship (Roseberry 1988:163). Archaeologists have even made great strides to an understanding of how economic production and distribution operate within systems fueled less by elite politics and more by ritual and ceremonial cycles (Spielmann 2002; Wells 2006; Wells and Davis-Salazar 2007; Wells and McAnany 2008).

Political Economies of Kin-Based Societies: Models for a Consideration of Mississippian Social Organization

The extent to which stratified political systems and economic-tributary relations were dominant features of social organization in the Mississippian Southeast has been debated extensively (see Cobb 2003; Milner 1990, 1998; Muller 1997; Welch and Butler 2006). In this thesis, I argue that an historical analysis of kin-based societies serves as a useful starting point for tracking the initial development of Mississippian lifeways in the tenth and eleventh centuries A.D. (see also Barrier 2011). I draw on Eric Wolf's (1982:88-96) direct engagement with political-economic theory, which provides a comprehensive basis for understanding economic organization and change within what he calls a kin-ordered mode of production. Central to political-economic analysis and Wolf's expanded conception of the mode of production is the concept of social or surplus labor, and it is this focus on labor that makes a political-economic approach productive for the study of non-capitalist societies (Saitta 1994:201).

As Cobb (1993) has stated the position:

> A central concern of political economy is with labor, be it labor value, the relations of production, or the deployment of labor. Differential access to wealth and power, the essence of our approach to political economy, is fostered in large part by the ability to manipulate surplus labor to achieve one's own ends. Therein lies the usefulness for grouping nonstratified societies as a topical area, for the mobilization of surplus labor (in the form of goods or services) in such groups is characteristically conducted under the aegis of the kinship system [Cobb 1993:46].

One of Wolf's (1982) contributions was to demonstrate that the surplus labor process is present in all societies (see Barrier 2011; Saitta 1994:Note 1). To quote Wolf himself:

> If kinship is a particular way of establishing rights in people and thus laying claim to shares of social labor, it is also true that the ways in which such rights and claims are established vary widely among different culture-bearing populations. Anthropologists have come to recognize that kinship works in basically different ways in two kinds of situations, those in which resources are widely available and open to anyone with the ability to obtain them, and those situations in which access to resources is restricted and available only to claimants with a 'kinship license.' In the first case, the ties of kinship grow out of the give-and-take of everyday life and link people who are in habitual interaction with one another. In the second case, the circle of kinship is drawn tightly around the resource base by means of stringent definitions of group membership [Wolf 1982:91].

As Wolf continues:

> This contrast defines two variants of the kin-ordered mode, for social labor is deployed differently in the two. The first variant is best exemplified in the anthropological literature by food collector[s]... Under such circumstances the aggregation or dispersion of people, each embodying a share of social labor, follows ecological constraints and opportunities. Upper limits to pooled social labor are set by the interaction of the technology with the local environment, as

> well as by the group's ability to manage conflict through consensus formation and informal sanctions… The deployment of social labor works differently in the second variant of the kin-ordered mode. Where nature is subject to transformation through social labor, the environment itself becomes a means of production, an instrument on which labor is expended. A segment of nature is transformed by a set of people – equipped with tools, organization and ideas – so as to produce crops… In such a society, social labor is distributed in social clusters that expend labor cumulatively and transgenerationally upon a particular segment of the environment, accumulating at the same time a transgenerational corpus of claims and counterclaims to social labor… Under these conditions the idiom of filiation and marriage is used to construct transgenerational pedigrees, real or fictitious. These serve to include or exclude people who can claim rights to social labor on the basis of privileged membership [Wolf 1982:91-92].

This distinction in how kin-ordered modes of production can be variously structured has been applied to explain some major differences between the political economies of Hopewell and Mississippian groups in eastern North America (Beck and Brown 2012). Beck and Brown draw a distinction, similar to Wolf's, between economies based on surplus production and those based on what they call surplus procurement. As Hopewell groups relied heavily on hunting and gathering, and to a lesser extent, on small-scale gardening of starchy seed crops, surpluses were unpredictable and temporally and spatially widely distributed. Hopewell complexity – seen archaeologically as increased ceremonialism, long-distance exchange networks, support of crafting and the production of art, large-scale aggregations, monumental constructions, etc. – was supported through ad hoc or opportunistic procurement of available surpluses (Beck and Brown 2012:74-75). In contrast, Mississippian political economies became based upon the production of an annually-pulsed and storable, staple cereal crop – maize – thus localizing surpluses both temporally and spatially.

In the American Bottom region, where Mississippian culture first developed and from where it subsequently spread, we see the initial development of sedentary villages by the ninth century A.D., concurrent with maize becoming an important dietary component (Kelly 1992;

Fritz 1990; Simon and Parker 2006). Besides a transition from a highly mobile lifestyle to life centered on sedentary villages, life within these pre-Mississippian villages during the next couple of centuries was physically structured primarily through the "courtyard group:" the spatial arrangement of a handful of structures around an open courtyard with central features like pits and posts (Kelly 1990a, 1990b, 2000). As discussed below, I argue that these courtyard groups were likely the spatial and material expression of developing kin-based corporate groups, potentially organized as emerging lineages.

The coeval investment in both a staple cereal crop and permanent village aggregations is not something unexpected from the perspective of cross-cultural studies of human economies and social change (Earle 2000). As the importance of maize production increased, Late Woodland systems of land use and labor organizations would have been transformed, leaving communities "faced with a radically different set of challenges and opportunities than those faced by their immediate forebears" (Beck and Brown 2012:79; see also Muller 1997:42). Unlike earlier Woodland Period political economies, new political-economic relations in the American Bottom would have become increasingly associated with new notions of property and land tenure, especially as these related to the preparation and maintenance of new agricultural fields and the organization of agricultural labor (see Doolittle 2004; Schroeder 1999, 2001).

Earle's (2000) cross-cultural review of property and use-rights in prehistory led him to suggest that a strong relationship existed between the intensification of agriculture and the development of corporate and household rights. Earle (2000:40) defines property as an exclusive right to things: property is "something possessed, and the exclusive right to hold, use, and/or dispose of that something." Property rights, and the jural codes and institutions that establish such rights, extends to both moveable and immoveable property. In developing agricultural economies, land becomes a key structuring force of the political economy. As Earle writes,

> [l]and is inherently set in space, which means people must move to it; however, land is improved by social labor… and the emergence of social groups can in part be explained by a need to defend and allocate land… Property rights in land are secured primarily through original possession, improvement, inheritance, and conquest. Ownership is often based on claims of first possession and of improvements, such as clearing and fencing a field, that change future returns… Inheritance involves transfer of land at death between socially related individuals that results in social continuity… Social groups must maintain control of land, and this control is usually manifest in inheritance rules [Earle 2000:40-41].

Thus, emerging political economies based on immoveable forms of property, like agricultural fields, predict the development of corporate kin groups like lineages that maintain communal residence, work and defend land, and see to its transference transgenerationally (Earle 2000:46). These ideas are used to structure and guide research presented herein on community organization at Washausen during the Mississippian transition. What follows is a review of extant models that have been used to explain the origins of Mississippian communities in the American Bottom. These models both make assumptions about how transitional Mississippian peoples organized their communities and political economies.

Previous Models of Mississippian Origins in the American Bottom

Researchers working in the American Bottom have identified significant changes in community organization during the Late Woodland and Mississippian periods (Kelly 1990a, 1990b; Koldehoff and Galloy 2006; Mehrer 1995; Mehrer and Collins 1995; Milner 1998; Pauketat 1994). These new patterns of settlement planning are associated with the development of new kinds of communities in the region, and they have been used for consideration of the origins of the earliest Mississippian societies (see Beck et al. 2007; Brown 2006; Emerson 1997; Kelly 1990b, 2002, 2006a; Milner 1990, 1998; Pauketat 2000a, 2000b, 2004; Schilling 2010). American Bottom archaeologists have offered two competing models to explain the transformations that marked the eleventh century Mississippian transition. One model suggests that early Mississippian communities were an outgrowth of interaction and competition among pre-existing, kin-based corporate groups, while the other model argues that a completely new form of Mississippian community was being created that dissolved earlier forms of kin-ordered communalism. Both positions are based on assumptions about how people organized and conceived their new communities, focusing in particular on the extent that pre-A.D. 1050 (or "pre-Mississippian") institutional relationships played a role in the development of subsequent Mississippian institutions (Milner 2006:xxi).

American Bottom Sociopolitical Trajectories

Shifts in regional settlement patterns dating to the eleventh century A.D. provide evidence that significant social changes occurred at this time in the American Bottom. By the late eleventh century, discrete sedentary villages had been replaced by a regional population living at a series of smaller settlements dispersed about new monumental mound centers (Figure 1.1). Excavations at Cahokia and at the Range site in the American Bottom have produced the most complete view of these changes in the region (Brown and Kelly 2014; Kelly 1990a, 1990b; Kelly et al. 2007; Pauketat 1994, 2004; Mehrer and Collins 1995; Milner 1998). Pre-A.D. 1050 nucleated village life at Range, for example, gave way to occupations that archaeologists refer to as farmsteads or hamlets that consisted of a few small, co-residential groups or perhaps single nuclear families. About this same time, the large nucleated village at Cahokia was transformed

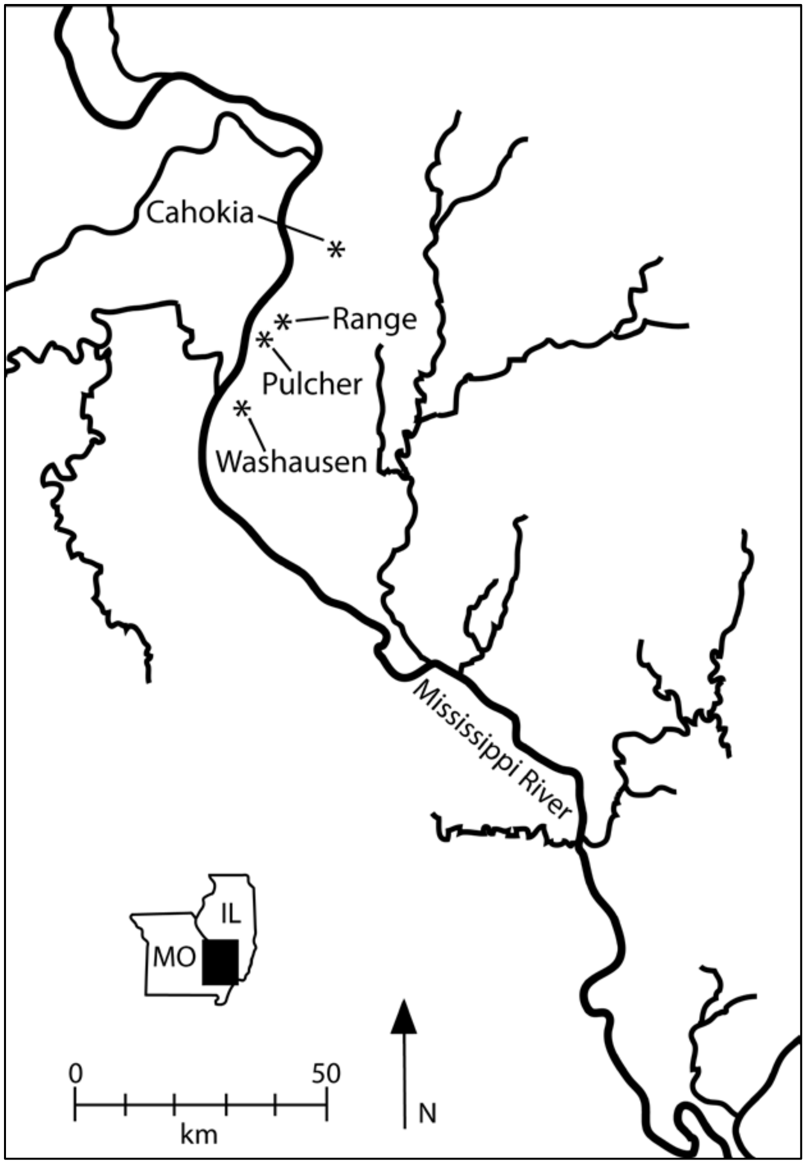

Figure 1.1. Map of the American Bottom region, with sites mentioned in text highlighted.

into a Mississippian center, with dense residential populations and elaborate monumental architecture. Although these settlement shifts are well documented, much less is known about the composition of the social groups and institutions that enacted these changes, particularly at early mound-towns beyond Cahokia.

The best documented pre-A.D. 1050 historical sequence comes from the Range site located south of Cahokia (Figure 1.1; see also Chapter 3). During the ninth through early eleventh centuries at the Range settlement, the residential courtyard was the locus of changes in the social, political, economic, and religious lives of inhabitants (Figure 1.2). These courtyard groups typically consisted of several structures ringing small open courtyard spaces. These central courtyards were marked by repetitive arrangements of central pits, posts, and the occasional larger structure. From the Late Woodland Patrick phase (A.D. 650-850) through the early Mississippian phase at Range (Figure 1.2), the growth and decline of specific communities appears to have occurred through the aggregation and subsequent fissioning of courtyard groups (Barrier and Horsley 2014; Kelly 1990a, 2000, 2007a, Kelly et al. 2007; see also Koldehoff and Galloy 2006). Although the social groups that utilized courtyard groups were not static, most archaeologists assume that they represent the spatial and material expression of co-residential kin groups, perhaps the domain of early matrilineages (Kelly 2000:167).

Key features of pre-Mississippian community organization known from Range and other sites include: (1) the arrangement of structures into distinct household or courtyard groups; (2) the placement of symbolically-important central facilities such as wooden posts or pit arrangements; (3) the presence of small public plazas in later pre-Mississippian phases, around which courtyard groups were distributed; and (4) the occasional presence of larger, specialized buildings (Kelly 1992, 2007b:491-492). During the Late Woodland Patrick phase, Range may have been home to a small-scale nucleated village for the first time (cf. Koldehoff and Galloy 2006). During the subsequent Dohack through Lindeman phases, larger (in population) and more nucleated villages developed at the Range site. During the George Reeves phase (A.D. 950-1000) the settlement's population grew, becoming a more densely settled village organized

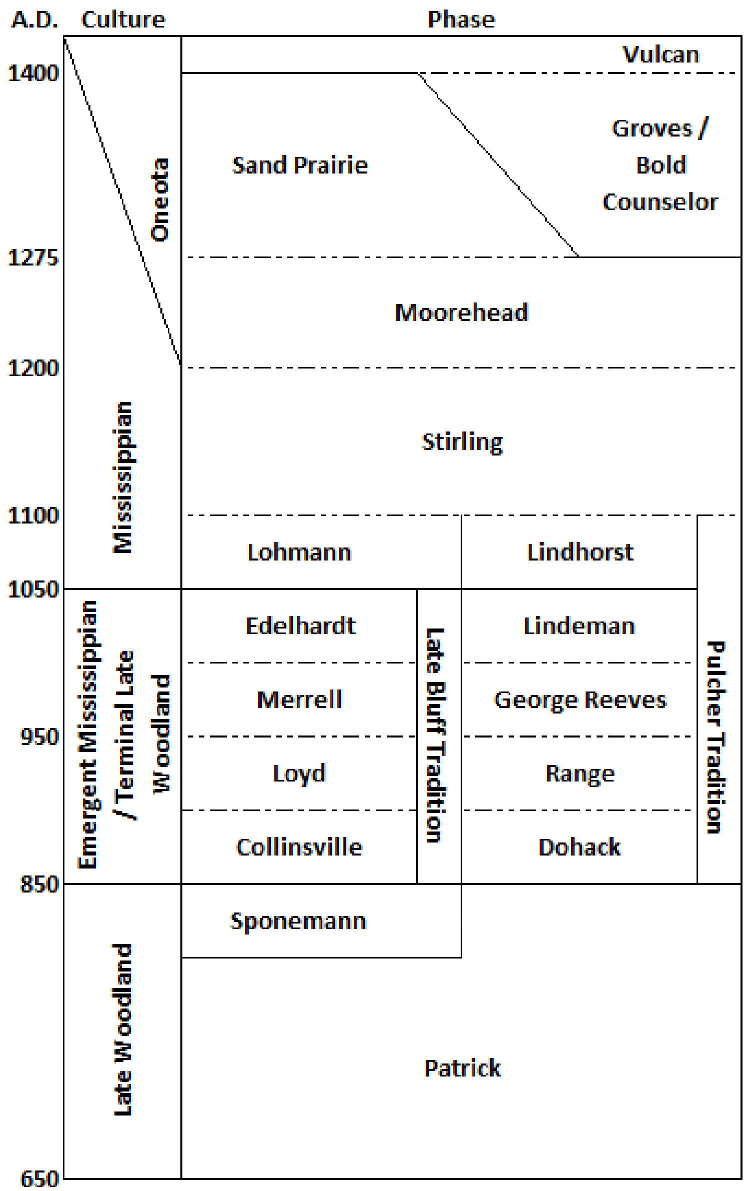

Figure 1.2. American Bottom chronology (calibrated dates) (adapted from Kelly 2008: Figure 37).

into two sub-communities each focused on their own central plaza. Each site sector appears to have grown through the addition of individual courtyard groups that connected themselves to one of the two sub-communities over the course of a few decades.

Community-level shifts during the George Reeves-Lindeman phase transition led to the dissolution of the southern plaza group at Range as a result of the fissioning of some segments of the community. Most remaining courtyard groups reoriented themselves to a new, single plaza in the northern portion of the settlement. By sometime in the Lindeman phase (A.D. 1000-1050), a major population decrease is evident, again likely the result of the fissioning of individual courtyard groups. By A.D. 1050 the early Mississippian Lindhorst phase settlement at Range is represented by only a handful of scattered structures.

At this same time (circa A.D. 1050), rapid changes occurred at the large village of Cahokia, marking the onset of the Mississippian Lohmann phase, which spans from A.D. 1050 to 1100 (Figure 1.2). The relatively rapid adoption of a suite of technological and cultural traits at Cahokia – including increases in the use of shell-tempered pottery and the introduction of wall trench architecture – followed on the heels of local population growth, a reorganization of the settlement's community plan, and major investments in earth moving and mound and plaza construction (see Beck et al. 2007; Dalan et al. 2003; Holley et al. 1993; Milner 1998; Pauketat 2004; Schilling 2010). Earlier dwellings that clustered around small courtyards (i.e., courtyard groups similar to those at the pre-A.D. 1050 Range site) were replaced by larger residential zones oriented around a series of new plazas and mounds, or around new architectural features like T-shaped and circular buildings (Brown and Kelly 2014; Collins 1997; Mehrer and Collins 1995; Pauketat 1994). Material evidence of large-scale public feasts indicates that large numbers of people took part in labor-intensive projects and in ceremonial rites that arguably served to integrate disparate groups through the construction of mounds and specialized buildings in politically-charged events (Kelly 2001; Pauketat et al. 2002).

According to one of two competing models, data from Cahokia suggest that new Mississippian communities emerged through the creation of social institutions no longer focused on kin-based corporate communalism (Emerson 1997; Pauketat 2000a, 2000b). Advocates of this model posit a disjuncture between earlier forms of community social organization and new "Mississippianized" communities. Pauketat (2000a, 2000b), for example, sees the development of Mississippian communities as the politicization of pre-A.D. 1050 forms of communalism. Whereas domestic and social life were apparently organized around the courtyard group at earlier regional villages – that is, by a small number of households that shared central public spaces and communal facilities – the creation of Mississippian communities at A.D. 1050 transposed community identities from the local kin group to the regional political community. New mound centers became the nexus of new kinds of Mississippianized communities (Pauketat 2000a:30, 33-34). Dissolution of earlier forms of social organization that seemingly revolved around courtyard group-based kinship ties and the local community were replaced at the moment of Cahokia's political centralization at A.D. 1050 (Pauketat 2000b:120). Nuclear families living at new farmsteads were potentially autonomous in their domestic affairs; they also would have lacked a local community, as community ties were now reckoned through social relations to political centers (Pauketat 2000a:34-35).

Other researchers, however, suggest that the new scales of social integration at Cahokia resulted from intensified interaction and competition among kin-based corporate groups (e.g., Beck et al. 2007; Brown 2006; Brown and Kelly 2014; Kelly 2006a; Milner 1998; Trubitt 2000; Saitta 1994; Welch 2006; Wilson et al. 2006). These researchers see evidence for greater historical continuity between pre-A.D. 1050 regional developments and early Mississippian social organizational formations witnessed at Cahokia and elsewhere, particularly in elements of community plans including the arrangement of living space around central courtyards and later central plazas. For example, Kelly (2006a) and Brown and Kelly (2014) see the rapid development of Cahokia after A.D. 1050 as the continued, if not significantly expedited, coalescence of several kin-based corporate groups into this emerging and densely settled landscape. As Brown and Kelly (2014) state:

> [a]t the onset of the Mississippian settlement pattern at Cahokia in the mid-eleventh century, the landscape was abruptly altered by creating a broad north-south occupational and ritual space of urban dimensions to accommodate the planned core or epicenter of the site. After Cahokia was reconfigured, the pre-existing Emergent Mississippian village plan was easily quadrupled. Four monumentally-sized plazas were laid-out as arms of a giant cruciform [Brown and Kelly 2014:562].

Drawing upon ethnographic literature on Siouan-speaking groups from the Midwest, some scholars have proposed a multi-clan model of social organization for Mississippian Cahokia (Brown 2006; Brown and Kelly 2014; Kelly 2006a; Welch 2006). This model finds support in Knight's (1990) much broader analysis of ethnographic and archaeological information about the social organization of contact- and early historic-period pan-Eastern Native groups. Knight's (1990:3; emphasis original) analysis led him to "propose that structural features inherent in exogamous *ranked clans* satisfy the preconditions for the emergence of social stratification, and that Mississippian social organization arose from that base in late prehistoric Eastern North America."

According to Knight (1990:5-6), Eastern North American clans were exogamous social categories or statuses perpetuated by unifiliation. Unlike clans elsewhere, pan-Eastern clans were not descent groups in the traditional sense, but rather were based upon biological ties between living relatives, usually privileging either patri- or matrifiliation. Communities and villages were composed of several clans, and clan segments were often distributed throughout multiple villages. Clan membership did not have a strong corporate basis. Rather, "functions of the clan were instead oriented primarily to the codification of conduct and etiquette among kin, to the settlement of disputes, to rules regarding hospitality to strangers, and to the regulation of marriage transactions. Clans also performed traditional roles at ceremonies" (Knight 1990:5-6).

Knight's (1990) analysis also found that economic activities, property, and agricultural land were under the purview of strongly corporate lineages. In contrast to clans, lineages were always localized within a village or at a hamlet or farmstead, and several lineages formed larger clans. As detailed by Knight:

> lineages could consist merely of an extended consanguineal family tied to an estate… or at most a localized cluster of closely related families. Such local groups were exogamous by virtue of clan membership… [and] membership was again merely a matter of filiation rather than of descent [Knight 1990:6].

Thus, although both clan and lineage membership was based on direct biological ties, lineages (at least in the contact- and early historic-periods) were perpetuated only as they maintained spatial proximity as a distinct household or cluster of households, and while a living matriarch or patriarch survived. According to Knight, the lineage-clan system that was prominent in the sixteenth century and later may have been one way that surpluses created in part through a dispersed settlement system operated to centralize those resources within larger, kin-based social units.

A Communities-based Approach to Understanding Early Mississippian Trajectories in the American Bottom

Mississippian archaeologists are well positioned to investigate the scalar relationships that link local social groups, larger regional polities, and even more geographically expansive social structures (Blitz 2010:1-3; Cobb and King 2005:169-170). Recently, several scholars have reinvigorated the concept of local "traditions" and how they endure, change, are replaced outright, or manipulated in the face of local and extra-local cultural variation, competition, or coercion (Alt 2002, 2006; Blitz and Lorenz 2006; Cobb 2005; Lightfoot 2001; Pauketat 2001a, 2001b, 2001c). Influenced by practice theory, researchers have benefitted by placing local sociopolitical trajectories squarely within the realm of active agents participating within a larger structural milieu (Cobb and Garrow 1996:34).

Traditions, like all shared practices, are transformed and remade as individuals, groups, and institutions reproduce their social communities (Cobb and Drake 2008:86). A diachronic and multi-scalar approach to social change permits us to understand how communities are shaped by particular institutions, practices, and patterns of material culture. Such an approach views communities as (a) dynamic social formations (b) generated by suprahousehold and institutional interactions that (c) take place within structured spaces over daily to generational spans of time (Yaeger and Canuto 2000:5). Communities in this sense are not themselves reducible to spatially defined sets of material traits. Rather, the archaeological record can be used to infer "instances of communities," and documented shifts in interactions between various institutions – from the co-residential household group to suprahousehold institutions at the local and polity levels – are means to better understand diachronic and long-term social changes (Yaeger and Canuto 2000:6).

Key issues in the study of the development of regional centers and larger-scale aggregations include understanding of the social institutions that are created to provide new opportunities for integration and that help mitigate the challenges of living under conditions of greater population densities (Quinn and Barrier 2014). Institutions can be defined as "the socially mediated and communally accepted sets of rules for interaction and conduct… [that] develop… as means to organize economic, political, or ideological aspects of life" (Quinn and

Barrier 2014:2250). Archaeologist Adam Smith (2003:235) states that institutions are "collectivities bound together by shared histories and interests that shape ingrained values and routines… [and that] recursively shape their members and, over time, can provide foundations for stability… and transformation." Archaeologists can locate the material remains of recurrent institutional practices through systematic study of distinct spatial, depositional, and architectural patterning; for example, specialized buildings or places on the landscape used for ritual or ceremonial purposes (e.g., Flannery 1998). Importantly, the institutions are not the buildings or places themselves, but the continued and replicated acts of groups or individuals that serve to regenerate those institutional practices and places (Pauketat 2007:40).

My research seeks to understand how co-residential groups at the transitional Mississippian Washausen settlement were both contributing to, and taking part in, sets of social processes involved with rapidly changing conditions documented for the early Mississippian Period in the American Bottom. A communities-based approach places analytical focus on the local groups and social institutions at Washausen, and requires examination of how these groups were constructing more extensively integrated communities at this time. My research contributes to our understanding of the Mississippian transition in the region, and it also contributes knowledge about the development of middle-range societies in general.

The extant models of regional Mississippian development, described above, are a useful heuristic device for conceiving of a series of research questions about Washausen. These questions can be used to document known *instances of community* formation and can be used to frame my major research question: To what extent and how were local co-residential groups involved in creating more extensively integrated and complex communities in the central American Bottom during the Mississippian transition?

Pauketat (2000a:19) views the active construction of community "as a process of group-identity formation" and shifts analytical focus to what he calls "moments of interaction" that occurred surrounding the mid-eleventh century Mississippianizing events at Cahokia. From this perspective, as he states, the developments of new communities would not have been the inevitable culmination of antecedent causes. Likewise, the communities-based approach taken here also places emphasis on the daily interactions of regional inhabitants, and the short-term site of Washausen can be considered an *instance of community* that presents a picture of how community at one of the earliest mound towns in the region was constructed and organized by local social groups inhabiting the settlement. I posit, however, that this approach, and results from research at Washausen, enriches a diachronic record that charts social changes through time in the region, and supports the view that local ways of self-organization (like the courtyard kin group) were active principles in constructing larger, and eventually Mississippian, communities. To evaluate this proposition, my major research problem outlined here will be evaluated against a series of expectations falling under two major dimensions of material culture: (1) architectural-spatial organization; and (2) commensal events and integrative institutions.

In the following chapters, results of field and laboratory investigations will be presented. Chapter 2 provides a background to the American Bottom landscape and environment, and details previous work in the area and at Washausen. Chapter 3 presents results of a large-scale geophysical survey at Washausen. This survey produced spatial data on the organization of the Washausen settlement that are utilized for assessing the role of corporate kin-groups in constructing an early monumental mound town. Results of excavations and radiocarbon dating and artifact analyses are detailed in Chapter 4. Finally, Chapter 5 discusses all the results of this research, and will consider how changes in the political-economic organization of kin-based corporate groups were part of Mississippianizing processes in the American Bottom.

CHAPTER 2
HISTORICAL BACKGROUND AND THE 2011 UNIVERSITY OF MICHIGAN-WASHAUSEN ARCHAEOLOGICAL PROJECT

The site of Washausen (11Mo305) is located in Monroe County, Illinois, near the small community of Fountain (Figure 1.1). Here, the American Bottom floodplain is not as wide as the expansive section of floodplain where Cahokia sits. Whereas the floodplain measures east-to-west up to 19 km wide in the northern American Bottom, south of the modern-day village of Dupo the valley measures between 4 and 8 km wide (Milner 1998:35). An east-to-west line (as drawn today from the eastern banks of the Mississippi River to the eastern bluffs through Washausen) measures 7 to 8 km. In the central American Bottom, where Washausen is located, the eastern bluffs rise between 50 and 100 m from the floodplain valley and in several places are defined by eroded limestone cliffs (Milner 1998:35) (Figure 2.1).

Washausen sits on the south bank of Fountain Creek, which flows in a general southwest direction from the bluffs to the Mississippi River. Fountain Creek was channelized by levee construction in the twentieth century, creating a straighter course than it had originally (Figure 2.2). Prior to construction of the levee, the creek turned northeast at Washausen before turning south again just beyond the Peiper site (11Mo31), which lies roughly 0.6 km from Washausen and was the location of a Late Woodland occupation with one small mound (Betzenhauser 2011; Milner 1998:181).

Today, the valley floor in Monroe County is used mainly for cultivation, and consists of large tracts of farmed land with a few shallow lakes interspersed. Prior to historic alterations

Figure 2.1. Photograph of Washausen site locality (foreground) in the American Bottom, with tree-covered limestone bluffs in background (photograph by author).

Figure 2.2. 1875 plat map showing location of the Washausen site (red star) along the banks of Fountain Creek prior to construction of the modern levee.

made to maximize the amount of land suitable for farming, the floodplain was much more heavily dissected by bodies of water, and would have been susceptible to more frequent annual and inter-annual flooding (for a thorough description of the pre-Columbian and early historic American Bottom environment, see Milner 1998:25-51; Milner and Oliver 1999; Schroeder 1997). By Milner's accounts, conservative estimates suggest that at least 35% of all bottom land was covered by creeks, wetlands, swamps, or sloughs. In addition, frequent flooding would have inundated much more land, or left larger tracts of ground soggy and swampy. Mid-nineteenth century flood records for the area show that in some years only 18 percent of the Cahokia locality and 43 percent of the land surrounding the Pulcher site remained "relatively dry ground" (Milner and Oliver 1999:83). As Milner recounts, after visiting the area the writer Charles Dickens:

> regarded it as a thoroughly distasteful and unwholesome place, 'an ill-favoured Black Hollow, called, less expressively, the American Bottom' that consisted of 'one unbroken slough of black mud and water [with] no variety but in depth.' On every side of his path through 'vast tracts of undrained swampy land' there lay 'stagnant, slimy, rotten, filthy water [Milner 1998:36].

Despite Dickens's use of some hyperbole, the American Bottom and its surrounding uplands contained an array of resource zones, and in many years, provided abundantly for its inhabitants – although it was not without risk (Milner 1998:77-78). Local inhabitants had access to the Mississippi River and its backwaters, streams, creeks, deep and shallow lakes, wetland swamps and sloughs, dry land, upland forests, and prairie grasslands (Schroeder 2004). Besides a large focus on maize farming during Mississippian times, a host of native cultigens as well as several different taxa of wild plants (including nuts, fruit, and other plants) and species of fish, mammal, bird, and waterfowl were utilized for food, clothing, and tools (Milner 1998:65-79).

Research by Schroeder (1997; 2000; 2004) shows that the American Bottom floodplain can be divided into three key landforms types, based upon the distribution of water sources, terrain, and the spatial patterning of tree taxa and herbaceous plants. She has labeled these three landforms: (1) deep wetlands; (2) shallow wetlands; and (3) dry land; and notes that "[e]ach of these landforms typically is characterised by long, narrow, sinuous features running across the bottomlands" (Schroeder 2004:818). Access to each of these landform types would have provided a diverse range of resources. As Schroeder describes:

> Deep and shallow wetlands are critical components of the bottomland environment of large rivers with broad floodplains, such as the American Bottom segment of the Mississippi. Fish and other aquatic fauna could be efficiently harvested in reasonably large numbers… The edges of swamps support a variety of plants and attract some animals, particularly migratory waterfowl… Starchy seeds… and oily seed… annuals readily grow in such edge environments… At the higher elevations in the floodplain, fertile soils were instrumental in cultivating corn, squash, gourd, as well as the starchy and oily seed native domesticates, and supported or attracted a variety of other terrestrial resources important to these ancient people, including deer [Schroeder 2004:819].

Schroeder's (1997) study of the American Bottom south of Cahokia, in Monroe and northern Randolph counties, demonstrated that dry land accounted for 52-60 percent of the bottoms, 29-35 percent was covered by shallow wetlands, and deep wetlands made up 10-15 percent of the area. She shows that although this composition of landform types presents an average patterning over much of these two modern counties, a patchy distribution of deep wetlands into clusters separated by stretches lacking these deeper water sources existed. Further, Schroeder argues that the location of these deep wetland clusters relates to the locations of larger mound sites during the Mississippian period (Schroeder 1997:163).

When sites in Monroe and northern Randolph counties were plotted on a map and a one kilometer catchment area is drawn around each of them, Schroeder (1997) found that exploitation of all three landform types was an important component of pre-Columbian settlement in the American Bottom. All sites appear to be located with access to deep and shallow wetlands as well as dry land. In fact, large mound sites (defined as sites with multiple mounds and long occupation spans) are positioned at locales with more-or-less equal amounts of all three landform types within their one kilometer catchments. The placement of other sites (both small-mound sites and non-mound sites) is skewed toward being in close proximity to shallow wetlands and dry land. That is, all small mound sites (defined as having a few small mounds and short occupation spans) have 20 percent or less deep wetlands in their catchment zones (Schroeder 1997:209-214). As Schroeder (1997:213) states, "[p]laces with a balance of floodplain habitats were better able to offset shortfalls in one resource by increasing the use of other resources…" especially during droughts or floods.

History of Investigations at Washausen

The Washausen site was identified by an archaeological survey and surface collected in the early 1970s as part of the Historic Sites Survey (HSS) directed by Porter (1974; Porter and Linder 1974). Years later, Milner (1998) tabulated ceramics collected from the site's surface during the HSS survey. These materials placed the use of the site from the Late Woodland through Mississippian periods, with the majority of the pottery dating to the Emergent Mississippian period (Milner 1998:182).

Washausen received no additional archaeological attention until February, 2004, when John Kelly and colleagues began systematic contour mapping, surface collections, and probing at the site (Kelly and Brown 2012:122, Figure 6.4; Stahlmann et al. 2004; see also Bailey 2007;

Chapman 2005; Kelly 2006b). In April 2004, and again in March 2007, Alleen Betzenhauser (2008, 2011) oversaw magnetometer and resistivity surveys that targeted the central mound and plaza area, as well as an area in the northern portion of the site and a strip of land stretching east from Mound B. In May, 2004, geophysical survey under the direction of Kelly targeted the site's central plaza (see Burks 2004; Bailey 2007). Additional geophysical mapping by Kelly was conducted again in 2005 focusing on an area just west of the projected plaza (John Kelly, personal communication 2011).

Test unit excavation at Washausen was first conducted in July 2004, as part of a University of Illinois field school (Betzenhauser 2011:132-133, Figure 5.34). A total of four 1 x 2 meter test units were excavated in the northern portion of the site, adjacent to and extending into the levee that channels Fountain Creek. No cultural layers were encountered below the plowzone (although not all units were excavated to sterile subsoil).

Additional test units were excavated by John Kelly in September, 2005 (John Kelly, personal communication 2011). Due to agricultural use of the area at that time, four 1 x 2 meter test units were placed in the northeastern portion of the site (in the lawn area where two modern houses currently stand) that revealed a buried A soil horizon extending approximately 35 cm below plowzone. Since then, Kelly has overseen the excavation of a handful of test units within and near to Washausen's plaza, mainly focused upon understanding the density and distribution of artifacts in the plowzone, and he has continued opportunistic surface collections targeting diagnostic materials (John Kelly, personal communication 2011).

In 2007 and 2008, as part of her dissertation research, Alleen Betzenhauser (2011) conducted more substantial excavations at Washausen in order to target intact, sub-plowzone features. As part of this phase of her research, Betzenhauser initially placed a total of three 1 x 2 meter test units (TU) at the site north of Mound A. Betzenhauser's TUs 6 and 7 were later expanded when cultural features were encountered below plowzone (discussed below; Betzenhauser 2011:Figure 5.34).

In 2011, I conducted archaeological investigations at the Washausen site. These investigations consisted of two separate seasons. Season 1 took place in February 2011. At this time, Dr. Timothy Horsley (Northern Illinois University) and I completed a magnetometer survey covering an area of 8.17 hectares (Barrier and Horsley 2014). Season 2 lasted from July through December 2011. During this second season, I directed excavations at the site that targeted five basin structures (and internal features) and one external feature. A total of 54 square meters was opened in six excavation areas. Substantial information is now available about the Washausen site – from mapping, surface collections, geophysical reconnaissance, and excavations. In the following section, I describe the history of fieldwork.

Previous Field Investigations at Washausen

As noted above, in 2004 John Kelly and colleagues initiated a project at Washausen that included contour mapping, surface collections, probing, geophysical survey, and limited test excavations. Initially, a north-oriented grid was established at the site. Using this site grid, a contour map was created (Figure 2.3) (assisted by Dr. Robin Machiran of the University of Missouri-St. Louis). Although the site has been affected by long-term agricultural use and plowing, two mounds (Mounds A and B) are still visible on the landscape, and a possible third mound (Mound C) and potential borrow areas are detectable on the contour map (Figure 2.4).

The Washausen site is located on a ridge-and-swale landscape. The elevation at the center of the site's plaza is approximately 123.5 meters amsl. From that point, the plaza slopes

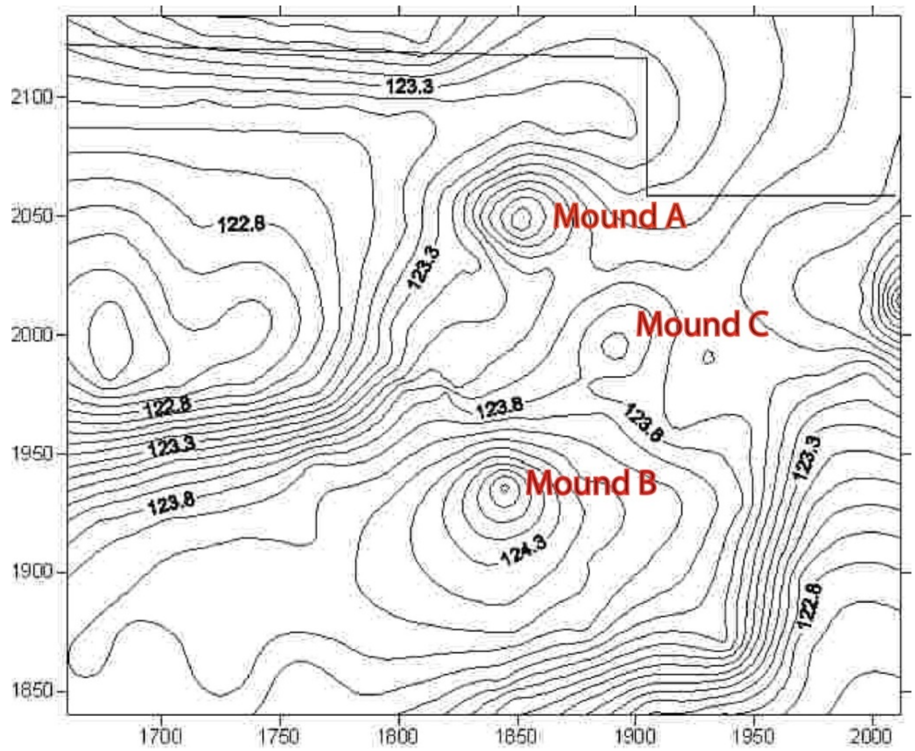

Figure 2.3. Contour map of the Washausen site (courtesy of John Kelly)

downward slightly as one moves north toward Mound A, and rises gently southward towards Mound B. Today, Mound A stands approximately 0.5-0.7 meters high (124 meters amsl), and Mound B stands about one meter high (124.6 meters amsl). Originally, both mounds would have been higher. The remnant of a potential third mound (Mound C) along the eastern edge of the plaza is barely visible on the landscape today, and measures roughly 0.2-0.3 m above the surrounding terrain.

The central mound-and-plaza complex is bounded on its northwestern and southeastern sides by low-lying, swales and depressions. In fact, Mound A, on the northern edge of the plaza, abuts a swale that today serves to funnel groundwater into an irrigation ditch just to the west. To the southeast of the plaza, just beyond Mound B, the ground rises to a flat, sandy ridge that runs in a general southwest-to-northeast direction. Just beyond this ridge to the southeast, the ground

Figure 2.4. Photographs showing Mound A (top) and Mound B (bottom) at the Washausen site, outlined in red (photograph by author).

slopes down precipitously (more than a meter), forming another southwest-to-northeast oriented swale depression (which held standing water at times during my 2011 field season).

North of Mound A and beyond the swale depression north of the mound, the ground gradually rises again to form a natural ridge. It is on this northern ridge and on the ridge just south of Mound B, that the extent of pre-Columbian occupation at Washausen is currently known to have existed (see Chapter 3; Barrier and Horsley 2014; Betzenhauser 2011). It is possible, however, that occupation at Washausen extended further north and northeast, but the construction of the Fountain Creek levee has covered the original ground surface.

Evidence of pre-Columbian occupation at the site extends eastward, but the density of subsurface features and surface materials declines as one moves toward the modern railroad (see below; Chapter 3). A similar pattern is seen as one moves west from the central site area, as subsurface features and the density of surface materials drop off significantly as close as 100 m from the plaza center (see Chapter 3; Bailey 2007; Chapman 2005). Surface remains were recovered on the sandy ridge about 500-600 m west of Washausen's center (John Kelly, personal communication 2011). This area has been given a separate site designation and named the Hawkins site.

After the creation of a site grid, Kelly laid out a nine hectare grid for systematic surface collections. Nine 100 meter square blocks (labeled A through I) were laid out. Within each nine blocks, 100 10 x 10 meter sub-blocks were demarcated (labeled 1 through 100), and each of these 10 square meter sub-blocks was further subdivided into four 5 x 5 meter collection blocks (labeled a through d) (see Bailey 2007; Chapman 2005).

Initially, only the southern half of Blocks C and D and the northern half of Block E received 100 percent collection coverage. After these areas were collected, a ten percent random sampling strategy was used in the remaining 100-square-meter blocks. Researchers later returned to the site for additional surface collection coverage. As reported by Betzenhauser (2011:268), 100 percent of Block A was collected, as well as 75 percent of Block B, 50 percent of Blocks C, D, F, and H, and 25 percent of Blocks G and I. Since 2006, Kelly has continued to opportunistically piece-plot diagnostic surface materials encountered during subsequent site visits (John Kelly, personal communication 2011).

The primary objective of the surface collections was to refine understandings of the chronology of occupation at the site, and to assess the possibility that the area between Mounds A, B, and C was the location of a plaza at Washausen. Analysis of surface materials have been conducted by Chapman (2005), Bailey (2007), and Betzenhauser (2011:265-267) (see Betzenhauser 2011:Figure 6.27), and the results of distributional studies (not including the more recent opportunistic finds) have been described by these researchers. Summarizing their results, ceramic surface remains place occupation of Washausen primarily to the local Lindeman through Early Mississippian Lindhorst phases of the late tenth through early eleventh centuries A.D.

The presence of a public plaza located between the mounds is supported by a lower density of surface materials within the bounds of the proposed plaza-space, with a much higher density of artifacts along its margins (Bailey 2007). In addition, the majority of red-slipped sherds (e.g., especially of the Monks Mound Red type) were located at the western and eastern margins of the plaza and near the plaza's center. The areas just to the southeast and southwest of Mound A also produced high frequencies of surface materials, including fragments of red-slipped ceramics, Mill Creek chert, sandstone, and basalt.

Geophysical surveys have also been used at Washausen to investigate the site's spatial configuration. Initial geophysical survey at Washausen was conducted by Betzenhauser in April of 2004, and again in 2007 (Betzenhauser 2011). John Kelly oversaw geophysical surveys at the site in May of 2004, and again several months later (see Burks 2004; Bailey 2007). Geophysical techniques were employed by both researchers in order to assess site layout, including the spatial relationship between the mounds and plaza. In addition, Betzenhauser (2011) used these survey techniques to better understand the spatial composition of subsurface features, and to aid assessment of potential changes in site layout at early Mississippian sites throughout the larger region.

Betzenhauser (2011) employed both magnetometry and resistivity at Washausen. Her surveys covered a total of 12,180 m^2, an area running from the northern levee, across Mound A and the plaza, to Mound B. A strip of land running east from Mound B was also surveyed. Betzenhauser's resistivity survey was completed over Mound B. Kelly (John Kelly, personal communication 2011) also utilized both magnetometry and resistivity at the site. His magnetic surveys focused specifically on the plaza area, and he conducted a resistivity survey over Mound A.

The geophysical surveys completed by Betzenhauser (2011:128-132) and Kelly (Bailey 2007) lend further support that the area between Mounds A and B was the location of a plaza at Washausen. Further, their surveys show that both Mounds A and B were originally constructed as square or rectangular monuments, even though they now appear conical-shaped as a result of annual plowing. Betzenhauser (2011:128-132) was also able to identify several anomalies that appear to represent structures, and commented on the potential presence of courtyard group configurations at the site.

Previous excavations directed by both Betzenhauser and Kelly have provided important information about the pre-Columbian occupation at the Washausen site. Of particular importance was Betzenhauser's excavation of two structures (her TU 6 loci) and a midden area (TU 7) (Betzenhauser 2011:132-139, Figure 5.34). Unit TU 7, a 2 x 2 m unit, was placed approximately 20-25 meters north of Mound A, and was excavated to a depth of 45 cm below surface. Below the plowzone, three separate midden fill zones were encountered, described as dark, organic-rich soils. The excavation of TU 7 was not completed to sterile subsoil; however, midden fill was noted as running the extent of the unit's horizontal profile.

Betzenhauser's TU 6 was placed north of Mound A near the northern levee (Betzenhauser 2011:Figure 5.34). Excavation of this test unit encountered feature fill and was subsequently expanded to cover an area of 28 m^2 to partially reveal two superimposed basin structures. Both structures were constructed with individually set wall posts. The lower (older) structure was labeled Feature 1, and the upper (younger) structure was labeled Feature 2 (Betzenhauser 2011:Figures 5.37-5.41).

Feature 1 has a depth of 46 cm below surface, and a floor area of approximately 8.5 m^2. A total of ten fill zones were identified, composed of light, dark, and burned fills. Evidence collected by the excavator suggests that this structure was dismantled prior to the construction of the overlying structure (Feature 2) (Betzenhauser 2011:135-137). Remains of burned thatch were removed from the fill of Feature 1, likely from the placement of burned materials soon after this structure was dismantlemed. A radiocarbon date on this thatch produced a calibrated date of A.D. 960 +/- 70 (Betzenhauser 2011:136). This radiocarbon date places the abandonment of Feature 1 as early as the Range-George Reeves phases, although the corresponding ceramic remains suggest a later Lindeman phase (late tenth century) abandonment. As noted by Betzenhauser (2011:136), the one-sigma error range of the dated sample extends into the

Lindeman phase. A width/length ratio of 0.59 for Feature 1 is more similar to Early Mississippian Lindhorst phase structures at the Range site.

Sometime after the infilling of Feature 1, a later single-set post structure (Feature 2) was constructed (Betzenhauser 2011:137-139). This later structure was offset just to the west of Feature 1, but partially extended into Feature 1 fills. Excavations show that Feature 2 was a smaller structure, with a floor area of 6.6 m^2, a basin depth of 38 cm, and a width/length ration of 0.66. The size and shape characteristics of Feature 2 compares to Lindeman-Lindhorst phase structures at the Range site, as well as to Lindeman phase structures at the nearby Divers site. A total of six fill layers were identified during excavation of Feature 2. As noted by the excavator (Betzenhauser 2011:138-139), Feature 2 fills contained fewer artifacts than Feature 1, and may have accumulated from natural erosion, rather than having been intentionally filled by local residents.

The 2011 University of Michigan-Washausen Archaeological Project (UM-WAP)

Previous fieldwork conducted at Washausen by John Kelly and his colleagues and Alleen Betzenhauser provided important information that I drew upon in my field investigations at the site. As summarized above, their work provided information about site layout and monumentality, site chronology, and off-mound occupation. Their work has shown that: (a) Washausen was the location of an early mound-and-plaza center in the central American Bottom; (b) it was occupied from at least the Lindeman (A.D. 950-1000) through Early Mississippian Lindhorst (A.D. 1000-1050) phases; and (c) occupants of Washausen maintained living space beyond the mound-and-plaza complex, possibly in courtyard group configurations.

With this information in hand, I recognized that the Washausen site could yield information about social processes that occurred during the early Mississippian transition in the central American Bottom. I devised a research strategy for new fieldwork at Washausen, GIS spatial analyses, artifact analyses, and radiocarbon dating. As director of the University of Michigan-Washausen Archaeological Project (UM-WAP), I oversaw an extensive geophysical survey, and directed more than five months of excavations at the site. In the remainder of this chapter, I will provide an overview of my fieldwork.

Season One – Geophysical Survey

In February 2011, I oversaw an extensive geophysical survey at Washausen covering an area of 8.17 ha (approximately 81,700 m^2; Barrier and Horsley 2014). The survey block was situated to encompass the entire mound-and-plaza complex as well as significant areas in all directions. This work was designed as a high resolution survey in order to obtain information about the entire area of major occupation of the site (Horsley et al. 2014).

Magnetometry was utilized in the 2011 survey that took place over a course of nine days. Conditions at the time were cold, and a thin layer of ice and snow covered the site. Magnetometry is commonly applied in archaeological investigations and can be used to detect a wide range of buried features over large areas (Aspinall et al. 2008; Benech 2007; Clark 1990:64-98; Gaffney and Gater 2003:36-42; Kvamme 2006). A *Bartington* Grad601-2 dual fluxgate gradiometer was used. Readings were recorded at 0.125 m intervals along traverses spaced 0.5 m apart, all collected in zigzag mode using marked guide ropes. This procedure was carried out across multiple 30 x 30 meter units, with smaller blocks utilized near field edges.

Following data collection, limited data treatment was undertaken. Processing was restricted to: (1) clipping the data to within 30 nT; (2) sensor de-striping to correct for differences between the two sensor pairs (Horsley and Wilbourn 2009); (3) slight de-staggering (.06 meters) on a few grids to correct for positional shifts between adjacent transverses (see Aspinall et al. 2008:124-126); and (4) limited edge-matching to ensure smooth transitions between adjacent grids. The data were then interpolated to increase the spatial density from a resolution of 0.5 x 0.125 meters to 0.25 x 0.125 meters (using a non-linear *sin(x)/x* function) (see Aspinall et al. 2008:133-134; Scollar et al. 1990:502-504). The resulting image was then imported into a geographic information system (GIS) database for integration with maps, satellite images, and other archaeological spatial datasets.

The survey's traverses were aligned to follow recent plow furrows, roughly parallel to the northern levee running in a northwest-southeast direction. This strategy was taken in order to minimize magnetic noise caused by recent plow scars. Our geophysical survey grid was established using a total station, and shot in at several points to Kelly's site grid (see above). After the survey, the geophysical data were converted to Kelly's grid.

The northern and eastern limits of the geophysical survey were bounded by the northern levee and the railroad berm to the east. To the south, the survey grid extended approximately 105 m south of Mound B where the surface slopes into a low-lying swale depression. The survey extended west approximately 165 m. Although magnetic anomalies representing subsurface features appear to extend north beneath the levee, and a low density of anomalies likely extend west past the survey limits, the spatial extent of our magnetometer survey appears to have encompassed the area of major occupation at Washausen.

The results of our geophysical survey and interpretations of the magnetometer data are presented in Chapter 3. In brief, our results support many of the interpretations of previous researchers. The central Washausen site appears to have been the location of a mound-and-plaza complex. In many areas beyond these central monuments, subsurface features were identified that represent the remains of a village at the site.

Our results, owing in part to the "total" coverage of the survey, demonstrates that off-mound occupation of the site was more substantial than previously recognized, particularly in the southern and southeastern portions of the site. In addition, the distribution of basin structures confirms the presence of residential courtyard groups at Washausen around the central mound-and-plaza complex.

These survey results were instrumental in devising a research design for conducting my excavations at the site. The magnetometer data helped establish an excavation strategy that allowed me to target subsurface features to address my research questions. A description of my excavation methods follows.

Season Two – Excavations

From July through December 2011, I directed excavations at the Washausen site. I opened a total of 54 square meters, distributed across six excavation loci (see Figure 4.1). Using information from our geophysical survey, my excavations were designed to sample intact subsurface features, including (semi-subterranean) basin structures and other features. Time and available labor allowed for a total of five basin structures (and internal features) to be sampled, as well as one external pit.

Using a total station, 1 x 1 meter units were placed on top of selected anomalies. The plowzone deposit from each unit was excavated as one level, and was screened through ½ inch wire mesh. Below the plowzone, a majority of units (~70%) were hand-excavated to sterile subsoil, and sub-plowzone sediments were screened through ¼ inch wire mesh. Approximately

30 percent of the units were excavated to the base of the plowzone, in order to outline and expose the spatial dimensions of basin structures.

Artifacts were bagged according to their horizontal and vertical spatial contexts. All features were excavated following their natural stratigraphy. Within natural zones, smaller arbitrary levels were sometimes excavated separately. Standardized forms were used to record information about features, soil/sediment characteristics, artifacts, elevations, and other pertinent details. Profile and plan-view maps were produced for each completed excavation locus and digital photographs were taken. Internal features encountered at structure floors, including posts as well as pits and hearths, were mapped, photographed, and excavated separately. Additional samples were collected within each excavation locus. A total of 56 soil samples was collected for water flotation in order to recover botanical and zooarchaeological remains from feature contexts. Organic remains were collected for AMS radiocarbon dating.

Five basin structures were partially excavated during Season Two. Initially two 1 m-wide trenches were laid out in a cruciform pattern over three basin structures (Structures 1, 2, and 3; see Chapter Four). Additional units were then opened over the anomalies to create wider trenches for more horizontal exposure. Each unit was excavated to the base of the plowzone to expose the edges of these features in several directions. This method served to ground-truth the geophysical data, by showing that the magnetic anomalies accurately matched their actual subsurface locations.

After the dimensions of these three basin structures were mapped at the base of the plowzone, several contiguous units were excavated through structure fill until I encountered sterile subsoil or internally-placed floor features. Detailed plans were drawn to record the linear dimensions of structure floors, including the position and shape of wall posts, pits, and areas of soil disturbance. Profile maps were created to record the stratigraphy of the fill that accumulated in the basins.

Soil samples for flotation were collected at various depths from structure fill, and soil samples were collected when zone changes were encountered and from fill layers that contained higher concentrations of organic materials and artifacts. When soil or radiocarbon samples were collected from fill layers, they were mapped. Care was given to record their vertical and horizontal proveniences on profile maps, so they could be linked to specific strata in the basin fill.

All intramural features (e.g., posts, pits, hearths) encountered at the base of structures were given individual feature designations and excavated separately. Remains of pits and wall posts were initially bisected or quartered to reveal their depth and morphology, as well as internal fill stratigraphy. Each feature was then mapped and photographed, and when possible, samples were collected from each feature for flotation and radiocarbon dating.

Two additional basin structures were also partially excavated (Structures 4 and 5; see Chapter 4). Over both of these structures, a 1 x 2 meter unit was laid out to intersect one edge of each feature, positioned to maximize excavation of feature fill and expose structure floor space. Similar to the excavation of other structures, the plowzone was removed initially. Then excavations were carried to subsoil, following methods described above. Internal features located at the base of these structures were similarly excavated and recorded.

Several magnetic anomalies thought to be the locations of subsurface pit features were cored using a 7/8 inch diameter soil probe. One feature was then selected for excavation. A 2 x 2 meter unit was laid out and excavated to the base of the plowzone. A oval-shaped feature was revealed and mapped, and designated Feature 19. Next, Feature 19 was bisected and excavated to sterile subsoil. A profile map was drawn, photographs taken, and a soil sample for flotation was collected. Feature 19 likely represents the remains of a shallow pit that was cleaned out prior to being filled via natural erosion. No artifacts other than a handful of small pieces of burned soil were recovered from within Feature 19.

In the following chapters, I present the results from the 2011 field investigations. Chapter 3 describes Season One's geophysical survey. Spatial information about the Washausen settlement is used to discuss community organization, and demographic information for Washausen is placed within a regional framework that charts a diachronic trajectory of village growth and decline leading up through the early Mississippian transition in the region. Chapter 4 presents results of Season Two's excavations, as well as data produced from artifact analyses and radiocarbon dating.

CHAPTER 3
SHIFTING COMMUNITIES: THE SPATIAL ORGANIZATION AND DEMOGRAPHIC DEVELOPMENT OF THE WASHAUSEN COMMUNITY

In this chapter I provide a description of the spatial organization of the Washausen site utilizing data collected during the 2011 geophysical survey. The geophysical data are used to produce a relatively complete map of the site displaying the patterning of distinct, residential courtyard groups distributed around a centrally located mound-and-plaza complex. First, I present the spatial organization of Washausen, and I focus on the extent, layout, and arrangement of monuments, plaza spaces, and structures. Then I consider Washausen's development within its local social and environmental landscape, and I feature the arrangement of numerous courtyard groups around the site's plazas and mounds. After this, I chart the growth of the settlement within a regional and diachronic historical framework. The growth of the community at Washausen illuminates an historical trajectory marked by the development of larger aggregated village settlements through time in the central American Bottom. The growth and decline of villages through time, I argue, occurred through a process of serial residential migrations within the larger region, enacted by the fissioning and re-aggregation of residential courtyard groups.

The Organization of Community at Washausen

Results from the 2011 UM-WAP magnetometer survey at Washausen provide data that are used here to consider the spatial organization of the Washausen community. The geophysical results are used to infer the extent and range of buried archaeological features at the site. The processed magnetometer data are displayed in Figure 3.1. In the section below, I provide a brief description of pertinent community elements.

Mound A. Mound A currently measures more than a half meter in height (approximately 0.5-0.7 m), and has been deflated by modern plowing. The geophysical data reveal Mound A as a rectangular anomaly, measuring roughly 28 x 25 meters, with probable borrow pits to its west and east. Interestingly, our results reveal that Mound A is not homogeneous throughout – magnetic contrasts probably indicate different sources for the construction materials, with outer and inner walls potentially being constructed from weakly magnetic material, and more magnetic materials used to fill in between. This observation of possible mound construction techniques is consistent with those reported by Sherwood and Kidder (2011) for mounds throughout the greater Southeast.

Mound B. Mound B currently stands approximately one meter in height, and has also been deflated from plowing. The area of Mound B is largely obscured by a spread of intense magnetic noise associated with debris from a nineteenth or twentieth century farm shed that once stood on or near this mound. A slight gap in this magnetic noise indicates the top of the mound, where both the mound and the historic debris have been truncated by plowing, and correlates well with its location indicated by soil marks in aerial photographs. A resistivity survey

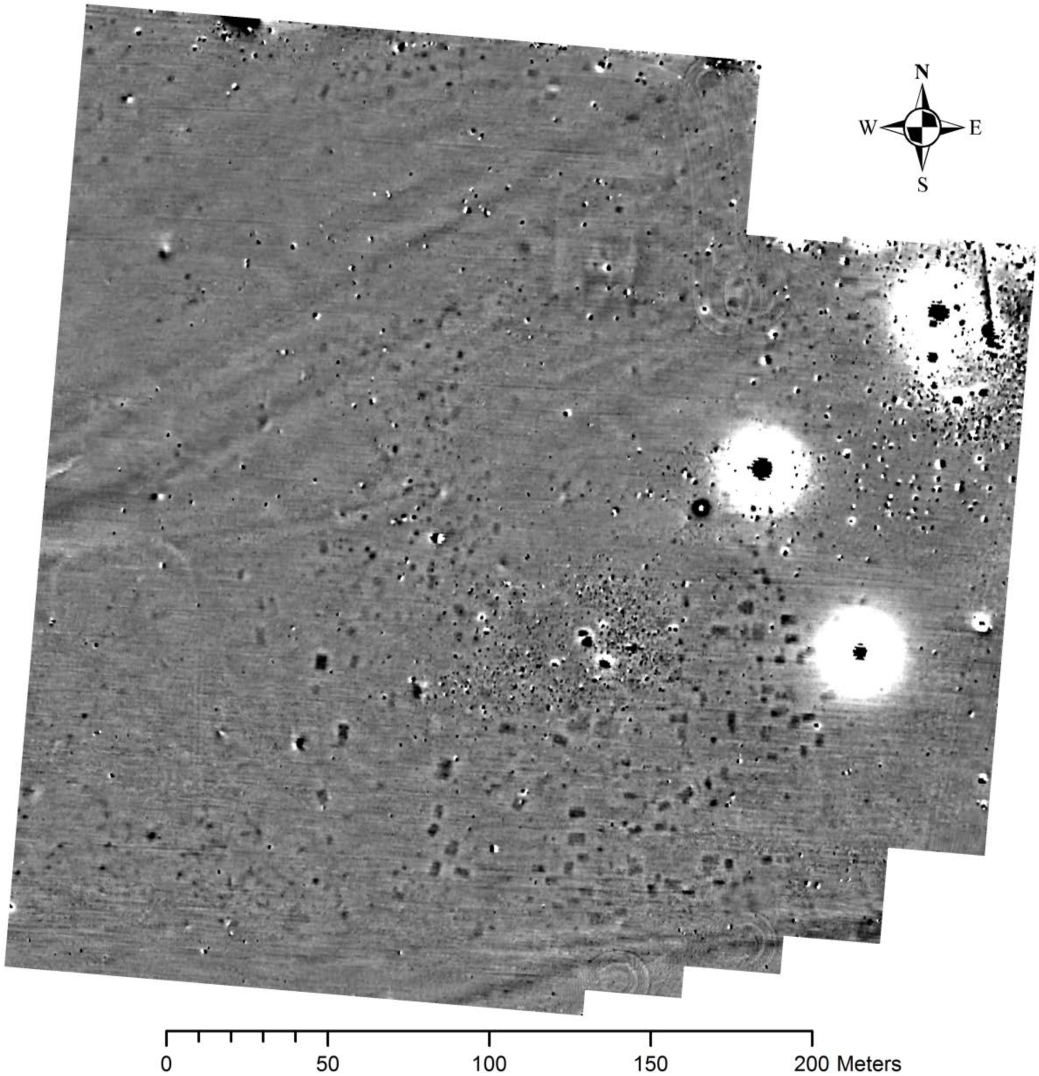

Figure 3.1 Gray-scale of processed magnetometer data, plotted from -3.5 nT (white) to +3.5 nT (black) (from the 2011 UM-WAP geophysical survey).

conducted by Betzenhauser (2011:Figure 5.32), however, provides evidence that Mound B was also a square/rectangular monument.

Mound C. No magnetic response has been identified over the slight rise believed to indicate this mound, although the lack of a magnetic signature could be due to an intense anomaly caused by a large piece of buried iron, possibly a nearby well. Despite the lack of geophysical evidence for an anthropogenic origin for this small rise, it is clear that it occupies a position adjacent to the plaza in an area where no basin structures or pits have been detected.

Plaza. Bounded by Mounds A and B to the north and south, possibly by Mound C to the east, and occupation features to the west, a rectangular area (measuring approximately 72 x 68 m) with few magnetic anomalies provides strong evidence for the length and width of the plaza. In the southern half are a small number of magnetic anomalies consistent with large post-pits and possibly a series of other pits. These results validate the delineation of the plaza based on surface materials (Baily 2007; Chapman 2005), and also correspond to general designs of late prehistoric mound-and-plaza layouts across southeastern North America (Kidder 2004; Lewis et al. 1998).

Circular Anomaly. A large ring, roughly 40-44 m in diameter, is visible in the magnetometer data west of the main concentration of occupation features. Such a negative magnetic response usually indicates an earthen bank, and it is clear that in places it has been truncated by plow damage. No signs of this anomaly are visible from the surface or from aerial photographs.

Courtyard Groups. The magnetometer data reveal the distribution of semi-subterranean (basin) structures and other features across the site. Based on comparisons with excavated late-prehistoric components throughout the American Bottom (Kelly 1990a; Kelly et al. 2007; Mehrer and Collins 1995; Pauketat 1994, 2003), it is possible to infer the presence of distinct, residential courtyard groups at Washausen. Courtyard groups typically consist of a number of structures ringing central spaces marked by pits, posts, and other associated features. Most common within pre-A.D. 1050 components, courtyard groups have also been recovered at early Mississippian (post-A.D. 1050) sites in the region (Alt 2001, 2002; Pauketat 2003). Archaeologists suspect that courtyard groups, in the American Bottom region and elsewhere in the Mississippian world, are the material expression of extended family kin groups, possibly lineages (Barrier 2011; Kelly 2000:167; Muller 1997:190-192; Wilson 2008:87-90). At Washausen, basin structures seem to be oriented in a north-northeast to south-southwest or west-northwest to east-southeast direction, possibly respecting a main spatial axis of the community and the mound-and-plaza complex.

Secondary Plaza. One grouping of buildings stands out in particular. Highlighted in Figure 3.2, large basin structures define a square-shaped plaza arrangement located in the south-central area of the settlement. Buildings marking the perimeter of this plaza are aligned, more-or-less, in a north-south or east-west direction. In the center of this group is a basin structure offset about 35-40 degrees from the dominant alignment. This building group appears to align with a potential site grid, as defined by the site's central mound-and-plaza complex. The area delineated by these perimeter buildings measures approximately 50 x 50 meters. This space is roughly two times larger than the two early plazas at the largest Emergent Mississippian village at the nearby Range site (Kelly 1990a:Figure 40). Thus, the open space delineated by this group's perimeter buildings likely served as a secondary plaza for the community.

Local Development of the Washausen Settlement

My description of various community elements at Washausen is based on the 2011 UM-WAP geophysical results, as well as targeted excavations at the site. Major elements include the central mound-and-plaza complex (with two or possibly three earthen mounds flanking the open, central plaza), a secondary plaza, and several distinct residential courtyard groups. Although delineation of clear-cut boundaries between inferred residential groups cannot be marked using geophysical data alone, the relatively "clean" magnetometer results support the short span of site

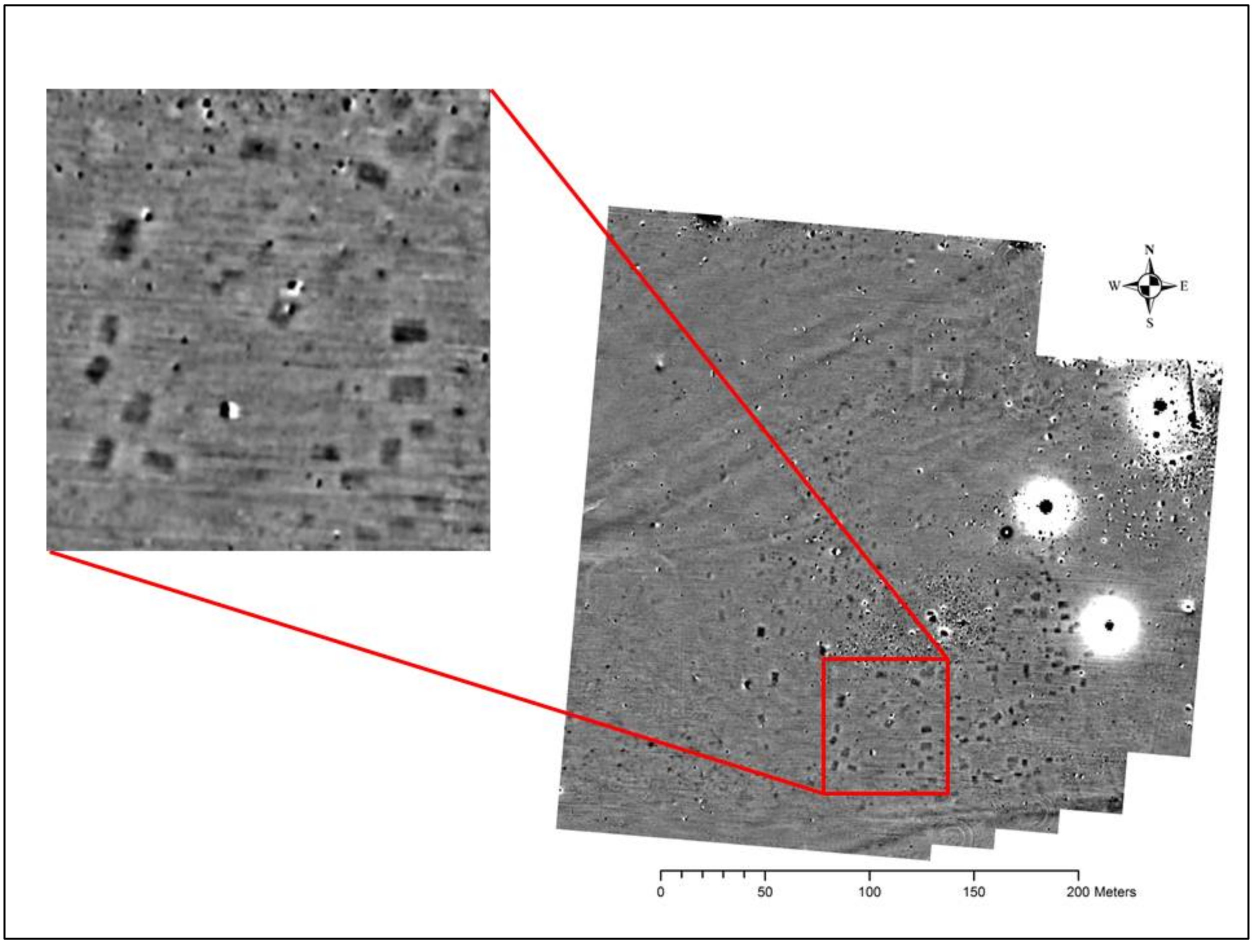

Figure 3.2. Gray-scale of processed magnetometer data, displaying secondary plaza at Washausen.

occupation formerly suggested by Kelly and others (see Chapter 2; and results of AMS radiocarbon dating, Chapter 4). In other words, the geophysical data do not represent a palimpsest of multiple and overlapping temporal components that would mask synchronic patterns.

Taken together, these data suggest that the Washausen site was likely occupied over the course of at least two to three generations. Over such a span of time, family group sizes would have waxed and waned, and residential areas would have evolved as structures were refurbished, enlarged, put into disuse, used as refuse pits, and replaced by new structures (Milner 1986;

Pauketat 1989, 2003; Welch 2006; Wilk 1983; Wilson 2008). Individual social groups would have reformulated the spatial parameters of their place on the landscape as they adjusted to mound and plaza construction, the growth of neighboring groups, the arrival or fissioning of other groups, increased need for storage space, and evolving ritual obligations important for each group. Below, I consider the developmental history of the short-term Washausen settlement through consideration of the local built environment, focusing mainly on the distribution of inferred residential structures across the site's landscape.

Two general areas of occupation are evident: one encircling the main mound-and-plaza complex, and another in the northern portion of the presently known site. In the northern area there are at least two to three clusters of structures. Other occupational features likely extend further north, but a levee built to channel Fountain Creek during the twentieth century has covered any evidence. The northern groups of structures are separated from the central area of the Washausen settlement by a low-lying swale that serves to drain a large portion of the site during times of heavy rains. This swale aligns to buried paleochannels detected during the geophysical survey (Figure 3.3), and likely would have been inundated with standing water during extended periods of most years (Milner 1998:Chapter Two; Milner and Oliver 1999; Schroeder 2004). Located to the southeast of this swale is the central area of the Washausen settlement. Several courtyard groups and other occupation features were distributed around the mound-and-plaza complex.

In order to estimate the population of the Washausen site, I have followed approaches developed elsewhere in the American Bottom (Milner 1986; Pauketat and Lopinot 1997). Rectangular anomalies matching expectations for residential dwellings are designated and their

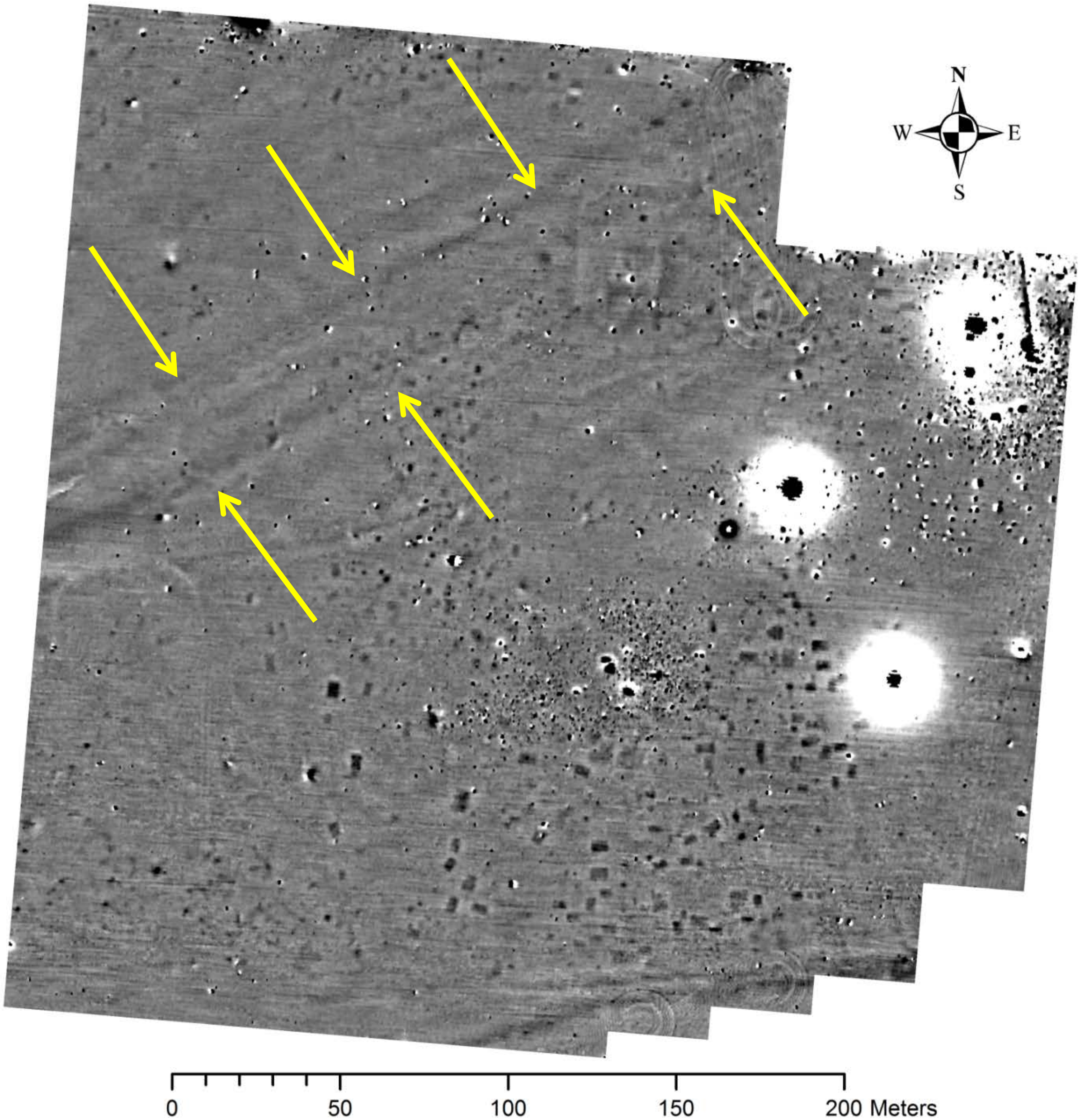

Figure 3.3. Gray-scale of processed magnetometer data, with yellow arrows referencing buried relict paleochannels.

areas calculated (see below). A total of 190 likely residential structures are distributed across the known site. The mean area of these 190 buildings is 7.5 m^2 (s = 3.5 m^2).

The occupation southeast of Mound B is located on the highest and flattest land at the site. This area corresponds to a high sandy ridge running in a generally east-west direction. The southeastern most courtyard groups and the buildings flanking the southern perimeter of the secondary-plaza sit adjacent to a drop-off well over a meter. Another low-lying swale is present here that held standing water during my fieldwork season in 2011. As one moves north and northwest of Mound B across the central plaza, the ground surface begins dropping in elevation and soils become less sandy, composed of higher clay content, and less well-drained.

Mound A's placement abuts the low-lying swale that separates the central site area from the occupation structures near the levee. Just to the northwest of Mound A, there is a paucity of magnetic anomalies that further indicates that this area would have been too wet for sustained occupation. The construction of Mound A at the edge of a swampy area may be related to the history of occupations at Washausen, as will be discussed below.

History of Occupation at Washausen

Washausen is one of a handful of the earliest known settlements in the American Bottom whose residents participated in constructing earthen platform mounds (Kelly 1990b:135; Milner 1998:105-106; Pauketat 2004:59). Little is known about the earliest period of mound building in the region, however. In the central American Bottom other mound settlements, like the one at the nearby Pulcher site, may also have been experiencing population growth (Figure 1.1). Residents at Pulcher eventually constructed up to 13 or 14 mounds (probably between A.D. 1000 and 1200); however, the history and sequence of site occupation and mound construction is poorly understood (Kelly 1993). From limited excavations and surface reconnaissance, it appears that the earliest mounds may be attributable to the local pre-A.D. 1050 Lindeman phase, and it is likely that many of the mounds were constructed during early Mississippian times. As at early Cahokia, where pre-Mississippian villagers organized into individual courtyard groups occupied the banks of Cahokia Creek (Pauketat 1994:169), the Pulcher occupation debris lies along the banks of Fish Lake in a series of discontinuous clusters (Griffin 1977; Kelly 1993). As Kelly has stated:

> although defined on the basis of the mounds [present]… the actual definition of Pulcher is still somewhat elusive, especially since the site has not been systematically surveyed. Freimuth (1974:1) suggested it covered '500 acres plus'… Fowler (1969:367, 1978) described a site encompassing 300 acres, and Gregg (1975) reduced the area to 100 to 200 acres. While these areas may represent the site as bounded by the mounds, such estimates can be extremely misleading, especially if they are interpreted by others as the area of residential occupation [Kelly 1993:443].

Kelly continues:

> It is important to realize that most of the investigations (testing and surface collections) have been restricted to the northwest portion of the central group. Tim Pauketat… who has walked a large portion of the site area, indicates that most of the occupation is along the terrace edge contiguous with Fish Lake and even this is discontinuous, a term Griffin (1977) used to characterize the site. Griffin (1977) also noted that the distribution of the Pulcher mounds is not a typical Mississippian pattern in that they are not arranged about a central plaza [Kelly 1993:443].

With this minimal knowledge of the greater Pulcher site, a few observations can be made. First, it appears that the early occupation of the site was adjacent to the banks of Fish Lake, along a high terrace running in a generally north-south direction. Second, areas of residential occupation are not continuous here, but distributed into clusters, possibly associated with individual mounds. Third, other mounds were constructed along an elevated ridge extending out in an eastward direction from Fish Lake, and it is likely that occupation zones and possibly a central plaza were constructed on this east-west running ridge. Thus, Pulcher may have grown through the arrival of distinct social groups throughout its history, groups whose residential spaces were associated with adjacent mounds and possibly with plazas.

If mounds and adjacent residential groups are thought of as separate sociopolitical entities, in line with Blitz's (1999; Blitz and Lorenz 2006:19) description of "mound-political units" in his fission-fusion model, then sites like Pulcher should not be viewed as static settlements. Rather, the histories of settlements' growth and development can be modeled, and these models can be tested with archaeological data. In reality, many of the mounds making up the Pulcher complex may have, at least originally, marked "separate entities" (Kelly 1993:443) the products of distinct social groups, whose houses and their associated mound spread out along the highest elevated ridges near productive wetlands and agricultural areas (see Milner and Oliver 1999; Schroeder 1997, 2004).

Similarly at Washausen, initial occupation areas, composed of distinct courtyard groups, may have been spread out along high ridges. Thus, the northern occupations would have lined the banks of Fountain Creek and the most southeastern occupation groups would have clustered onto the high and flat sandy ridge where Mound B is located. This southeastern occupation zone appears to have become the most densely populated area at Washausen, and was closely affiliated with the settlement's secondary plaza, public ceremonial events, and a rare T-shaped building that served a specialized (non-domestic) function (see Chapters 4 and 5).

Milner (1986) has noted that through time across the American Bottom floodplain, there was a general trend for households to relocate to higher elevations. Thus, one scenario for the history of Washausen's development would predict that initial use of the site would be around the central mound-and-plaza complex, on its eastern and western boundaries. If this was the case at Washausen, the use of the central plaza as defined by two or three mounds would have maintained its original parameters marking a centrally important public space; that is, mounds were constructed to mark an extant plaza between the earliest occupied courtyard groups (see

Kidder 2004) as residents at Washausen moved to higher ground on the site's northern and southeastern ridges.

A more likely scenario, however, is that the earliest arrivals forming residential groups at Washausen settled on the highest ridges at the site, along the banks of Fountain Creek (the northern area of the site) and then settled on the ridge southeast of Mound B. As the Washausen village grew and began attracting more residents, just as they were also being pulled into Pulcher and Cahokia (Beck et al. 2007:842; Kelly 1990 a, 1990b, 2002, 2007a), these later-arriving groups would have filled previously unoccupied spaces on gently sloping and less well-drained soils (around the central mound-and-plaza complex). As such, the act of constructing the mounds themselves and sanctifying a central ritual ground would have served to better integrate numerous groups living under conditions of greater nucleation and population densities.

Radiocarbon dates produced from organic samples from the northern and southeastern ridges at Washausen provide information about the history of occupations at the site, and support this second scenario (described in detail in Chapter Four). A total of ten AMS dates were run on organic materials recovered during the 2011 UM-WAP excavations, and one extant radiocarbon date was given in Betzenhauser (2011). These 11 absolute dates suggest that both ridges were locations of activity starting during the tenth century A.D. and lasting into the eleventh century, with perhaps the southeastern ridge being occupied more intensely during the eleventh century.

Under this second scenario of Washausen's historical development, the construction of Mound A on the edge of a low-lying swampy area (adjacent to the low-lying, relict paleochannel) would have fixed the central plaza not upon the highest and flattest ground at Washausen (where groups were already living), but on gently sloping terrain not being used for residential space. This scenario is not unlike the emerging picture of Cahokia's early development. Schilling's (2010, 2012, 2013) recent work dating the construction of Monks Mound places its initial construction around A.D. 1100 or later, and it seems to have been erected in rapid fashion thereafter. He proposes that the placement of Monks Mound was necessitated by the positioning of several extant, large social kin groups that already maintained important residential and ritual spaces, plazas, and mounds on the highest grounds. As Schilling states:

> coring located the original ground surface beneath Monks Mound and demonstrates that the premound surface slopes almost three meters from Southeast to Northwest. On the one hand, this slope is not the optimal placement for a large earthen structure and probably exacerbated slumping on the western slope. On the other hand, the Ancient Cahokians may not have had a choice given the necessity to place Monks Mound – the center of the world – in that particular place. Although, conjectural, given the meaning of platform mounds in Eastern North American Indian beliefs, it may have been necessary to put Monks Mound in that specific location in spite of poor topography [Schilling 2010:285].

If the growth and development of Washausen followed a trajectory similar to those posited for early Pulcher and Cahokia, then the histories of social institutions like the residential courtyard group must be given a new primacy in the study of Mississippian development. Much productive research on the emergence and constitution of complex societies has been top-down, focusing on institutions, groups, or individuals at the apex of political hierarchies; another productive approach is to study the organization and integration of institutions and groups that interact to induce dynamically shifting historical arrangements (Crumley 2007). The courtyard as a kin group undoubtedly had a dynamic history as a core structuring institution of early Mississippian society, and dramatic shifts through time in the importance of this institution should not be overlooked.

The Mississippian world across the greater Southeast is replete with cases of polity growth and decline, often through processes of aggregations and dispersals at both previously occupied and entirely new mound centers (e.g., Boudreaux 2013). In the American Bottom region, a protracted movement towards greater nucleation and larger scales of both intra- and inter-site integration is evident when viewed at a gross scale. But from a more time-sensitive scale, we see the dynamic movement of residential groups across the landscape, and we can chart recurrent patterns of aggregation and dispersal as nucleated villages and towns developed for periods of time before being abandoned or becoming the location of smaller settlements (Alt 2001; Emerson 1997; Kelly 1990b, 2002; Milner 1990; Pauketat 2003).

One hypothesis is that Washausen grew through the addition of courtyard groups, which had broken away from nearby villages like Range (Figure 1.1; see below). Efforts to integrate larger-scale communal rituals and, perhaps, mitigate political competition are evident in the creation of the settlement's secondary plaza and construction of the central mound-and-plaza complex. However, groups at Washausen were soon drawn even deeper into ongoing regional processes of aggregation and dispersal (shown below and in Chapter 5). It appears that, within a few generations of Washausen's founding, groups began relocating to rapidly growing settlements like Pulcher or Cahokia, dispersing throughout the floodplain, or even began leaving the region altogether.

Recent research on other later Mississippian centers in the Southeast demonstrates that complexity and dramatic historical change resulted in part through the interactions of distinct corporate kin groups (Barrier 2011; Blitz and Lorenz 2006; Boudreaux 2013; Knight 2010:Chapter 9). Thus, I consider the long-term development of the Washausen settlement as resulting from the ongoing process of courtyard group aggregation and fissioning. I construct a method for calculating population for Washausen, and place its growth within a trajectory of village growth and decline in the central American Bottom. Demonstrating that early mound villages in this region developed through the fission-fusion process underscores the need for continued research, not only to document the presence and movement of corporate kin groups across the landscape, but also to explore how their interactions served to enact cultural and institutional change. Mere documentation of the presence of courtyard groups is not enough; investigation of how corporate kin groups constructed more highly integrated social communities will be the focus of later chapters.

Population and Regional Development of the Washausen Community

The last few decades of Mississippian archaeology in the Eastern United States has provided a clearer picture of the population dynamics associated with the growth and decline of these complex polities (Blitz 2010:12; Cobb 2003). Whereas earlier accounts suggested relatively long-lived, stable social systems, subsequent research has demonstrated much more flux in the occupational histories of Mississippian sites and entire regions (e.g., Anderson 1994; Beck 2003; Blitz 1999; Blitz and Lorenz 2006; Boudreaux 2013; Cobb and King 2005; Hally 1996; Knight 2010; Knight and Steponaitis 1998; Milner 1990). In many places, it is no longer assumed that the largest sites (often containing one or more earthen mound and plaza) were continuously occupied throughout the entire Mississippian sequence. Instead, it is known that centers of regional power, influence, and population often shifted between neighboring sites.

Researchers working in the American Bottom region have demonstrated that population sizes were not static throughout the local Late Woodland and Mississippian periods (Alt 2006;

Koldehoff and Galloy 2006; Milner 1990, 1998:120-125; Pauketat 2003, 2004; Kelly 1990a, 2002, 2008; Schilling 2010:309). During early Mississippian times (Figure 1.2), especially beginning in the eleventh century A.D., population increased dramatically at a handful of large mound settlements. The best evidence is from Cahokia, which during the late eleventh century grew to become not only the largest settlement in the region, but also the largest and most complex Mississippian center in Eastern North America (Fowler 1975, 1989; Hall 1975; Milner 1990, 1998; Pauketat 2004).

Archaeologists are aware that late prehistoric population increases in the American Bottom and at Cahokia resulted in part from immigration from other regions, as well as from local growth (Cobb 2005:567). In fact, evidence suggests that regional population numbers had been increasing for several centuries throughout the earlier Late Woodland period (Kelly 1990b:143-144, 1992:187-190, Figure 6.9; see also Buikstra et al. 1986) and likely continued throughout much of the Mississippian Stirling phase (A.D. 1100-1200) (Milner 1998:120-125; Pauketat and Lopinot 1997). Cahokia's population seems to have peaked earlier than overall regional numbers and were at reduced levels throughout much of the Stirling phase, likely a result of the movement of segments of Cahokia's populace to floodplain sites and beyond (Milner 1998:Figure 6.1; Pauketat and Lopinot 1997:Figure 6.3, Figure 6.4).

Previous Population Estimates for the American Bottom

Determining exact population numbers and demographic change in the past has proven difficult and challenging to archaeologists, and several techniques have been employed to produce population estimates from archaeological remains (e.g., Bandy 2005:S110; Curet 1998). In situations lacking written documentation, archaeologists have used site area, surface debris density, midden accumulation, mortuary remains, food refuse, estimates of labor requirements for monumental constructions, and architectural information as proxies for the number of people that occupied a site or region.

There has been much speculation about Cahokia's population numbers, and several reviews of this literature exist (see Milner 1986:227-228, 1998:120-121; Muller 1997:218-219; Pauketat and Lopinot 1997:103-105). Gregg (1975) was the first to put forth estimates using information about residential architecture from excavations at Cahokia. Since then, most researchers have similarly used structure densities and domestic building sizes from extant excavation data to generate population estimates for the site and the greater American Bottom region (Barrier and Horsley 2014; Kelly 1992; Milner 1986, 1998; Pauketat 2003; Pauketat and Lopinot 1997). Although published estimates vary, the shared strengths of these approaches are that they have spelled out assumptions that underlie estimating procedures and they are based on similar data (Milner 1998:121).

While much of the discussion of the region's population has centered upon Cahokia itself, other areas of the greater American Bottom receiving attention have been the floodplain region south of Cahokia and the adjacent uplands just to the east. Milner's (1986) calculations for a large portion of the Mississippi River floodplain south of Cahokia were based on architectural information from 11 excavated Mississippian sites, each representing non-mound farmsteads. Only rectangular structures were included, as other building types are considered to have served non-domestic functions. Rebuilt structures, or buildings with evidence for significant wall repair, were counted separately, and paired structures were counted as one unit. A total of 98 rectangular structures were identified, and these were used to calculate the density of single family residences for all habitable land.

Milner's (1986) methodology also accounted for structure longevity and household size. Several factors contribute to the length of time a building would have served as a residence, including but not limited to structural decay, damage from fire, infestations, as well as social and economic circumstances that contribute to residents' decisions to relocate (see Pauketat 1989:303). For his study area, Milner (1986) used house longevity estimates of three, five, and ten years. Pauketat and Lopinot (1997) used estimates of five, ten, fifteen, and twenty years for Cahokia, and Pauketat (2003) used estimates ranging from ten to seventeen years for upland Richland Complex villages, with the assumption that buildings at villages and at Cahokia would have been occupied longer than those at small farmsteads (see Pauketat 2003:47, Note 6).

Information about the number of individuals per house is also a limiting factor in reconstructions of prehistoric population demography. Following Cook (1972), who assembled ethnographic data for native groups in the western United States, Milner (1986) calculated the likely number of individuals per structure based on house size.[1] Due to increases in building size throughout the Mississippian phases in the region, Milner's estimates ranged from 4.14 to 7.11 persons per structure. Pre-Mississippian buildings, smaller on average than Mississippian structures, likely housed fewer people. Thus, Kelly (1992:188, Figure 6.9) used an estimate of 2.32 persons per structure for pre-Mississippian settlements in the central American Bottom region, and Pauketat and Lopinot (1997) used 2.55 as an estimate for pre-Mississippian Edelhardt phase buildings at Cahokia. Estimates of four and five persons per structure were later used by Milner (1998:121-124) for Mississippian Period Cahokia and by Pauketat (2003) for Lohmann to early Stirling phase upland villages.

[1] Cook's (1972:16) methodology for estimating the number of persons per structure is based on the area of living space of residential buildings. He shows that structures housing up to six individuals require 25 ft^2 of floor space per individual, and an additional 100 ft^2 of floor space is needed for any additional occupant (see also Milner 1986:231; Pauketat and Lopinot 1997:115).

Even with the use of these strict methods, there are many uncertainties and unknowns in calculating population. The major problem in estimating population in the American Bottom is establishing representativeness of the archaeological samples. According to Milner (1998:123-124), "[i]nadequate sampling is the greatest single flaw in available data" because excavated areas are unlikely to provide a perfect representation of occupation density across an entire settlement. Although the excavated area at Cahokia exceeds that for most sites, the data used to estimate population have come from excavations of the most densely occupied areas of the site and from areas excavated in conjunction with recent constructions.[2]

Sampling for the greater region is even more problematic. Milner (1998:Figure 6.1) has provided rough population estimates for the American Bottom floodplain region for the four Mississippian phases. These figures are the sum of estimates extrapolated from excavated areas at Cahokia and farmsteads, as well as an aggregate estimate for all other mound centers spread throughout the valley. Known population density figures from excavated, outlying farmstead sites were multiplied by the total area of the valley floor, minus the river and islands (Milner 1998:125). Then, since minimal occupational data exist for the majority of mound centers, estimates for Cahokia itself were doubled to stand in for the total combined population of all other floodplain mound sites. Even as he was developing this methodology, Milner (1998:125) suggested that it likely overestimated the total floodplain population, in large part due to the assumption that populations were evenly distributed throughout the entire stretch of the American Bottom.

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[2] Milner (1998:Figure 6.1) presents a series of population estimates, ranging from low to high, for the region. His American Bottom floodplain estimates range from about 20,000 to 50,000 for the Stirling phase. For Lohmann phase Cahokia, Milner gives a high-end population estimate of about 8,000 residents. Pauketat and Lopinot (1997:Table 6.3) give a Lohmann phase estimate of about 15,000 for the site. Pauketat (2003:Figure 5) gives slightly higher estimates for Lohmann phase Cahokia based on a 50-year phase duration and a house longevity estimate of 10 years.

Methodology for Calculating Population Estimates for Washausen

The results from the 2011 UM-WAP geophysical survey allow a series of population estimates to be calculated for Washausen and provide demographic information about a pre-Columbian American Bottom mound center other than Cahokia. Estimates given herein are calculated using architectural information from the site (following Kelly 1992; Milner 1986, 1998; Pauketat 2003; Pauketat and Lopinot 1997). The number of buildings and their sizes are derived from interpretation of geophysical data collected during the 2011 magnetometer survey at Washausen, which were used to create a site map (described above). This method provides population estimates based on inferred building counts, rather than figures produced from estimations of site-wide building densities based on limited sampling.

Processed geophysical data were imported into a GIS database and shapefiles were created with polygons that define the shape of suspected structures. Maps were then produced of the Washausen settlement. These maps were instrumental in the development of my excavation strategies. A total of five structures distributed across the site were partially excavated (Figure 2.5). These excavations served to ground-truth geophysical data, demonstrating that the placements, alignments, and dimensions of inferred structures match with high precision the actual spatial specifications of basin structures (Figure 3.4).

With the confirmation that rectangular anomalies identified through magnetometry could reasonably be interpreted as houses, all rectangular basin features that matched expectations for actual dwellings were included in the demographic modeling. Following previous researchers (Milner 1986:229-230, 1998; Pauketat and Lopinot 1997), only rectangular structures were used in calculations, whereas square, round, and T-shaped buildings were omitted. Where clear

Figure 3.4. Photograph showing 1 x 2 meter unit excavated to clip the edge of a rectangular basin structure (Structure 4, Feature 26), as predicted from the magnetometer data (photograph by author).

evidence existed in the geophysical data for superimposed structures (e.g., overlapping buildings with different orientations), two separate dwellings were counted. Solitary structural features away from courtyard group clusters and a few very large buildings adjacent to mounds were omitted because these were not likely to have serves as residences. The GIS program was then used to calculate the area of all likely residential dwellings at Washausen.

The methods used to assess the number and size of structures at Washausen produced reliable data for estimating population figures for the site. Whereas in previous studies structure density figures from excavated areas were used as proxies to calculate estimates for entire sites and the region (Milner 1998:123-125), the figures for Washausen are based on a relatively complete site map.

Population Estimates for Washausen

A total of 190 rectangular basin structures were used in calculations of the population of the Washausen site (Figure 3.5). As previously discussed, inferred structures and other feature classes are distributed in clusters that conform to the residential courtyard groups that are typical of American Bottom village sites at this time (Kelly 1990a, 1990b; Pauketat 1994, 2003). The patterning of courtyard groups and public architecture, as well as ceramic remains and radiocarbon dates recovered from the site (Chapter 4; see also Bailey 2007; Betzenhauser 2011; Kelly 2006b), demonstrate that the major occupation of the Washausen settlement was short-lived, representing more or less a single-component occupation. Coupled with the relative lack of disturbance to subsurface features, these data allow for robust estimates of a synchronic occupation and population.

Four separate population estimates are presented for Washausen because it is unlikely that all structures were contemporaneously occupied (Table 3.1). Separate calculations are presented based on the assumptions that structures were occupied for either 10 or 15 years, and that the site was occupied for either 50 or 75 years. Ten- and 15-year structure longevity estimates correspond with figures used for Cahokia and other early Mississippian Period upland villages (Pauketat 2003; Pauketat and Lopinot 1997; see also Milner 1998; Pauketat 1989).

Table 3.1 lists the population estimates calculated for Washausen. These range from 101 to 228 inhabitants, based on an average of four persons per structure. An estimate of four persons is consistent with estimates used by Milner (1998) for Cahokia and by Pauketat (2003)

Figure 3.5. Map of the Washausen settlement, showing distribution of rectangular basin structures (black).

Table 3.1. Population Estimates for the Washausen Site, Based on 4 Persons per Structure.

Length of Site Occupation	75 yrs		50 yrs	
Structure Longevity	10 yrs	15 yrs	10 yrs	15 yrs
Estimated Population	101	152	152	228

for the upland, Richland Complex village sites. This average is also similar to the estimate of 3.3 persons per structure that results from calculating the number of individuals based on the mean area of rectangular structures at Washausen (mean = 7.5 m^2, s = 3.5 m^2) (from Cook 1972; as used in Kelly 1992; Milner 1986; Pauketat and Lopinot 1997).

The average number of persons per structure that I used for Washausen is consistent with figures for a settlement occupied during the Mississippian transition in the American Bottom. Excavations throughout the region show that basin structures increased in size through time. Because of this diachronic change in house size, Kelly (1992) calculated an estimate of 2.32 persons per structure for pre-Mississippian villages in the central American Bottom, and Pauketat and Lopinot (1997) estimated 2.55 persons for Edelhardt phase residences at Cahokia. Early Mississippian, Lohmann phase buildings at farmsteads and at Cahokia are thought to have housed an average of 4.14 and 4.60 persons, respectively (Milner 1986; Pauketat and Lopinot 1997).

The 101-228 estimated range is based on architectural data currently available. However, it is probable that the actual population of the Washausen settlement during its period of major use was near the high end of this range. This is because, as discussed in Chapter 2, the occupation at the site may have extended further to the north than currently evident, underneath the modern-day levee channeling Fountain Creek (see also Betzenhauser 2011). The methods used here for delineating the number of structures cannot adequately detect repaired walls, which may have served to extend the use-life of some structures thus increasing the number of contemporaneously occupied buildings (see Milner 1986, 1998:122; Pauketat 2003; Pauketat and Lopinot 1997).

Washausen Population Estimates and Regional Village Development in the Central American Bottom

These data for the Washausen site contribute the first systematically derived population estimates for a late prehistoric mound settlement in the American Bottom floodplain outside of Cahokia. The total population of this transitional Mississippian Period mound-and-plaza village likely never reached 300 individuals. Although seemingly a small number, especially relative to estimates for Cahokia that range from several thousand up to 15,000 inhabitants (see Milner 1998:124; Pauketat 2003:47; Pauketat and Lopinot 1997), the Washausen population numbers are not outside of our general expectations for a Mississippian village of its size (see Anderson 1999:15.2; Muller 1997b:Tables 5.8-5.11). In fact, the population of the much larger Mississippian mound center of Moundville in Alabama, where nearly 30 earthen mounds were once constructed, was probably under 2000 people at its height (Steponaitis 1998).

Thus, the Washausen data demonstrate that the earliest villagers in the American Bottom who constructing monumental mounds and large public spaces, sometime in the early eleventh century, were living in communities of modest size of at most a few hundred people. The Edelhardt phase village at Cahokia, and potentially others like Pulcher (Kelly 1993, 2002), had likely grown larger prior to A.D. 1050 (Pauketat and Lopinot 1997). However, very large local population sizes do not seem to be a prerequisite for the development of complex, suprahousehold social organizations and incipient monumentality.

The population data for Washausen are significant beyond revealing the size of early villages with mounds in the American Bottom. When looked at in a regional context, these data present a picture of the demographic changes co-occurring with the development of larger villages and an increased regional emphasis on both maize and native seed crop production (see

Fritz and Lopinot 2007). Demographic shifts, undoubtedly, were part and parcel of the social processes involved with the build-up of larger and more complex polities, as movements of groups across the landscape (via fissioning and re-aggregation) served to create conditions conducive to the production of new social communities (Pauketat 2003:43; see also Alt 2006; Cobb 2005; Cobb and Butler 2006; Cobb and King 2005). These new communities may have extended beyond the spatial boundaries of early mound settlements (see Yaeger and Canuto 2000) to include year-round or temporary residents of nearby farmsteads, villages, or rural "nodal" sites (see Emerson 1997; Pauketat Emerson 1997:7-8; Milner 1990:21-23).

The best-known pre-Mississippian village sequence has been produced from expansive excavations at the Range site (Figure 1.1) in the central American Bottom (see Chapter 1, also Kelly 1990a, 1990b; 2000). The central American Bottom region has been defined by Kelly (1990b, 2002) as the area of the floodplain south of the Goose Lake Meander locale and Prairie du Pont Creek, extending south through much of Monroe County, Illinois, and includes the Washausen and Pulcher sites. A series of several communities have been delineated at Range, suggesting that sedentary village life had begun in the region by at least the Dohack phase (Figure 1.2), sometime during the later decades of the ninth century (Kelly 1990a; Koldehoff and Galloy 2006). This is also when evidence of maize agriculture first becomes common at Range and most other regional localities (Kelly 1992; Fritz and Lopinot 2007; Simon and Parker 2006).

The sequence for the Range site documents sedentary communities from at least 150-200 years prior to the start of the regional Mississippian phases at A.D. 1050. In addition, researchers have demonstrated a fluid and punctuated history of settlement movement and reorganization at Range. These involved the formation and dissolution of distinct villages through time, a continuation of shifting landscape-use patterns that were characteristic of the earlier Late Woodland Patrick phase (*cf*. Kelly 1990a, 1992, 2000; Koldehoff and Galloy 2006). At the center of these population movements were co-residential courtyard groups.

Kelly (1990a, 1992, 2000) has charted the organization of several sequential village occupations at the Range site that show an increase in nucleation and occupational density through time. By the late tenth century, George Reeves phase courtyard groups were configured around two central plazas, with each individual group maintained its own ritual facilities. This speaks to the importance of multiple, overlapping integrative institutions under conditions of increasing nucleation, as each group is expected to have taken on greater roles organizing agricultural land and labor and key aspects of its ritual and political life. Around A.D. 1000, the fissioning of courtyard groups led to the dissolution of one of the larger plaza groups. The remaining courtyard groups reoriented themselves to a new single plaza for a period of time, but by late in the Lindeman phase, another major population decrease is evident, again the result of fissioning of individual courtyard groups that were likely relocating to larger centers like the already growing Washausen and Pulcher settlements (Kelly 1990a, 1990b, 2002).

Thus, the early histories of village life and the development of greater scales of complexity in the American Bottom resulted in part from processes of fissioning and re-aggregations (see also Kelly 1990a:108, 1990b, 1992; Pauketat 2003:43). In fact, similar processes are suspected to have been commonplace across the greater Mississippian world (Blitz 1999; Blitz and Lorenz 2006), and fissioning is seen as a fundamental facet of the social dynamics of early villages in general worldwide (e.g., see Bandy 2004:322). In the Titicaca Basin of Bolivia, for example, Bandy (2004) has sketched a similar pattern of village fissioning and re-aggregations during the Formative Period. In this area, he attributes recurrent episodes of village fissioning to mechanisms that resolved increasing levels of intra-village conflict associated with increasing local populations and scalar stress. Subsequent villages that maintained larger populations show evidence for the development of "integrative institutions capable of mitigating the scale-related stresses that emerged and intensified as [villages]… grew" (Bandy 2004:330). Bandy (2004:330) demonstrates that the "village fissioning threshold" increased, going from population estimates of around 170 with village areas of about three hectares during the Early Chiripa phase, to population estimates of 277 at larger villages covering around five hectares during the Middle Chiripa.

In a much larger comparative study of 36 early village sequences world-wide, Bandy (2008) finds a similar pattern of development. In an overwhelming majority of these 36 regions, Bandy says that "large villages" developed during the first millennium after the onset of sedentary, agricultural life. In his North American cases (he does not include the American Bottom) large village development is seen after an average of about 450 years.

From his comparative data, Bandy (2008:335) defined "large villages" as those reaching approximately 300 occupants covering an area usually greater than three hectares. He states that with the growth of these large villages, "the development of novel institutions of social integration at the suprahousehold level could make possible the emergence of villages larger than the critical population threshold" for fissioning (Bandy 2008:341). That is, when communities fitting Bandy's criteria for "large villages" develop, demographic changes are often accompanied by the development of public institutions that served to integrate newly arrived groups and increasingly competitive factions. In his Titicaca Basin case, these integrative institutions are marked by the appearance of public ceremonialism and architecture (e.g., sunken courts) in large Middle Chiripa villages, and later by the growth of a regional religious tradition by the Late Chiripa phase, a time witnessing the growth of even larger and more stable villages (Bandy 2004).

The Range and Washausen site sequences in the central American Bottom support Bandy's (2004, 2008) model for large, agricultural village development through recurrent episodes of fissioning and re-aggregations, and the construction of integrative ritual facilities like mounds and plazas (Figure 3.6 and Table 3.2).[3] Although the largest Dohack phase village at Range is slightly larger than the subsequent Range phase villages, the largest George Reeves phase community was at least doubled in size, with an estimated population of 105 individuals covering an area of 1.2 hectares (Kelly 1990a). After the fissioning of several courtyard groups, and the dissolution of one of the site's larger plaza groups, the resulting Lindeman phase village at Range had a reduced population of around 61 individuals in a village space that extended for less than one hectare.

At this time during the Lindeman phase, by A.D. 1000 or slightly earlier, major occupation at Washausen began (Figure 1.2). Washausen villagers who still primarily organized themselves into courtyard and plaza groups, in ways similar to the George Reeves phase community members at Range, were active in creating new community-scale identities – identities shared by the multiple residential groups living at Washausen and potentially by others at nearby farmsteads. The Lindeman-Lindhorst phase (late tenth- through early eleventh-century) community at Washausen was marked by the construction of earthen, platform mounds demarcating a large, open public plaza. This mound-and-plaza ceremonial complex would have brought together individuals and groups in large-scale gatherings, helping to shape community

[3] At the Range site, Kelly (1990a:74) identified "a sequence of at least 28 temporally discrete communities for the 500 year span" stretching from the Late Woodland Patrick phase through the Early Mississippian Lindeman phase (*cf.* Koldehoff and Galloy 2006 for the Late Woodland Patrick phase). Throughout this sequence community sizes fluctuated, reflecting recurrent cycles of residential group fissioning and re-aggregation. In Figure 3.6, only data for the largest aggregations for each archaeological phase at Range are graphed, which masks much greater population and community dynamics for the Range locality.

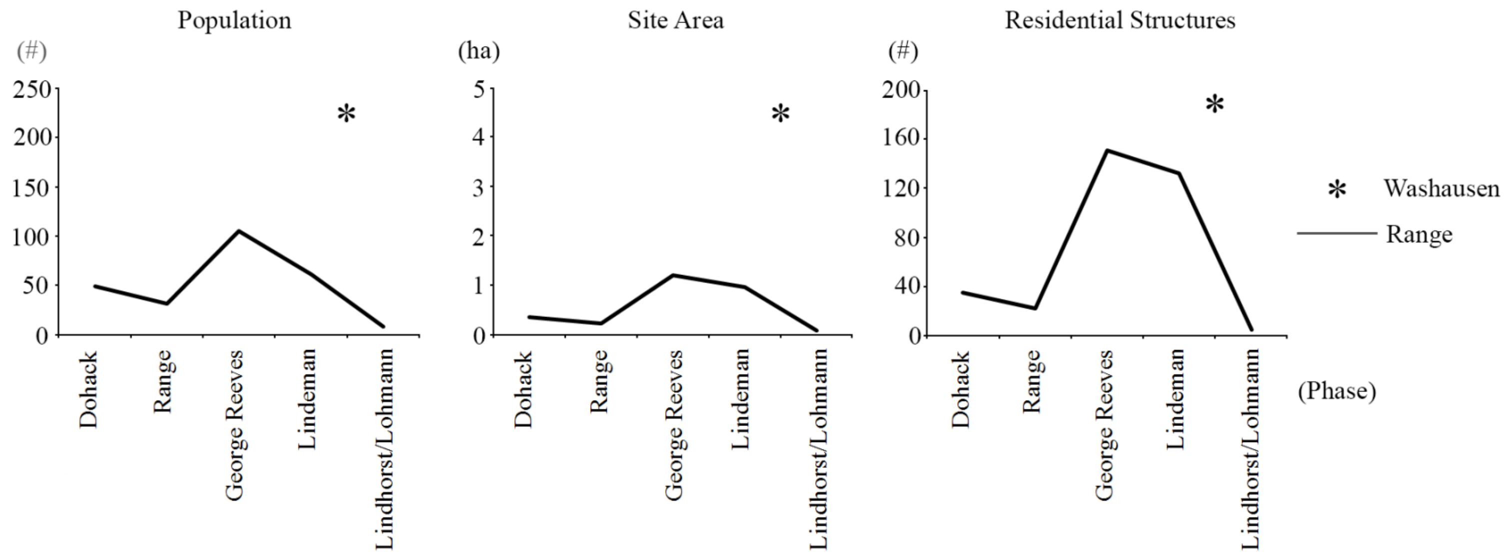

Figure 3.6. Graphs showing village-level demographic changes through time in the central American Bottom at the Washausen and Range sites; data displayed for Range depict only the largest temporally discrete community for each archaeological phase, as presented in Kelly (1990a:Table 9).

Table 3.2. Demographic Profile of Village Sequence from the Dohack through Lindhorst/Lohmann Phases in the Central American Bottom.

Site	Phase	Area	# of Houses	Population
	Dohack (D-2)	.36	35	49
	Range (R-2)	.22	22	31
Range[a, b]	George Reeves (G-2)	1.20	151	105
	Lindeman (L-1)	.96	132	61
	Lindhorst/Lohmann (M-1)	.08	5	8
Washausen[c]	Lindeman-Lindhorst/Lohmann	4.50	190	228+

[a] Data from Kelly 1990a.
[b] Calculations based on structure longevity of 5 years, and 2.32 persons/structure for pre-Mississippian phases and 4 persons/structure for the Lindhorst/Lohmann phase.
[c] Calculations based on structure longevity of 15 years, 4 persons/structure, and a site occupation of 50 years.

identities (Pauketat et al. 2002:275). In addition, Washausen's population was double that of the earlier George Reeves phase village at Range, and covered an area more than four times its size.

Washausen's demographic profile around the time of the Mississippian transition matches what would be expected of Bandy's (2008) "large villages," with populations approaching 300 individuals, settlement areas greater than three hectares, and new forms of suprahousehold institutions and public ceremonialism. The timing of the growth of Washausen and other large villages throughout the region support the idea that significant sectors of these new settlements resulted from immigrant social groups breaking away from waning villages like the one at Range. The creation of new community identities and institutions through the act of mound-and-plaza construction would have integrated newly arriving courtyard groups, despite larger local population sizes, greater scales of nucleation, and heightened levels of scalar stress.

The Washausen village, however, was never transformed beyond the threshold-point for Bandy's "large villages." Within a few generations the Washausen mound-and-plaza village was abandoned. Just as courtyard groups had fused themselves into the new Washausen community, the breakaway of courtyard groups was a likely culprit of the dissolution of the settlement sometime shortly after A.D. 1050. Although no definitive claims can be made at this time, it may be that social groups leaving Washausen immigrated to other rapidly growing centers like the nearby Pulcher and Cahokia sites, where they again likely took an active part redefining new community- and regional-scale Mississippian identities.

The Washausen site, then, presents a valuable case study for examining how distinct social groups came together and created new communities. Occupied during the regional Mississippian transition during the tenth and eleventh centuries, Washausen can provide information about the nature of interactions between residential courtyard groups. Arguably, the creation of new social institutions like those at Washausen provided the basis for even later developments that are evident at Mississippian period Cahokia. In Chapter Four, results of excavations, radiocarbon dating, and artifact analyses are presented. This information is critical for understanding the development of larger villages like Washausen; it allows for a more thorough understanding of the development of early Mississippian society.

CHAPTER 4
THE 2011 UM-WAP FIELD INVESTIGATIONS AT WASHAUSEN

This chapter presents results from the 2011 UM-WAP excavations at Washausen, as well as information produced from analyses of artifacts that reveal activities that took place at the site. As discussed in Chapter 3, major settlement at Washausen begun in the tenth century A.D. (Figure 1.2). The settlement remained a center of occupation until at least the mid-eleventh century, and was likely completely abandoned during the decades immediately following A.D. 1050.

I first describe my excavations and then discuss the archaeological deposits. Then, I present the results of radiocarbon dating to date site occupations and activities. After radiocarbon dates are discussed, I present results from artifact analyses. Analyses were conducted on zooarchaeological, botanical, ceramic, and lithic materials. Data from artifact analyses, alongside results presented in Chapter 3, will be used in Chapter 5 to evaluate the evidence for social institutions and public activities that would have supported increased integration of aggregated residential courtyard groups.

2011 UM-WAP Excavations at Washausen

Excavation methods utilized during the 2011 field investigations at Washausen are discussed in Chapter Two. Here, I summarize the excavated features. As noted earlier, I opened a total of 54 square meters, distributed across six excavation loci (Figure 4.1). Utilizing information from the geophysical data, I developed an excavation strategy to sample intact subsurface features, especially basin structures.

Five basin structures were partially excavated. Three of these are located within the site's secondary plaza, and two are within residential courtyard groups (Figure 4.1). In addition, an external pit located within the confines of the secondary plaza was excavated.

<u>Structure 1 (Feature 5)</u>. Structure 1 is centrally located within the secondary plaza at Washausen (Figure 4.1). A total of thirteen 1 x 1 m units were placed over the top to expose three basin edges of this building below the plowzone. Then, a trench was excavated to the base of this building (Figure 4.2). Due to extreme amounts of bioturbation within the sandy soils at the base of this building, no internal features were discernable during excavations. Recovered remains derive from fill zones within the structure's basin.

Excavations show that Structure 1 measured approximately 3.7 meters along its long axis. Its basin's average depth was 0.87 meters below surface (0.52 meters below the modern plowzone) (Figure 4.3). Two major zones of fill were encountered during excavations of Structure 1. The bottom major fill zone consisted of dark grayish brown (10YR 4/2) silt clay. The overlying major fill zone consisted of a darker grayish brown (10YR 3.2) silt clay. Extensive rodent burrowing and basin edge slumping are visible in profile.

<u>Structure 2 (Feature 6)</u>. Structure 2 lies on the eastern edge of the secondary plaza at Washausen (Figure 4.1). A total of twelve 1 x 1 meter units were placed over the top, exposing all four basin edges of this building below plowzone. A trench was then excavated to the base of this building, following its shorter axis. Like Structure 1, the base of Structure 2's basin contacts sandy soils, and bioturbation affected the ability to confidently delineate internal features.

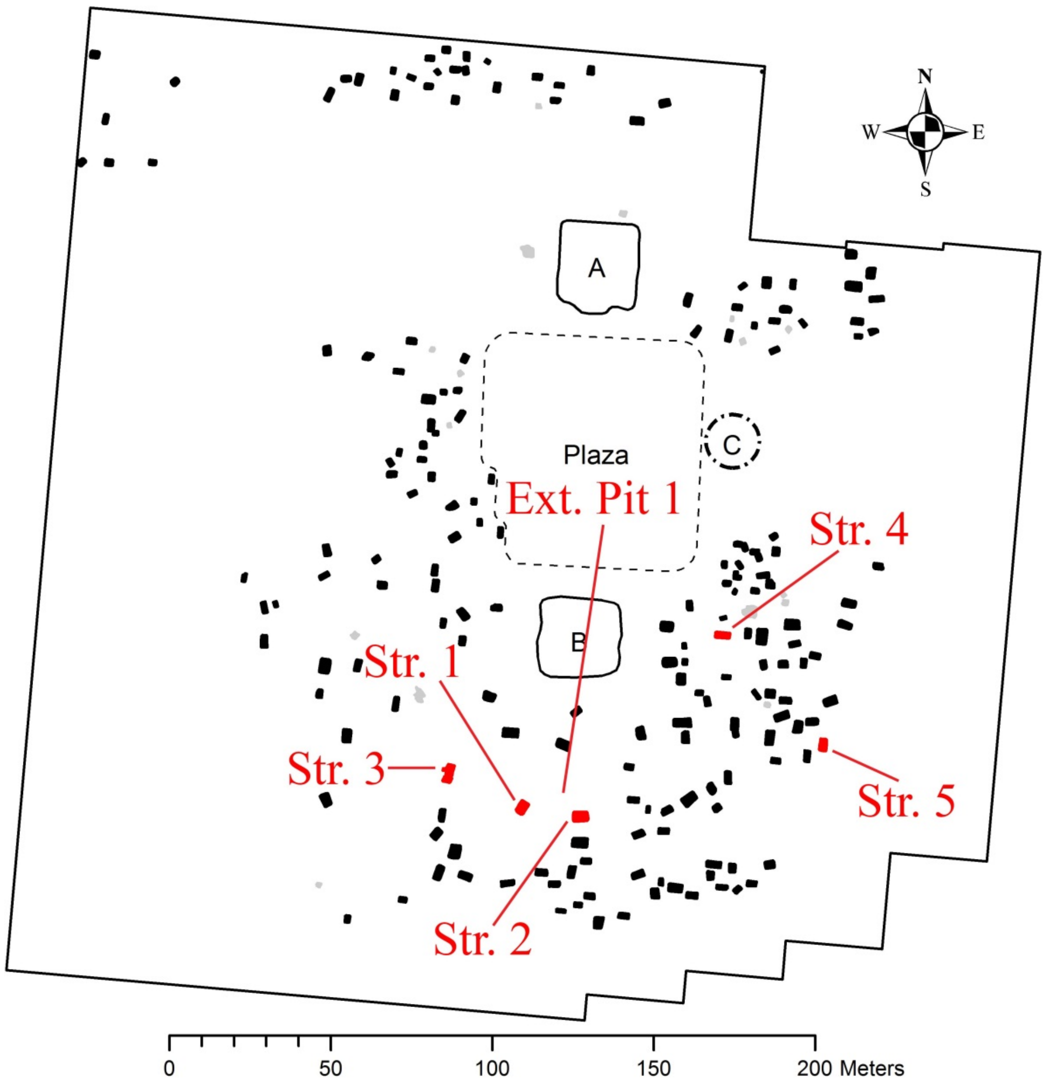

Figure 4.1. Map showing location of six excavation areas.

Figure 4.2. Photograph showing excavations of Structure 1 at Washausen (photograph by author).

However, three potential post holes are visible in plan-view at the basin's base along its northern edge, and may represent a line of single-set wall posts. Recovered remains result from fills zones within this structure's basin.

Excavations reveal that Structure 2 measured ca. 5 m long and 3.4 m wide. Basin fills within Structure 2 show more stratigraphic complexity than any other building excavated at Washausen, either during UM-WAP's 2011 investigations or during Betzenhauser's (2011) earlier work at the site (Figure 4.4). Rather than filling in via natural erosion processes, it appears that several of the fill zones result from intentional dumping episodes by Washausen's occupants. Analyzed material remains from these fill zones support this anthropogenic origin for several of the fill zones, and will be discussed in more detail below.

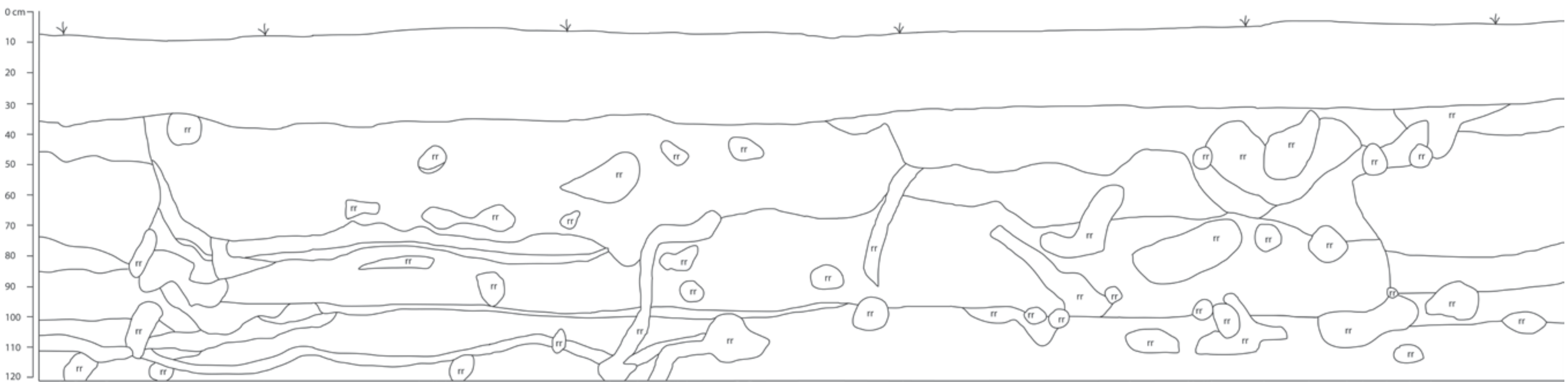

Figure 4.3. Profile map of Structure 1 (Feature 5) basin and fill zones (west profile).


Figure 4.4. Photograph showing excavations of Structure 2 at Washausen (photograph by author).

Structure 2's basin has an average depth of 0.95 m below surface (0.68 m below the modern plowzone). A thin zone of very dark brown (10YR 2/2) silt clay extends across much of the basin's floor (Figure 4.5). Overlying this layer is a thicker zone of black (2.5Y 2.5/1) silt clay, which is overlain by an upper zone of very dark gray (10YR 3/1) silt clay.

Structure 3 (Feature 7). Structure 3 is located on the western edge of Washausen's secondary plaza (Figure 4.1). A total of eleven 1 x 1 m units were placed over the top to expose three basin edges of this building below plowzone. A 1 x 3 m unit was then excavated to the base of this structure. This excavation strategy was successful in revealing Structure 3's rare shape (Figure 4.6). Along the western wall of the building's long axis is a protruding wing. This morphology corresponds to what are called "T-shaped" buildings in the American Bottom. At

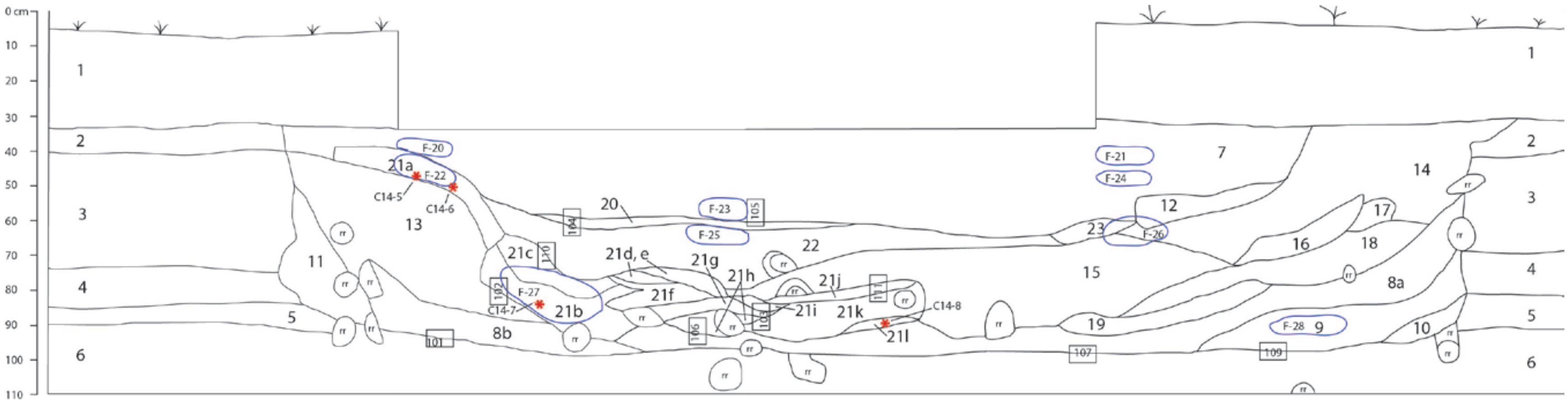

Figure 4.5. Profile map of Structure 2 (Feature 6) basin and fill zones (west profile).

Figure 4.6. Photographs showing shape of T-shaped structure, Structure 3 (Feature 7), at the base of the plowzone (top-right), and T-wing extension wall posts and circular pit (Feature 48) at structure floor (bottom-left) (photographs by author).

Cahokia and a handful of other American Bottom sites, T-shaped structures, although infrequent, normally date to post-A.D. 1050. Although their functions may have varied (see Chapter 5), it has been argued that they were specialized (non-domestic) buildings that served important group ritual and storage functions, and possibly acted as integrative focal points between neighboring residential groups (Alt 2001:145-146; Baltus and Baires 2012; Emerson 1997; Mehrer and Collins 1995:38-40; Milner 1998:93-94; Pauketat 1994:79).

The fill comprising Structure 3's basin consists of one apparent zone, likely the result of natural erosion. This zone was made up of very dark grayish brown (10YR 3/2) silt clay. A series of five postholes were encountered at the base of Structure 3 along the western edge of its T-wing extension, the remains of individually-set wall posts (Figures 4.6). At least two of these postholes show signs of post repair or replacement. Just inside of this line of posts is a circular pit, labeled Feature 48 (Figures 4.6 and 4.7). This pit measures approximately 62 cm in diameter and 67 cm deep. Feature 48 was quartered and excavated to its base, which revealed straight sides and a flat bottom. Three primary zones make up Feature 48's fills. The bottom fill zone is composed of brown sand, overlain by lighter sand. Brown clayey sand, mottled with yellow clay, comprises the upper fill zone. Between each of these primary zones a thin lens of dark organic materials extends across a portion of the pit.

An interior hearth, designated Feature 24, was encountered east of Feature 48 near the center of Structure 3 (Figure 4.8). Feature 24 was surrounded by heavily burned soils, which possibly result from the cleaning out of this hearth, or are the remains of a series of earlier hearths. The horizontal extent of the 1 x 3 m unit excavated to the base of Structure 3 did not allow this determination to be made, however. Feature 24 is oval in plan, measuring 46 x 66 cm. Excavation of Feature 24 proceeded by bisecting and quartering its fills, in order to map its

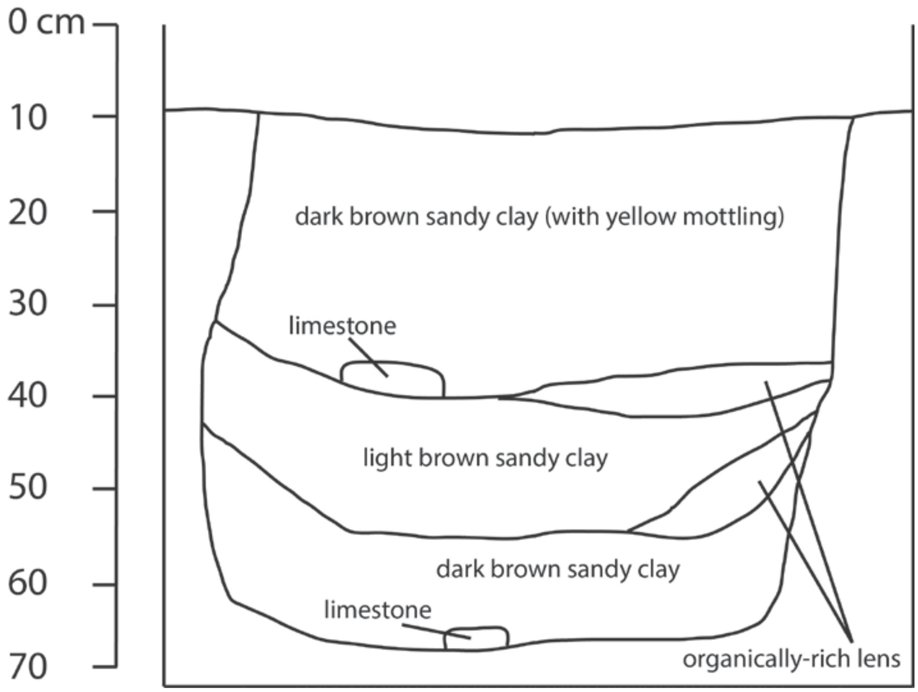

Figure 4.7. Profile map of Feature 48 (composite of northeast and southwest quarter profiles).

Figure 4.8. Photographs of hearth (Feature 24) encountered at base of T-shaped structure (Structure 3); top: plan view of hearth, showing bisected and quartered excavation strategy; bottom: profile view showing yellow clay cap overlying thin lens of carbonized organic remains (photographs by author).

morphology in profile. This methodology revealed the hearth's bowl-shape, and its maximum depth of 13 cm below the floor of Structure 3. A single zone of yellow clay comprises most of Feature 24's fills, capping an approximately 2 cm thick lens of carbonized organic remains. After the clay cap was removed, this thin lens was collected as samples for water flotation processing.

Structure 4 (Feature 26). Structure 4 is located within one of the settlement's residential courtyard groups, directly east of Mound B (Figure 4.1). A total of two 1 x 1 m units were placed over the top of the building to delineate the northern wall along its long axis. This excavation strategy was utilized to successfully clip the northern wall, seen as a line of five post holes, evidence of a series of individually-set wall posts (Figure 3.4). Recovered remains come from fills zones within this structure's basin.

The average depth of Structure 4's basin was measured at 0.66 m below surface (0.36 m below the modern plowzone) (Figure 4.09). Two major zones of fill were encountered during excavations of Structure 4. The bottom zone consists of very dark brown (10YR 2/2) silt loam clay, and measured on average 15 cm thick. This bottom zone appeared to be organically rich compared to the overlying zone, which was likely formed by natural erosion. This upper basin fill layer is comprised of very dark grayish brown (10YR 3/2) silt loam clay.

Structure 5 (Feature 27). Structure 5 is located within another one of the settlement's residential courtyard groups, in the far southeastern portion of the site (Figure 4.1). A total of two 1 x 1 m units were placed over top of the structure to delineate the western wall along its long axis. This excavation strategy was successful, and Structure 5's western wall is seen as a series of at least six postholes, representing individually-set wall posts. Recovered remains result from fills zones within this structure's basin.

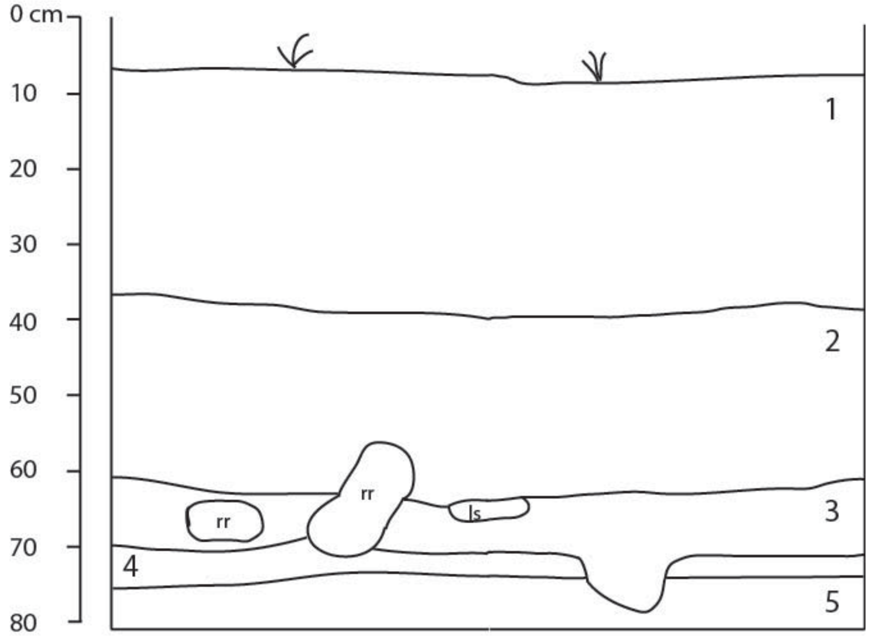

Figure 4.9. Profile map of Structure 4 (Feature 26) basin and fill zones (south profile).

The basin of Structure 5 has an average depth of 0.86 m below surface (0.56 m below the modern plowzone). Structure 5's basin fills appear to have accumulated through natural erosion processes. Fills consist of very dark grayish brown (10YR 3/2) silt clay, with an upper band with light yellow mottling, and a lower band of heavy yellow mottling.

External Pit 1 (Feature 19). External Pit 1 is not located within a structure, but within the open confines of the secondary plaza at Washausen (Figure 4.1). A total of four 1 x 1 m units were placed over this pit to expose the feature in its entirety (Figure 4.10). After the plowzone was removed, this feature was revealed as an oval pit, measuring 1.2 m along its long axis and 0.93 m along its short axis. External Pit 1 was completely excavated as two halves (bisected along its longer axis). This pit has relatively straight sides and a flat base, and has an average depth of 0.63 m below surface (0.33 m below the modern plowzone) (Figure 4.11).

External Pit 1 is composed of two primary fill zones, and both appear to have formed via natural erosion. The bottom zone consists of olive brown (2.5Y 4/4) silt clay, and the upper zone

Figure 4.10. Photograph showing oval pit feature (Feature 19) (photograph by author).

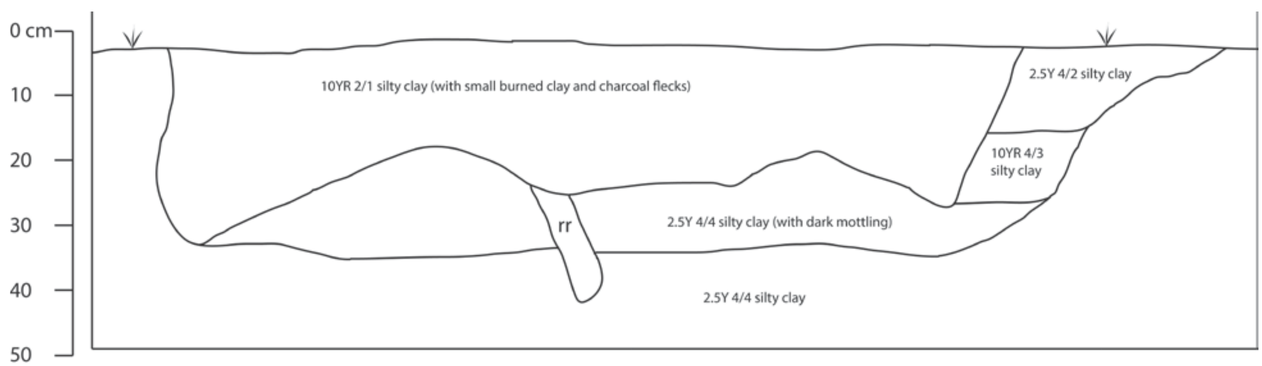

Figure 4.11. Profile map of Feature 19 (south profile).

of very dark gray (10YR 3/1) silt clay with small charcoal and burned clay flecks. As seen in Figure 4.11, this upper fill zone and two minor fill zones in the far eastern edge of the pit may indicate that External Pit 1 was used twice, having been filled in and later dug back out. No artifacts other than small pieces of burned clay were recovered from External Pit 1 fills.

Radiocarbon Dates from Washausen

A total of ten AMS radiocarbon dates were processed after my excavations at Washausen, and Betzenhauser (2011) presents one additional radiocarbon date for the site (Table 4.1). All eleven samples were organic remains recovered from structure basin fills or intramural features at the site. These dates, and their excavation contexts, are presented below, followed by a discussion of their bearing on the dating of occupations and activities at the settlement. The UM-WAP radiocarbon dating procedure was designed to produce two AMS dates for each of the five excavated structures (described above). Nine of these dates were run on annual botanical remains (e.g., seeds, maize, grass stems) and one on a fragment of oak charcoal.

Table 4.1 provides information about the ten AMS radiocarbon dates resulting from the 2011 UM-WAP excavations at Washausen, as well as the earlier reported date for the site. Both uncalibrated and calibrated dates are presented, as well as information about each sample and their excavated context. All ten new UM-WAP dates were submitted to the University of Arizona's Accelerator Mass Spectrometry Laboratory. Calibration of the UM-WAP dates were performed using the University of Oxford's OxCal online calibration program, version 4.2 (Bronk Ramsey 2009), and the InCal13 calibration curve (Reimer et al. 2013). The date presented by Betzenhauser (2011) was submitted to the University of Illinois' Institute of Natural Resource Sustainability. The ten UM-WAP dates are herein reported as samples 11WAP201 through 11WAP210.

<u>Sample 11WAP201</u>. Sample 201 produced a calibrated date of A.D. 1090 +/- 73 (A.D. 1017-1163). This sample originates from basin fills of Structure 1. Sample 201 was run on grass stem fragments from a small concentration of carbonized thatch located near the bottom of

Table 4.1. Calibrated AMS Radiocarbon Dates for the Washausen Site (11Mo305), Monroe County, Illinois

Sample	Min age	Max age	Midpoint	Feature	Excav. level	Excavation context	Material
11WAP201[1]	1017	1163	1090 +/- 73	5	7	Unit 10 (PP84)	thatch - grass stems
11WAP202[1]	1015	1161	1088 +/- 73	5	6	Unit 20 (PP85)	thatch - grass stems
11WAP203[1]	1021	1184	1102 +/- 82	6	4	Unit 31 (FLOT 27), Zone 21	seeds - knotweed
11WAP204[1]	1017	1163	1090 +/- 73	6	5	Unit 30 (FLOT 28)	maize
11WAP205[1]	1031	1210	1120 +/- 90	7	base	hearth	seeds - knotweed & chenopod
11WAP206[1]	767	1050	908 +/- 142	7	4	pit	seeds - sumpweed & chenopod
11WAP207[1]	969	1218	1093 +/- 125	26	3	Unit 51-52 (organically-rich layer)	maize
11WAP208[1]	987	1208	1097 +/- 111	26	3	Unit 51-52 (organically-rich layer)	maize
11WAP209[1]	1017	1163	1090 +/- 73	27	2	Unit 53-54	maize
11WAP210[1]	989	1155	1072 +/- 83	27	fill	wall post; Unit 53-54	charcoal - oak
Extant Sample 1[2]	890	1030	960 +/- 70	1	fill	Feature 1 (Betzenhauser 2011)	thatch - grass stems

[1] Samples from 2011 UM-WAP excavations; submitted to the University of Arizona's Accelerator Mass Spectrometry Laboratory; calibrated using the University of Oxford's OxCal online calibration program, version 4.2 (Bronk Ramsey 2009), and the InCal13 calibration curve (Reimer et al. 2013).

[2] Sample from Betzenhauser's (2011) excavations; submitted to the University of Illinois' Institute of Natural Resource Sustainability

this building's basin, possibly from wall fall. Therefore, this sample provides a terminal date for use of this structure, just prior to or concurrent with initial infilling.

Sample 11WAP202. Sample 202 produced a calibrated date of A.D. 1088 +/- 73 (A.D. 1015-1161). This sample originates from basin fills of Structure 1. Sample 202 was run on grass stem fragments from remains of carbonized thatch located between the two primary fill zone layers. This sample should, then, give a date sometime after initial infilling of this basin was begun.

Sample 11WAP203. Sample 203 produced a calibrated date of A.D. 1102 +/- 82 (A.D. 1021-1184). This sample originates from basin fills of Structure 2. Sample 203 was run on seeds of erect knotweed (*Polygonum erectum*) recovered from Zone 21 of basin fills. As will be discussed later in this chapter, Zone 21 likely results from anthropogenic deposition related to public commensal events at Washausen, potentially having taken place within the settlement's secondary plaza. Thus, this date corresponds to specific activities that occurred late in the site's history.

Sample 11WAP204. Sample 204 produced a calibrated date of A.D. 1090 +/- 73 (A.D. 1017-1163). This sample originates from basin fills of Structure 2. Sample 203 was run on maize fragments originating from an organically rich zone directly overlying the floor of this basin. Therefore, this sample provides a date for initial infilling of this structure's basin.

Sample 11WAP205. Sample 205 produced a calibrated date of A.D. 1120 +/- 90 (A.D. 1031-1210). This sample originates from the hearth (Feature 24) centrally located in the floor of Structure 3, a T-shaped building on the western edge of the settlement's secondary plaza. Sample 205 was run on seeds of erect knotweed (*Polygonum erectum*) and chenopodium (*Chenopodium berlandieri*) recovered from the thin lens of organic remains lining the base of this hearth (in direct association with recovered tobacco seeds) (Figure 4.8). As discussed above, it is possible that remains of earlier hearths are present in this T-shaped structure, but only Feature 24's status as a hearth could be confirmed during excavations. If other hearths were used and filled in, Feature 24 represents the last utilized hearth in this building. Thus, Sample 205 produces a date corresponding with terminal use of this T-shaped structure.

Sample 11WAP206. Sample 206 produced a calibrated date of A.D. 908 +/- 142 (A.D. 767-1050). This sample originates from the circular pit (Feature 48) encountered in the floor of Structure 3's T-wing extension, located on the western edge of Washausen's secondary plaza. Sample 206 was run on seeds of chenopodium (*Chenopodium berlandieri*) and sumpweed (*Iva annua* var. *macrocarpa*), recovered from a thin lens of dark organic materials near the base of this pit, directly overlaying its bottom fill zone (Figure 4.7). Sample 206 provides either a terminal date for Feature 48 as the pit was filled in and put into disuse, or provides a date referencing early use of this pit.

Sample 11WAP207. Sample 207 produced a calibrated date of A.D. 1093 +/- 111 (A.D. 969-1218). This sample was run on maize fragments that originate from the initial zone of fill within Structure 4's basin, a building located within one of the settlement's residential courtyard groups, directly east of Mound B. This roughly 15-cm-thick zone of fill produced increased amounts of artifacts relative to directly overlying fill zones, and may have accumulated via anthropogenic activities rather than through natural erosion (Figure 4.12). Thus, Sample 207 likely dates initial infilling of Structure 4's basin soon after occupation of this building was terminated.

Sample 11WAP208. Sample 208 produced a calibrated date of A.D. 1097 +/- 125 (A.D. 987-1208). This sample was run on maize fragments that, like Sample 207, originate from the

Figure 4.12. Photograph showing excavation of Structure 4 (Feature 26). Seen in planview is top of bottom major fill zone (photograph by author).

initial zone of fill within Structure 4's basin. Sample 208, therefore, also likely dates initial infilling of Structure 4's basin soon after occupation of this building was terminated.

Sample 11WAP209. Sample 209 produced a calibrated date of A.D. 1090 +/- 73 (A.D. 1017-1163). This sample was run on maize fragments that originate from the upper fill of Structure 5, located within another one of the settlement's residential courtyard groups, in the far southeastern portion of the site. Thus, Sample 209 likely post-dates Structure 5's occupation by some time.

Sample 11WAP210. Sample 210 produced a calibrated date of A.D. 1072 +/- 83 (A.D. 989-1155). This sample was run on a fragment of oak charcoal. It was recovered within the fill of a posthole (Feature 39) encountered at the base of Structure 5's basin. During excavations, it appeared that the original wall post was removed and subsequently filled in. Therefore, Sample 210 likely dates the initial dismantling of Structure 5.

Extant Sample 1. An extant radiocarbon sample for the Washausen site is reported by Betzenhauser (2011:135-136). This sample produced a calibrated date of A.D. 960 +/- 70 (A.D. 890-1030). Extant Sample 1 was run on grass and giant cane (*Arundinaria gigantea*) stem fragments from thatch remains related to abandonment and infilling of a structure (Betzenhauser's Feature 1) located in the northern portion of the Washausen settlement, north of Mound A and the low-lying relict paleochannel. After this building was dismantled and filled in, a later structure was constructed in this same area, superimposed upon the older dated structure. Thus, Extant Sample 1 dates use of a northern residential courtyard group at Washausen, and pre-dates initial construction of the later superimposed structure.

Discussion of Radiocarbon Dates

Radiocarbon dates for the Washausen settlement provide evidence about the history of occupations at the site, as well as certain activities that took place there. A total of 11 radiocarbon dates currently exist, including ten AMS dates run from samples recovered during the 2011 UM-WAP excavations. These ten samples date various features located within the settlement's secondary plaza and two residential courtyard groups in the southeastern portion of the site, situated along an elevated ridge. A previously published date (Betzenhauser 2011) results from the basin fills of a structure located within a courtyard group in the northern part of the site, north of the central mound-and-plaza complex and separated from the southern occupation areas by a low-lying swale. Thus, these 11 dates allow for a consideration of the timing of occupation across the entire Washausen settlement.

Previous examinations of materials recovered from the Washausen site led researchers to place major occupations of the settlement to the tenth and eleventh centuries A.D. (Figure 1.2), or to the local George Reeves, Lindeman, and Lindhorst phases (Bailey 2007; Betzenhauser 2011; Kelly 2006b). The 11 radiocarbon dates now assembled from excavations at Washausen support this temporal placement. Initial occupation of the site likely occurred as early as the late tenth century (George Reeves phase) or slightly earlier. A majority of the settlement appears to have been abandoned by sometime during the late eleventh century (Lindhorst phase), with a few locations of the site being used – potentially – into the early twelfth century (Stirling phase). Therefore, these radiocarbon dates support the view that the Washausen mound settlement was occupied during the regional Mississippian transition, which is traditionally dated to the mid-eleventh century at A.D. 1050.

The earliest and latest dates from Washausen both originate from Structure 3, the T-shaped building on the western edge of the settlement's secondary plaza. Sample 206's date of A.D. 908 +/- 142, from the building's internal pit, suggests this building was constructed during the tenth century, although its 2-sigma error range extends forward in time into the mid-eleventh century. The latest date from the site is A.D. 1120 +/- 90, which was recovered from the hearth in the center of Structure 3. This date suggests that use of the T-shaped building lasted potentially into the early twelfth century, although its 2-sigma range extends back in time into the first half of the eleventh century, and overlaps with the error range produced by Sample 206. Assuming these two dates' midpoints are good estimations for length of use implies that Structure 3 was maintained for at least two centuries, a rather long use-life for pre-Columbian wooden buildings in this region (*cf*. Milner 1986, 1998; Pauketat 1989; 2003; Pauketat and Lopinot 1997). Therefore, it is likely that Structure 3 was built later in the tenth century, and that final use of the building's hearth occurred sometime in the late eleventh century, a period of time more congruent with the other nine dates from the site.

Absolute dating of organic remains from other structures in both the southeastern and northern portions of the site suggest that initial occupation of both of these areas took place sometime during the late tenth century, or during the first half of the eleventh century at the latest. The earliest (and only) radiocarbon date for the northern portion of the site places disuse of an early structure at A.D. 960 +/- 70, as reported by Betzenhauser (2011). Sometime after filling in of this structure, a more recent building was constructed over top. The superimposed placement of this overlying building means that occupations in the northern portion of the site (near the modern-day levee) continued into the eleventh century, contemporaneous to major occupation of the elevated ridge in the southeast portion of the site near Mound B. Betzenhauser (2011:135-136) reports that the earlier (dated) building's morphology and the ceramic assemblage from its fills are more consistent with a Lindeman phase, or early eleventh century, component.

The remaining eight AMS dates originate from contexts that are associated with the infilling of four structures in the southeastern portion of the site (Structures 1, 2, 4, and 5). These calibrated dates, with midpoints ranging from A.D. 1072 to 1102, suggest that abandonment of the Washausen settlement took place during the late eleventh century, during the early Mississippian Lindhorst phase. The second-youngest date for the site, calibrated at A.D. 1102 +/- 73, was run on materials from fill zones within Structure 2 that, as is discussed later in this chapter and in Chapter Five, relate to commensal events that occurred late in the settlement's history. With this information obtained from radiocarbon dating, a description of material remains recovered during the 2011 UM-WAP is given below.

Results of Material Analyses

A variety of material artifacts were recovered during the 2011 UM-WAP excavations at Washausen. As noted in Chapter Two, remains were collected using various techniques, including hand collection of artifacts during screening, piece-plotting of certain artifacts, and from samples collected for water flotation.

Archaeobotanical Remains[4]

Botanical remains from the Washausen site were recovered primarily from processed sediment samples after water flotation (Table 4.2). A few botanical specimens were hand collected during excavations, including suspected remains of thatch or preserved clumps of grasses/cane. A total of 413 liters of flotation processed sediment yielded a diverse array of floral remains. A total of 14.02 g of wood and nutshell were recovered, equivalent to an average density of 0.03 g/liter. Seeds and maize fragments were recovered at higher frequencies – 8.0 seeds/liter and 7.5 maize fragments/liter. The overwhelming majority of maize and seed remains, however, originate from samples collected from Structures 2 and 3.

Wood. A total of 256 fragments of wood were identified, diffusely scattered throughout samples recovered across the site. Oak (both red and white subgroups) dominated, followed by hickory. These two taxa make up 72% of the wood assemblage. Tree taxa with minor representation include willow/poplar, maple, honey locust, elm, and ash. The wood assemblage's composition is typical of late prehistoric assemblages throughout the American Bottom.

[4] Archaeobotanical remains were analyzed and summarized by Kathyn Parker (2013; Kathryn Parker Archaeobotany).

Table 4.2. Results of Archaeobotanical Analysis.

Taxon	Str. 1	Str. 2	Str. 3	Str. 4	Str. 5	Ext. Pit 1	Taxon Total
Wood							
Acer sp. (maple)	5	0	0	0	0	0	5
Carya sp. (hickory)	4	14	5	5	10	0	38
Fraxinus sp. (ash)	1	0	0	0	0	0	1
Gleditsia triacanthos (honey locust)	5	0	0	0	0	0	5
Quercus sp. (oak)	27	34	78	13	9	0	161
Q. sp., subgenus *Erythrobalanus* (red oak group)	8	7	3	0	0	0	18
Q. sp., subgenus *Lepidobalanus* (white oak group)	0	1	4	0	0	0	5
Salix/Populus spp. (willow or poplar)	1	14	3	1	0	0	19
Ulmaceae (elm family)	0	4	0	0	0	0	4
Gymnosperm	1	2	0	0	0	0	3
Bark	1	13	8	3	1	0	26
Diffuse porous	3	8	3	1	3	0	18
Ring porous	24	28	20	9	4	0	85
Unidentifiable	33	30	41	14	0	0	118
Wood Total	**113**	**155**	**165**	**46**	**27**	**0**	**506**
Nutshell							
Carya sp. (hickory)	6	46	7	2	0	0	61
C. illinoensis (pecan)	2	4	1	0	0	0	7
Corylus americana (hazelnut)	6	3	1	9	0	0	19

Table 4.2. Results of archaeobotanical analysis, continued.

Taxon	Str. 1	Str. 2	Str. 3	Str. 4	Str. 5	Ext. Pit 1	Taxon Total
Juglandaceae (hickory/walnut family)	36	33	36	20	0	1	126
Quercus sp. (acorn)	1	6	5	2	0	0	14
Nutshell Total	**51**	**92**	**50**	**33**	**0**	**1**	**227**
Seeds							
Acalypha sp. (three-seeded mercury)	0	1	0	0	0	0	1
Amaranthus sp. (pigweed)	2	4	25	0	0	0	31
Amphicarpa bracteata (hog peanut)	0	1	5	0	0	0	6
Andropogon sp. (bluestem/broom sedge)	0	8	0	0	0	0	8
Chamaesyce maculata (nodding spurge)	0	5	2	0	0	0	7
Chenopodium berlandieri (chenopod)	14	258	199	14	4	0	489
Crucifereae (mustard family)	2	0	0	0	0	0	2
Cyperaceae (sedge family)	0	2	0	0	0	0	2
Desmodium sp. (tick trefoil)	0	2	7	1	0	0	10
Diospyros virginiana (persimmon)	0	4	2	1	0	0	7
Echinochloa muricata (barnyard grass)	0	2	1	0	0	0	3
Fabaceae (bean family)	0	3	7	0	0	0	10
Galium sp. (bedstraw)	1	0	0	0	0	0	1
Helianthus annuus (common sunflower)	0	7	1	0	0	0	8
Helianthus/Iva (sunflower or sumpweed)	0	0	0	2	0	0	2
Hordeum pusillum (little barley)	0	23	37	0	0	0	60

Table 4.2. Results of archaeobotanical analysis, continued.

Taxon	Str. 1	Str. 2	Str. 3	Str. 4	Str. 5	Ext. Pit 1	Taxon Total
Ipomoea sp. (morning glory)	0	33	6	1	0	0	40
*Iva annua (*sumpweed)	0	1	5	0	0	0	6
Leersia sp. (cutgrass/whitegrass)	1	0	0	0	0	0	1
Lepidium virginicum (peppergrass)	1	0	0	0	0	0	1
Leptoloma/Digitaria spp. (witchgrass/crabgrass)	1	9	37	0	0	0	47
Nicotiana rustica (tobacco)	1	2	10	0	0	0	13
Panicum sp., cf. *virgatum* (switchgrass)	7	139	18	1	0	0	165
Phalaris caroliniana (maygrass)	41	120	74	10	2	0	247
Poaceae (grass family)	3	23	17	1	0	0	44
Polygonum sp. (smartweed)	4	3	6	2	0	0	15
P. erectum (erect knotweed)	7	1237	22	4	1	0	1271
Portulaca oleracea (purslane)	2	3	14	0	0	0	19
Rubus sp. (raspberry/blackberry)	0	4	1	0	0	0	5
Sambucus canadensis (elderberry)	1	0	1	0	0	0	2
Sida spinosa (prickly sida)	1	6	0	0	0	0	7
Solanum ptycanthum (black nightshade)	0	83	21	2	0	0	106
Strophostyles helvola (wild bean)	2	1	6	0	0	0	9
Verbena sp. (vervain)	1	0	0	0	0	0	1
Vitis sp. (grape)	1	3	0	0	0	0	4
Unidentifiable	1	237	305	62	10	3	618
Seeds Total	**93**	**2225**	**829**	**101**	**17**	**3**	**3268**

Table 4.2. Results of archaeobotanical analysis, continued.

Taxon	Str. 1	Str. 2	Str. 3	Str. 4	Str. 5	Ext. Pit 1	Taxon Total
Maize (*Zea mays*)							
kernel	50	1170	126	37	10	0	1393
embryo	6	19	34	0	1	0	60
cupule	21	1354	0	37	8	0	1420
glume	4	96	14	8	2	0	124
rachis segment	0	5	0	0	0	0	5
Maize Total	**81**	**2644**	**174**	**82**	**21**	**0**	**3002**
Miscellaneous Materials							
Bud	1	0	0	0	0	0	1
Dicot stem	0	5	0	0	0	0	5
Cucurbita pepo (squash) rind	0	0	1	0	0	0	1
Epidermis (rolled, curled)	1	1	0	0	0	0	2
Fruit/vegetative tissue	1	244	3	0	0	0	248
Fungus	0	2	10	0	0	0	12
Fused ashy residue clump	0	28	0	0	0	0	28
Grass stem	8	55	7	1	2	0	73
Insect larva	0	1	1	0	0	0	2
Pedicel	0	6	0	1	0	0	7
Miscellaneous Total	**11**	**342**	**22**	**2**	**2**	**0**	**379**

Nut Remains. Like wood, nutshell was diffusely scattered and sparse. A total of 227 fragments were recovered, weighing together only 3.24 g. The majority of nut remains were of the hickory/walnut family (*Juglandaceae*). It is likely that most of the remains identified as belonging to the *Juglandaceae* family were specimens of hickory rather than walnut. Hickory nuts are common throughout prehistory in this region. Other nutshell represented were (in descending order) hazelnut, acorn, and pecan.

In the American Bottom, hickory was intensively exploited, while nuts of other species are present in more variable frequencies. At Washausen, hazelnut seems to have been a secondary resource. A total of 8.4% of the nutshell assemblage is hazelnut, which is an unusually high percentage compared to other regional assemblages. The total nutshell assemblage from Washausen provides data in support of a regional trend of a decline in the importance of nuts as a targeted resource during the early Mississippian transition, as agricultural production was being intensified (Simon and Parker 2006; VanDerwarker et al. 2013).

Seeds. At Washausen, 3,326 seeds were recovered from the five structures sampled, consisting of both domesticated and wild types. A total of 2,650 of these specimens were identifiable across 34 different plant taxa. The seed assemblage is dominated by cultigens/domesticates: 78.6% is comprised of starchy and oily seeds that make up the suite of Eastern Complex (EC) domesticates. Erect knotweed (*Polygonum erectum*) is the most commonly occurring starchy EC grain, followed by chenopodium (*Chenopodium berlandieri*), maygrass (*Phalaris caroliniana*), and little barley (*Hordeum pusillum*). The common sunflower (*Helianthus annuus*) and sumpweed (*Iva annua, var. macrocarpa*) are both present in low numbers, which is a common pattern for these oily-seed EC crop taxa. Only a single rind of squash/pumpkin (*Cucurbita pepo*) was recovered. Other notable seeds present are of tobacco

(*Nicotiana rustica*) and morning glory (*Ipomea* sp.), recovered from Structures 2 and 3 located in the settlement's secondary plaza.

Uncultivated seed types recovered belong to a broad array of plant species. Wild plant foods include five taxa of fleshy fruits and berries. These include black nightshade, persimmon, grape, raspberry/blackberry, and elderberry. The majority of fruit seeds identified (n=124) are black nightshade. Seeds from members of the bean family have also been identified, especially from the hearth area within Structure 3. Of these, wild bean and hog peanut, as well as tick trefoil, are well represented.

Specimens of wild grasses and grass-like sedges make up about 13% of the site-wide seed assemblage (n=124). The most common grass is switchgrass/panic grass, followed by witchgrass/crabgrass, representatives of the grass family *Poaceae*, bluestem/beardgrass, barnyard grass, members of the sedge family, and cutgrass.

<u>Maize</u>. A total of 3,103 fragments of maize (combined weight of 24.64 g) were recovered, including cupules, glumes, kernels, embryos, and rachis segments. Samples from Structure 2 fill, Zone 21 (Figure 4.5), produced a high frequency of maize remains, alongside elevated amounts of certain EC cultigens and other plant remains. Five rachis segments from Structure 2 fills show cupule angles that range from 45-75 degrees, which suggests cobs with ten to 16 rows of small pyramidal-shaped kernels. This maize assemblage, therefore, matches expectations for the types of maize normally recovered in the region at this time, and demonstrates that regional inhabitants during the period of occupations at Washausen were full participants in maize agriculture alongside continued production of EC cultigens (see Simon and Parker 2006).

Faunal Remains[5]

Faunal remains from the Washausen site were recovered during excavations as well as from sediment samples after water flotation (Table 4.3). A total of 1,003 vertebrate and invertebrate remains are present in this assemblage. Structure 2's basin fills produced a majority (75.8%) of the faunal assemblage. Faunal specimens, as reported herein, were identified to the most specific taxonomic level possible. Structure 2 and Structure 4 produced the greatest number of identifiable specimens. Structures 1, 3, and 5 yielded few animal bones, the majority of which are unidentifiable below the level of taxonomic class. What follows is a description of faunal remains from Structures 1, 2, and 4.

Structure 1 (Feature 5). Remains of four animal taxa were identifiable from the fills of Structure 1, including deer (*Odocoileus virginianus*), bird (waterfowl), and fish. A total of 70.1% of all faunal remains were burned, a majority of these being calcined. Most specimens from Structure 1 were unidentifiable either to the level of, or below, class.

Deer remains from Structure 1 consist of 12 specimens, including tooth fragments as well as an ischium, a vertebra, and a metapodial fragment. The metapodial fragment comes from a distal shaft that has been grooved and snapped, suggesting its use during tool manufacture. Waterfowl are represented by goose (Anserinae) and duck (Anatinae). The goose specimen is a bone from its wing tip, and compares to a small-sized individual. A distal humerus fragment from a duck would have belonged to a medium-sized individual. Only one fish bone was identified, belonging to a species within the sucker family (Catostomidae).

Structure 2 (Feature 6). An overwhelming majority of all zooarchaeological remains were recovered from the fill zones of Structure 2. In total, 690 vertebrate and 76 invertebrate specimens were identified. Four different taxa of mammals are present. Deer is the most

[5] Zooarchaeological remains were analyzed and summarized by Lucretia Kelly (2013; Washington University).

Table 4.3. Results of Zooarchaeological Analysis.

Taxon	Str. 1		Str. 2		Str. 3		Str. 4		Str. 5	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Mammals (excavated)										
Rodentia							2	1		
Geomys bursarius			1	1						
Sciurus sp.			7	2			1	1		
Ondatra zibethicus			1	1						
Odocoileus virginianus	12	1	54	3			1	1		
large mammal	6		101		1		6		1	
medium-large mammal	15		84							
medium mammal			1							
Mammals (floated)										
Rodentia			2	1			1			
Odocoileus virginianus			12	1						
Total Mammals	**33**	**1**	**263**	**9**	**1**		**11**	**3**	**1**	
Mammal or Bird (excavated)			14							
Birds (excavated)										
cf. *Podilymbus podiceps*			3	1						
Anseriformes			1							
Anserinae	1	1	2	1						
large Anatinae			3	1						
medium-large Anatinae			5	1						

Table 4.3. Results of zooarchaeological analysis, continued.

Taxon	Str. 1 NISP	Str. 1 MNI	Str. 2 NISP	Str. 2 MNI	Str. 3 NISP	Str. 3 MNI	Str. 4 NISP	Str. 4 MNI	Str. 5 NISP	Str. 5 MNI
medium Anatinae	1	1	5							
small Anatinae			4							
medium *Anas* sp.			2	1						
Anas discors/carolinensis			10	2						
Aythya sp.			1	1						
Tympanuchus cupido			3	2						
Buteo sp.			2	1						
Passeriformes			3	1						
medium-large bird	1		32							
medium bird	1		18				3			
medium-small bird			8							
Birds (floated)										
cf. *Podilymbus podiceps*			1							
Olor buccinator			1	1						
medium Anatinae			2	1			1			
Colinus virginianus			1	1						
Total Birds	**4**	**2**	**107**	**15**			**4**			
Fish (excavated)										
Polydon spathula			3	1						
Lepisosteus sp.			5	1			1	1		

Table 4.3. Results of zooarchaeological analysis, continued.

Taxon	Str. 1 NISP	Str. 1 MNI	Str. 2 NISP	Str. 2 MNI	Str. 3 NISP	Str. 3 MNI	Str. 4 NISP	Str. 4 MNI	Str. 5 NISP	Str. 5 MNI
Amia calva			15	2			10	1		
Dorosoma cepedianum							1	1		
Catostomidae	1	1	15				3			
Ictiobus sp.			8				2	1		
Ictiobus cf. *bubalus*			2	1						
Ictaluridae			8				2			
Ictalurus sp.			5	1						
Pylodictis olivaris			2	1			1	1		
Ameiurus sp.			4				1	1		
Ameiurus cf. *natalis*			1	1						
Ameiurus cf. *nebulosus*			1	1						
Centrarchidae			6	2			2	1		
Micropterus sp.			1	1			3	1		
Morone sp.							1	1		
Aplodinotus grunniens			3	1						
indeterminate fish	2		61				65		2	
Fish (floated)										
Lepisosteus sp.			4				6			
Amia calva			5				3			
Catostomidae			7							

Table 4.3. Results of zooarchaeological analysis, continued.

	Str. 1		Str. 2		Str. 3		Str. 4		Str. 5	
Taxon	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Ictiobus sp.			7	1						
Ictaluridae			11				2			
Ictalurus sp.			1							
Ameiurus sp.			2							
Centrarchidae			12				3			
Micropterus sp.			2							
Lepomis sp.			2	1						
Pomoxis sp.			2	1						
Aplodinotus grunniens			6				1	1		
Total Fish	**3**	**1**	**201**	**16**			**107**	**10**	**2**	
Reptiles (excavated)										
indeterminate turtle	1	1								
Amphibian (excavated)										
indeterminate amphibian			1	1						
Amphibian (floated)										
Anura	1	1								
Total Amphibian	**1**	**1**	**1**	**1**						
Indeterminate Vertebrate (excavated)	45		103		10		10		3	
Total Vertebrate	**86**	**5**	**690**	**42**	**11**		**132**	**13**	**6**	

Table 4.3. Results of zooarchaeological analysis, continued.

Taxon	Str. 1 NISP	Str. 1 MNI	Str. 2 NISP	Str. 2 MNI	Str. 3 NISP	Str. 3 MNI	Str. 4 NISP	Str. 4 MNI	Str. 5 NISP	Str. 5 MNI
Invertebrate (excavated)										
indeterminate mussel	1		76				1			
Grand Total	**87**	**5**	**766**	**42**	**11**		**133**	**13**	**6**	

common (NISP=66), followed by small numbers of tree squirrel (*Sciurus* sp., n=7), Plains pocket gopher (*Geomys bursarius*, n=1), and muskrat (*Ondatra zibethicus*, n=1).

Deer remains from Structure 2 comprise an MNI of four. All body parts are represented, but elements from the head and extremities are under-represented, suggesting that complete bodies were not brought to the site for processing. In contrast, axial and forelimb areas are over-represented by more than twice the expected number, while hindquarter elements are present at expected frequencies.

One mandible with intact teeth was recovered. For this specimen, a likely age estimate of 2.5 to 3.5 years is consistent with the number of erupted molars present and extent of tooth wear (Schwartz and Schwartz 1981). Young deer are also present in the assemblage, represented by at least 2 MNI. Identified were a total of 11 elements that compare to a full-term fetal comparative specimen, and two elements that compare to a very young individual less than five to eight months of age (Purdue 1983). One individual compares to specimens that are younger than 23-29 months, based on an estimate of epiphyseal fusion, and another specimen was likely older than 29 months. An additional quantity of specimens (n=101) are only identified as large mammal, many of which likely represent deer remains.

At least 12 taxa of bird are identified, the majority of which are waterfowl, including ducks and geese. A wing bone (carpometacarpus) from a trumpeter swan (*Olor buccinator*) was recovered from Zone 21 of Structure 2's fills. This specimen is a distal fragment with light cut marks near its break. Swan remains are rarely recovered in the American Bottom region, but their distributional pattern suggests these birds were of symbolic significance (Kelly and Kelly 2007). A tentatively identified specimen of pied-billed grebe (cf. *Podilymbus podiceps*) is also present in the assemblage.

Remains of terrestrial birds have also been identified. Four taxa are represented, including greater prairie chicken (*Tympanuchus cupido*), bob-white quail (*Colinus virginianus*), buteo hawk (*Buteo* sp.), and passerines/perching birds (Passeriformes). Prairie chicken and bob-whites were likely eaten. Hawks, however, were potentially used in ritual and have not been a commonly recovered species in the American Bottom (Kelly 2010). A total of two hawk wing specimens (a humerus and an ulna fragment) were recovered from Structure 2 fills, Zone 21.

Structure 2 samples also produced remains from 17 fish taxa from various families. Fish from the sucker family (Catostomidae) are the most common (27.9%). Catfish (Ictaluridae) was the second most common fish family represented (25.0%), including both large river catfish and backwater bullheads. A flathead catfish (*Pylodictis olivaris*) individual compared well with a 30-pound comparative specimen. Other large catfish include channel or blue catfish (*Ictalurus* sp.), one that would have weighed at least 30 pounds and another perhaps 70 pounds.

Other fish include members of the sunfish family (Centrarchiae), which make up 17.9% of the fish assemblage, including bass (*Micropterus* sp.), crappie (*Pomoxis* sp.), and sunfish (*Lepomis* sp.). Elements from bowfin (*Amia calva*) make up 14.3% of the fish remains identified below the taxonomic level of class, and gar (*Lepisosteus* sp.) and freshwater drum (*Aplodinotus grunniens*) both comprise 6.4% of the assemblage. A rarely identified fish that makes of 2.1% of the remains is the paddlefish (*Polydon spathula*). Paddlefish are open-water fish that are found in quiet waters, but require access to spawning areas that consist of gravel bars in free-flowing river waters.

<u>Structure 4 (Feature 26)</u>. Structure 4 fill zones produced a total of 132 vertebrate NISP and one invertebrate NISP. Three mammalian taxa were identified, including rodents

(Rodentia), tree squirrel, and white-tailed deer. Additionally, one specimen could be identified as bird, an element from a medium-sized duck.

Most numerous within the Structure 4 assemblage is fish remains, comprising 42 NISP identifiable below the taxonomic level of class. The composition of fish remains differs from that from Structure 2, however. Here, bowfin is most frequently represented (31.0%), followed by bass (19.0%), gar (16.7%), catfish (14.3%), suckers (11.9%), freshwater drum (2.4%), gizzard shad (*Dorosoma cepedianum*, 2.4%), and temperate bass.

Ceramic Remains

The majority of ceramic remains retrieved during the 2011 UM-WAP field season at Washausen were recovered during excavations and screening; a portion of the total rim sherds were retrieved as individual piece plots. All ceramic artifacts were analyzed following established methods for the region (see Kelly et al. 2007; Ozuk 1987). This approach allows Washausen ceramic artifacts to be easily compared to other local assemblages from other sites.

A total of 7,851 sherds were recovered from Washausen during the 2011 UM-WAP excavations. Of these, 207 rims were identified. Temper type was determined for all sherds. An attribute analysis was used to collect additional data from rim sherds. Attributes recorded for rims include the following: form; weight; temper; interior and exterior surface treatment; other decoration; lip type; rim type; rim length; rim thickness; orifice diameter; percent of orifice-arc present; neck height; presence/absence of cord-marking, and if present, cord twist direction and cord width. Table 4.4 presents results of the rim attribute analysis.

Several different temper types were used for the production of pottery during the decades surrounding the Mississippian transition (Kelly 2002). In the Washausen assemblage most sherds were tempered with crushed limestone (81.8%). Shell was the second-most used

Table 4.4. Results of Ceramic Rim Attribute Analysis.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
1	3	jar	4.7	shell	slipped, brown	slipped, brown		flattened	outslanting-incurved	4.5	18	7		
1	4	jar	143	limestone	plain, cordmarked below neck	plain		flattened	vertical-incurved	5.1	29	12.5	z	1.8
1	5	jar	136.5	limestone	plain, cordmarked below neck	plain		flattened	vertical-incurved	6.9	28	12.5	z	2
1	6	bowl	11.3	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.9	22	7.5		
1	7	stumpware	37.7	limestone	cordmarked	plain		extruded	outslanting	11.4			z	1.4
1	8	jar	125.1	limestone	plain, cordmarked below neck	plain	lip lug, rounded	flattened	vertical-incurved	7.8	24	15	z	1.1
1	9	stumpware	38.5	limestone	cordmarked	plain		flattened	vertical	11.3	24	5	z	0.6
1	11	jar	14	limestone	cordmarked	plain		flattened	inslanting	5.9	20	5	z	0.3
1	12	bowl	29.4	limestone	cordmarked	plain		flattened	vertical-outcurved	6.6	34	5	z	0.5
1	15	jar	2.8	limestone	slipped, black	slipped, black	lip lug, rounded	flattened	vertical-incurved	4	8	7.5		
1	16	jar	59.6	limestone	plain	plain		flattened	outslanting-incurved	5.1	20	10	z	0.6
1	17	bowl	14.8	limestone	slipped, red	slipped, red		flattened	inslanting-outcurved	5.5	17	7.5		
1	18	stumpware	84.5	grog	plain	plain		extruded	outslanting	13.1	12	25	z	1
1	19	jar	2.6	limestone	slipped, red	slipped, red		flattened	inslanting-outcurved	5.3				
1	21	bowl	7.2	limestone	slipped, red	slipped, red		flattened	outslanting-outcurved	4.2				
1	23	jar	23.9	limestone	slipped, red	slipped, red		flattened	inslanting-vertical	4.9	17	5		
1	24	bowl	20.4	limestone	cordmarked	plain		flattened	outslanting-outcurved	7.5			z	0.5

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
1	25	bowl	22.4	limestone	cordmarked	plain		flattened	inslanting-outcurved	8.5	33	5	z	0.7
1	27	bowl	33.9	limestone	cordmarked	plain		flattened	inslanting-outcurved	7.2	47	5	z	0.8
1	28	jar	8.7	shell	plain	plain		everted	outslanting-outcurved	7.9	19	5		
1	30	jar	26.8	limestone	slipped, red	slipped-red		flattened	vertical-incurved	6.7	16	10		
1	34	jar	2.7	grit	slipped, reddish-brown	slipped, reddish-brown	incised on exterior	rounded	outslanting	5.1	21	2.5		
1	35	bowl	25.4	limestone	slipped, brown	slipped, brown		flattened	vertical-outcurved	5.6	36	2.5		
1	36	jar	18.3	limestone	plain	plain	handle, loop with effigy		inslanting-incurved	9.1				
1	37	bowl	13.4	shell	polished	polished		everted	inslanting-incurved	3.6	27	5		
1	38	bowl	15.9	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.3	31	5		
1	39	bowl	24.9	shell	plain	slipped, red		flattened	outslanting-outcurved	8.7	46	2.5		
1	40	bowl	27.6	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.7	25	10		
1	41	jar	31.1	limestone & shell	plain	plain	lip lug, rounded	flattened	outslanting-incurved	5.3	16	12.5		
1	42	bowl	10	limestone	slipped, red	slipped, red		rounded	inslanting-incurved	5.6				
1	43	bowl	4.9	limestone	polished	slipped, red		rounded	vertical-outcurved	5.9	15	5		
1	44	bowl	2.8	limestone	slipped, red	slipped, brownish-red		flattened	vertical-outcurved	4.6	15	5		
1	45	jar	10.4	limestone	plain	plain		rounded	outslanting-incurved	6.9	13	7.5		
1	46	bowl	8.6	limestone	slipped, red	slipped, brownish-red		flattened	vertical-outcurved	4.7	18	5		

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
1	47	jar	15.4	limestone	plain	plain	notched lip, diagonal	slightly everted	outslanting-outcurved	5.7	25	20		
1	48	jar	13.6	limestone	polished	polished		everted	inslanting-incurved	6.3	20	7.5		
1	49	jar	42.2	limestone	slipped, brown	slipped, brown		flattened	inslanting-incurved	6.6	19	10		
1	98	jar	12.8	limestone	slipped, red	plain		rounded	inslanting-incurved	4.7	21	5		
1	99	bowl	37.1	limestone	cordmarked	plain		flattened	outslanting-outcurved	5.3	23	5	?	0.5
2	1	jar	46.6	shell	plain	plain		flattened	outslanting-incurved	5.2	34	7.5		
2	2	jar	12.3	limestone	polished	polished	notched lip, vertical into and below lip	rounded	everted	5.7				
2	13	bowl	68.8	limestone	cordmarked	plain		flattened	vertical-outcurved	9.7	26	7.5	z	2.3
2	14	jar	24.2	limestone	slipped, red	polished		flattened	inslanting-incurved	6.7	12	12.5		
2	20	jar	18.1	limestone	plain	plain	notched lip, vertical into lip	rounded	everted	6.9	25	2.5		
2	22	jar	53.3	limestone	plain	plain	lip lug, rounded	rounded	inslanting-outcurved	4.8	19	12.5		
2	26	bowl	6.1	limestone	slipped, red	slipped, red	lip lug, rounded	everted	inslanting-outcurved	4.3	10	10		
2	29	jar	21.6	limestone	polished	plain		everted	vertical-incurved	4.2	13	10		
2	31	pinch pot, jar	2.5	no temper	plain	plain		everted	outslanting-incurved	2	7	10		
2	32	jar	17.7	shell	plain	plain	handle, loop		outslanting-incurved	4.5				
2	53	jar	41.1	shell	plain	plain		flattened	outslanting-incurved	6				
2	54	jar	31.5	shell	plain	plain		slightly everted	outslanting-incurved	3.4	30	7.5		

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	55	jar	3.2	indet	plain	plain		rounded	outslanting-incurved	4.3	8	7.5		
2	56	jar	1	limestone	plain	polished, black		flattened	outslanting-??	2.6				
2	57	jar	2.7	grit	plain	plain		rounded	outslanting-incurved	4.2	8	7.5		
2	58	jar	83.8	limestone	cordmarking	plain		flattened	inslanting-outcurved	7.7	41	10		
2	59	jar	5	indet	polished, black	polished, black		everted	outslanting-incurved	2.7				
2	60	jar	5.7	shell	plain	plain		slightly everted	vertical-??	3.8				
2	61	jar	1.7	limestone	plain	plain		flattened	outslanting-??	6.7				
2	62	jar	2.6	grog	plain	plain		everted	outcurved-inslanting	4.8	14	5		
2	63	bowl	2.4	shell	slipped, red	slipped, red	lig lug-rounded	flattened	outslanting-outcurved	5.4				
2	64	jar	32.6	grit + grog	cormarked	plain		flattened	vertical-inslanting	7	17	15	S	1.2 mm
2	65	jar	0.9	limestone	slipped, red	slipped, red		flattened	inslanting-incurved	4.5	11	5		
2	67	jar	2.1	limestone	slipped, red	slipped, red	incised (exterior)	flattened	outslanting-incurved	5.5				
2	68	bowl	1.9	limestone	slipped, red	slipped, red		flattened	outslanting-outcurved	4.9	16	5		
2	69	stumpware	28.9	limestone	cormarked	plain		extruded	outslanting	15.4			Z	0.9
2	70	jar	2.4	limestone	plain	plain		flattened	inslanting-incurved	4.5	10	7.5		
2	71	jar	0.8	limestone	plain	plain		flattened	outslanting-??	4.6				
2	72	jar	1	limestone	plain	slipped, red		flattened	outslanting-outcurved	4.4				
2	73	jar	11.4	limestone	plain	plain		flattened	vertical-incurved	4.1	12	12.5		

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	74	jar	6	limestone	plain	plain		everted	vertical-incurved	3.4	13	5		
2	75	bowl	5.3	shell	plain	slipped, red		everted	outslanting-outcurved	5.8	22	5		
2	76	bowl	22.9	limestone	slipped, red	slipped, red	lip lug, rounded	flattened	outslanting-outcurved	5.9	19	7.5		
2	77	jar	14.4	limestone	slipped, red	polished, black		flattened	inslanting-incurved	6.1	9	10		
2	78	jar	21.8	limestone	polished, black	polished, black		flattened	inslanting-incurved	6.7	2.4	7.5		
2	79	bowl	37.7	limestone & shell	cordmarked	plain		exterior thickened	outslanting-outcurved	6.1	47	5	S	1.2
2	80	jar	23.5	limestone	slipped, red	plain	punctated	flattened	inslanting-incurved	7.3	10	10		
2	81	??	1.2	limestone	plain	slipped, red		everted	flattened	5.9				
2	82	jar	5	limestone	polished, black	polished, black	incised-lip, verticle into & under	everted	outslanting-incurved	4.4	10	12.5		
2	83	bowl	9.3	limestone	polished	polished		everted	outslanting-outcurved	4.3				
2	84	bowl	1.8	limestone	plain	plain		flattened	inslanting-incurved	3.8				
2	85	jar	9.2	limestone	slipped, red	plain		flattened	inslanting-incurved	4.4	13	7.5		
2	86	jar	3.9	limestone	slipped, red	slipped, red		everted	outslanting-outcurved	2.8				
2	88	??	2.3	limestone	plain	plain	lip lug, rounded	flattened		4.7				
2	89	jar	4.8	limestone	slipped, red	plain		flattened	inslanted-incurved	5.3				
2	90	??	1.3	limestone	polished, black	polished, black		flattened		4				
2	91	jar	1.6	limestone	plain	plain		flattened	vertical-incurved	3.6				

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	92	bowl	3.2	limestone	plain	slipped, red		flattened	vertical-??	7.9				
2	93	jar	1.6	limestone	plain	plain	incised-lip, verticle into	everted	inslanting-incurved	5.4				
2	95	bowl	20.2	shell	plain	plain		flattened	vertical-outcurved	7.6	36	2.5		
2	100	bowl	63.1	limestone	cordmarked	slipped, brown		flattened	outslanting-outcurved	7.4	39	5	Z	1.2
2	135	bowl	17.5	limestone	slipped, red	slipped, red	lip lug, rounded	flattened	outslanting-outcurved	5.2	14	10		
2	136	jar	6	limestone	cordmarked	plain		flattened	inslanting-incurved	3.2			z	1.1
2	137	jar	5.8	limestone	plain	plain		flattened	inslanting-incurved	4.8				
2	138	jar	10.8	limestone	slipped-red	slipped-red		flattened	inslanting-incurved	5.8				
2	139	jar	35.7	limestone	slipped-red	plain	punctated	flattened	inslanting-incurved	7.6				
2	140	jar	2	limestone	slipped-red	slipped-red	lip lug, rounded	flattened	outslanting-incurved	3.2				
2	141	jar	7.4	limestone	slipped-red	slipped-red		flattened	inslanting-incurved	5.2				
2	142	jar	1	limestone	plain	plain		flattened	outslanting-incurved	4				
2	143	bowl	8.8	limestone	plain	slipped-red	lip lug, rounded	flattened	outslanting-outcurved	3.3	8	10		
2	144	jar	8.7	shell	slipped-brown	slipped-brown		flattened	outslanting-incurved	3.6	13	12.5		
2	145	jar	17.3	limestone	plain	plain		flattened	vertical-inslanting	7.5	27	5		
2	146	jar	26.7	limestone	plain	plain		flattened	inslanting-incurved	4.8				
2	147	jar	5.8	limestone	slipped-red	plain		rounded	inslanting-incurved	8.1				
2	148	bowl	3.2	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	4.4	14	5		

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	150	jar	1.2	limestone	plain	plain		flattened	inslanting-incurved	3.7				
2	151	jar	1.5	limestone	slipped-red	slipped-red		flattened	inslanting-incurved	5.2				
2	152	jar	42.8	limestone	slipped-red	plain		flattened	inslanting-incurved	5.8	14	7.5		
2	153	bowl	3.6	limestone	slipped-red	slipped-red		rounded	outslanting-outcurved	3.3	29	5		
2	154	bowl	4.4	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	6.2				
2	155	bowl	4.9	limestone	slipped-red	slipped-red	lip lug, rectangular	flattened	vertical-outcurved	4.1				
2	156	jar	23.8	limestone	plain	plain	notched lip - vertical into lip	everted	outslanting-outcurved	8.2	28	5		
2	157	jar	1.5	limestone	plain	plain		flattened	outslanting-incurved	5.4				
2	158	jar	26.4	limestone	plain	plain		flattened	vertical-incurved	3.4	15	17.5		
2	159	jar	23.7	limestone	plain	plain		everted	inslanting-incurved	7.2	28	5		
2	160	bowl	21.6	shell	plain	plain		flattened	outslanting-outcurved	7.5				
2	161	jar	1.6	shell	polished, black	polished, black		rounded	outslanting-incurved	5.2				
2	162	bowl	8	shell	slipped-red	plain		everted	outslanting-outcurved	5.4	22	5		
2	163	jar	12.7	shell	plain	plain		flattened	inslanting-incurved	5.7				
2	164	jar	6.6	limestone	slipped-red	plain	punctated	flattened	inslanting-incurved	7				
2	165	bowl	15.1	limestone	plain	slipped-red		flattened	vertical-outcurved	4.1	18	5		
2	166	bowl	64.1	limestone	cordmarked	plain		flattened	outslanting-outcurved	5.1	36	17.5	s	1.1

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	167	bowl	26.5	limestone	slipped-red	slipped-red		flattened	vertical-outcurved	5.4	18	7.5		
2	168	jar	15.6	limestone	slipped-red	slipped-red		everted	inslanting-incurved	5.3	12	12.5		
2	169	jar	0.9	limestone	plain	plain	incised	extruded	inslanting-incurved	4				
2	170	jar	7	limestone	slipped-red	plain	punctated	flattened	inslanting-incurved	5.6	14	7.5		
2	172	jar	19.5	limestone	plain	plain		flattened	inslanting-incurved	7.8				
2	173	jar	26.3	limestone	slipped-red	plain		flattened	inslanting-incurved	6.2	11	12.5		
2	174	bowl	9.1	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	5.1				
2	175	bowl	16.3	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	4	21	5		
2	176	bowl	6.9	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	3.6				
2	177	bowl	14.2	limestone	slipped-red	slipped-red	lip lug, rectangular	flattened	outslanting-outcurved	4.1	14	7.5		
2	178	jar	1.4	shell	plain	plain		flattened	vertical-incurved	2.4	8	12.5		
2	179	jar	21	limestone	plain	plain	notched lip - vertical into lip	flattened	vertical-incurved	8	18	12.5		
2	180	jar	4.4	limestone	slipped-red	slipped-red	notched lip - vertical into lip	everted	inslanting-incurved	4	11	7.5		
2	181	jar	1.4	limestone	slipped-red	slipped-red		flattened	inslanting-incurved	3.9				
2	182	jar	12.9	limestone	plain	plain		flattened	inslanting-incurved	5.6	11	5		
2	183	stumpware	48.4	limestone	cordmarked	plain		flattened	vertical	12.8			s	0.8
2	184	jar	21.8	shell	plain	plain		flattened	inslanting-incurved	7.9				

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	185	jar	4.8	shell	plain	plain		flattened	outslanting-incurved	4.7	17	5		
2	186	jar	3	limestone	plain	plain	notched lip - vertical into and under lip	everted	inslanting-incurved	3.7	10	10		
2	187	jar	17.3	limestone	plain	plain		flattened	outslanting-incurved	5.1	11	10		
2	188	jar	9.4	shell	plain	plain		flattened	inslanting-incurved	6.2				
2	189	jar	1.7	limestone	plain	plain		flattened	vertical-incurved	4.7				
2	190	jar	5.8	limestone	plain	plain		flattened	inslanting-incurved	7.7	32	5		
2	191	bowl	1	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	5.1				
2	193	bowl	37.6	limestone	plain	plain		flattened	outslanting-outcurved	8.9				
2	194	jar	9.5	limestone	plain	plain		flattened	inslanting-incurved	4.5				
2	195	bowl	2	limestone	slipped-red	slipped-red		flattened	vertical-outcurved	5.4				
2	196	jar	3.6	limestone	slipped-red	plain		flattened	inslanting-incurved	5.8	16	5		
2	197	jar	24.5	shell	slipped-brown	plain		everted	inslanting-incurved	6.3	30	5		
2	198	jar	2.9	limestone	slipped-red	plain		flattened	inslanting-incurved	4.8	10	7.5		
2	199	jar	14.3	shell	slipped-red	slipped-red	notched lip - vertical into lip	flattened	outslanting-incurved	7.4	18	7.5		
2	200	jar	20.3	shell	plain	plain		flattened	inslanting-incurved	7.4				
2	201	bowl	1.4	shell	plain	plain		rounded	outslanting-outcurved	2.4				

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
2	202	jar	19.4	limestone	plain	plain		flattened	vertical-incurved	5.9	20	5		
2	203	jar	1	limestone	slipped-red	slipped-red		flattened		4.9				
2	204	jar	9.7	limestone	plain	plain	notched lip - diagonal	everted	inslanting-incurved	7.2	18	5		
2	205	bowl	2.1	limestone	slipped-red	slipped-red		flattened	outslanting-outcurved	4	13	5		
2	206	jar	2.9	limestone	plain	plain	notched lip - vertical into lip	everted	inslanting-incurved	3.2	12	7.5		
2	207	bowl	6.8	limestone	cordmarked	slipped-red		flattened	outslanting-outcurved	6.6			s	1.1
3	96	jar	8.7	limestone	plain	plain		flattened	outslanting-outcurved	5.2				
3	97	bowl	1.9	limestone	plain	slipped, red		flattened		10.1				
3	121	bowl	14.6	grog	cordmarked	plain	notched lip	flattened	outslanting-outcurved	6.7	27	5	S	0.2
3	122	bowl	43	shell	plain	plain	drilled hold in body	flattened	outslanting-outcurved	6.6	33	5		
3	123	bowl	1	limestone	plain	plain		flattened	outslanting-outcurved	5.2				
3	124	bowl	0.5	limestone	slipped, red	slipped, red		flattened	outslanting-outcurved	4.8				
3	125	bowl	4.8	limestone	slipped, red	slipped, red	notched lip-vertical into	everted	outslanting-outcurved	6	16	7.5		
3	127	jar	1.5	indet	polished, black	polished, black		slightly everted	outslanting-incurved	6.6				
3	128	jar	17.2	limestone	plain	plain		flattened	outslanting-incurved	7.1				
3	129	bowl	4.6	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.9	17	5		
3	130	bowl	2.5	limestone	slipped, red	slipped, red		rounded	inslanting-incurved	4.9				
3	131	bowl	2.3	limestone	slipped, red	slipped, red		flattened	inslanting-incurved	5				

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
3	132	jar	1.2	limestone	plain	plain		flattened	inslanting-incurved	4.9				
3	133	jar	1.7	limestone	slipped, red	slipped, red		flattened	outslanting-incurved	4.3				
3	134	bowl	1.9	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.6				
4	50	jar	247.9	limestone	polished	polished		everted	outslanting-incurved	7.4	33	22.5		
4	51	jar	54.9	shell	slipped, red	slipped, red	handle, loop	everted	outslanting-incurved	10.7	16	20		
4	52	jar	164.3	shell	slipped, brown	slipped, brown		flattened	outslanting-incurved	6.4	45	12.5		
4	94	jar	10.5	shell	slipped, red	slipped, red		everted	inslanting-incurved	5.4	18	7.5		
4	109	stumpware	24	limestone	cordmarked	plain		flattened	vertical	10.8	13	10	Z	0.9
4	110	jar	2.8	limestone	plain	plain		flattened	outslanting-incurved	4.2				
4	111	jar	2.5	limestone	slipped, red	slipped, red		flattened	vertical-??	6.3				
4	112	jar	9.2	limestone	plain	plain	lip lug, rounded	everted	inslanting-incurved	4.1	15	7.5		
4	113	jar	80.2	limestone	slipped, red	slipped, red		everted	outcurved-inslanting	6.6	28	7.5		
4	114	jar	78.5	limestone	plain	plain	notched lip-diagonal	everted	inslanting-incurved	7.6	29	7.5		
4	115	bowl	6.1	limestone	slipped, red	slipped, red		flattened	outslanting-outcurved	6.2				
4	116	jar	10.5	limestone	polished	polished		slightly everted	inslanting-incurved	4.8				
4	117	jar	21.9	limestone	slipped, black	plain		flattened	outslanting-incurved	7.5	26	7.5		
4	119	jar	2.7	limestone	plain	plain		flattened	outslanting-incurved	4.5				
4	120	jar	6	limestone	slipped, red	slipped, red	lip notching-vertical	everted	inslanting-incurved	5.9	19	5		

Table 4.4. Results of ceramic rim attribute analysis, continued.

Str. #	Rim #	Form	Weight (g)	Temper	Surface (ext)	Surface (int)	Decoration	Lip Type	Rim Type	Rim Thickness (mm)	Orifice Diameter (cm)	Orifice %	Cord Twist	Cord Width (mm)
5	101	jar	37.8	shell	cordmarked, polished, black	plain		flattened	inslanting-incurved	5.8			Z	0.4
5	102	jar	2.2	limestone	plain	plain		everted	oustlanting-incurved	4.1	9	7.5		
5	103	bowl	1.2	limestone	slipped, red	slipped, red		flattened	oustlanting-outcurved	3.9				
5	104	bowl	1.4	limestone	slipped, red	slipped, red		flattened	vertical-outcurved	4.3				
5	105	jar	1	limestone	slipped, red	slipped, red		flattened	inslanting-incurved					
5	106	jar	1.1	limestone	slipped, red	slipped, red		everted	inslanting-incurved	3				
5	107	jar	1.1	limestone	polished, black	polished, black		flattened	inslanting-incurved	5.3				
5	108	jar	1.3	limestone	polished, black	polished, black		flattened	inslanting-incurved	3.5				

tempering agent, identified in 11.8% of the sherds. A total of 4.2% of sherds contained mixed tempers (limestone + shell, or grit + grog). Less than 0.1% of the sherds were tempered solely with grog or grit, or lacked any tempering agent altogether.

The percentage of limestone tempering compares well to the Lindeman phase (A.D. 1000-1050) ceramic assemblage from the Range site, reported at about 82% (Kelly and Ozuk 2007b). The relative frequency of shell tempering at Washausen, however, is higher than the Lindeman phase Range site assemblage, where shell was present in only 2% of sherds. Betzenhauser (2011) reports that the ceramic assemblage recovered from her excavations in the northern portion of the Washausen site is composed of 76% limestone and 15% shell tempered sherds. At the nearby Divers site, the Lindeman phase assemblage is made up of 81% limestone and 2% shell tempered sherds, and the Lindhorst phase (A.D. 1050-1100) assemblage contains 65% limestone and 8% shell tempered sherds (Betzenhauser 2011). From comparison with these other datasets, the relative frequencies of different ceramic tempering agents at Washausen support the chronological placement of site occupations based on radiocarbon dating, as described above.

I conducted comparisons of the relative frequencies of temper types, vessel forms, and surface treatment for rims from all five excavated structures. When combined, limestone is the most common temper at 78.3%, followed by shell at 15.5%. Sherds with mixed or indeterminate tempers compose 1.9% and 1.5% of the assemblage, respectively. Grog tempering accounts for about 1.4% of the rims, followed by grit at 0.9%. Only 0.5% of the rims contained no temper at all. When temper types are compared by structure, no significant differences are seen (x^2 = 17.494; *df* = 28; *p* = .938) (Table 4.5).

Table 4.5. Summary of Rim Temper Data.

Str.	**Limestone**		**Shell**		**Grog**		**Grit**		**Mixed**		**Indet.**		**no temper**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
1	32	(80.00)	5	(12.50)	1	(2.50)	1	(2.50)	1	(2.50)				
2	98	(77.17)	22	(17.32)	1	(.79)	1	(.79)	2	(1.57)	2	(1.57)	1	(.79)
3	12	(75.00)	1	(12.50)	1	(6.25)					1	(6.25)		
4	13	(81.25)	3	(18.75)										
5	7	(87.50)	1	(12.50)										

Vessel forms identified in this Washausen assemblage include jars, bowls, stumpware, and pinch pots (see Kelly and Ozuk 2007a). Combined, jars are most common, making up 62.8% of the assemblage. This percentage was followed by bowls at about 32.3%, stumpware at 2.9%, and pinch pots at 0.5%. A total of 1.5% of the rims were not identifiable according to vessel form. These vessel form percentages compare favorably to the Lindeman phase Range site assemblage, with the exception of stumpware which makes of 5.8% of the late tenth century assemblage at Range (Kelly and Ozuk 2007b:Table 13.1). When the relative frequencies of vessel forms are compared by structure at Washausen, no significant differences are seen (x^2 = 20.078; *df* = 16; *p* = .217) (Table 4.6).

Surface treatments observed on Washausen ceramics include plain, cordmarked, slipped (red and brown), and polished categories. For all rim sherds, slipped surfaces are the most common, at 44.4%. Of these, the majority (41.1%) is red-slipped, and 3.4% are brown-slipped. Red-slipping is a common surface treatment at this time (Griffin 1949; Kelly 2002; Pauketat 1994), and Kelly and Ozuk (2007b:324) note that a brown or dark appearance to slips may have

Table 4.6. Summary of Rim Vessel Form Data.

Str.	**Jar**		**Bowl**		**Stumpware**		**Pinch Pot**		**Indet**	
	N	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
1	20	(50.00)	17	(42.50)	3	(7.50)				
2	85	(66.93)	36	(28.35)	2	(1.58)	1	(.79)	3	(2.36)
3	6	(37.50)	10	(62.50)						
4	13	(81.25)	2	(12.50)	1	(6.25)				
5	6	(75.00)	2	(25.00)						

resulted from aberrations during the firing process. Plain surfaces are second-most common, making up 36.2% of the rim assemblage. This is followed by cordmarked (10.2%) and polished surfaces (9.2%).

Of the slipped rims, 87.0% are tempered with limestone and 12.0% are shell tempered. Red-slipped, limestone tempered sherds are classified as the Monks Mound Red type (Griffin 1949). Despite the fact that its name is associated with the prominent monument at Cahokia, Monks Mound Red vessels appear to have been produced in the central American Bottom region where Washausen is located, and were a hallmark of the Pulcher ceramic tradition (Kelly 2002). As Kelly (2002:142) has stated, "[p]roduction and distribution of Monks Mound Red vessels during the latter part of the Emergent Mississippian was part of important social and ritual activities. Pauketat (1994:60) has also noted that these Monks Mound Red vessels 'indicate a high rate of intercommunity interaction.'" From surface collections at Washausen, Monks Mound Red bowls and jars were also found in high percentages in association with the site's main central plaza (Bailey 2007).

Unlike the relative frequencies of temper types and vessel forms, different surface treatments on rim sherds do not appear to be evenly distributed across all five structures (x^2 = 29.633; *df* = 16; *p* = .02) (Table 4.7). However, the small sample sizes, especially from Structure 3, Structure 4, and Structure 5, make it difficult to assess the significance of this pattern. When only rims from Structure 1 and Structure 2 are compared, both structures have similar percentages of slipped (45.0% and 43.3%, respectively; red and brown slips combined) and polished rims (7.5% and 7.9%, respectively). Differences exist, however, in the frequencies of plain and cordmarked rims. A total of 20% of Structure 1's rims have plain surfaces, compared

Table 4.7. Summary of Rim Surface Treatment Data.

Str.	Plain		Cordmarked		Slipped, Red		Slipped, Brown		Polished	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
1	8	(20.00)	11	(27.50)	15	(37.50)	3	(7.50)	3	(7.50)
2	55	(43.31)	7	(5.51)	52	(40.95)	3	(2.36)	10	(7.87)
3	6	(37.50)	1	(6.25)	8	(50.00)			1	(6.25)
4	5	(31.25)	1	(6.25)	6	(37.50)	1	(6.25)	3	(18.75)
5	1	(12.50)	1	(12.50)	4	(50.00)			2	(25.00)

to 43.3% of Structure 2's rims. Cordmarking is present on 27.5% of Structure 1's rim sherds, versus only 5.5% of those from Structure 2.

This noted difference between the presence of plain and cordmarked rim sherds between Structure 1 and Structure 2 could relate to temporal differences. There is a noted decline in the occurrence of cordmarked vessels through time in the region. For example, at the Range site cordmarking drops from 62.7% of the George Reeves phase (A.D. 950-1000) assemblage to only 38.8% of the Lindeman phase (A.D. 1000-1050) assemblage (Kelly and Ozuk 2007a, 2007b). Radiocarbon dating of Washausen's Structures 1 and 2 suggests a terminal use-date of these buildings during the late eleventh century, or during the local Lindhorst phase (A.D. 1050-1100). This difference may also reflect sampling issues related to differential breakage patterns across the site, as cordmarking was often applied to the bodies of vessels but not above their shoulders. A third explanation for this difference may relate to the nature of activities associated with the deposition of fills between the two structures. As will be discussed in Chapter Five, multiple lines of evidence suggest that portions of Structure 2 fills contain remains of commensal events, potentially ceremonial feasts that took place within the confines of the site's secondary plaza. If so, the increased presence of plain vessels may speak to their role as serving vessels during public events that are known to have been taking place at this time regionally (Pauketat et al. 2002).

Chipped Stone Remains

Lithic artifacts retrieved during the 2011 UM-WAP field season at Washausen were recovered during excavations and screening. Chipped stone was analyzed following the classification scheme presented by Andrefsky (2005). This methodology allowed all chipped stone artifacts to be sorted into specific types that reduced lithic assemblage variability into heuristic classes that facilitate comparison to other assemblages (Andrefsky 2005:61).

The typology presented here is based on morphological attributes of all chipped stone remains (see Andrefsky 2005:61-85). As such, these types do not necessarily reflect the function of artifacts; rather, these typological classes are based on artifact shapes, and are specific enough to create mutually exclusive types. The benefit of this approach is that "[t]his kind of basic typology can be modified, collapsed, or expanded to address specific questions put forward by specific researchers" (Andrefsky 2005:75).

Figure 4.13 displays the morphological typology used here, displayed in flow chart form (see also Andrefsky 2005:75-84). All chipped stone specimens were first sorted into the general categories of *tool* or *debitage*. Tools are defined as objects either intentionally modified or modified as a result of use (Andrefsky 2005:76). Debitage is defined as items that have resulted from objective pieces from the act of shaping those objects.

Tools were further separated into classes of *biface* or *nonbiface*. Bifacial tools are those that have been modified extensively by removal of flakes from both sides of the objective piece to form an edge circumscribing the whole artifact (Andrefsky 2005:77). Bifaces were then

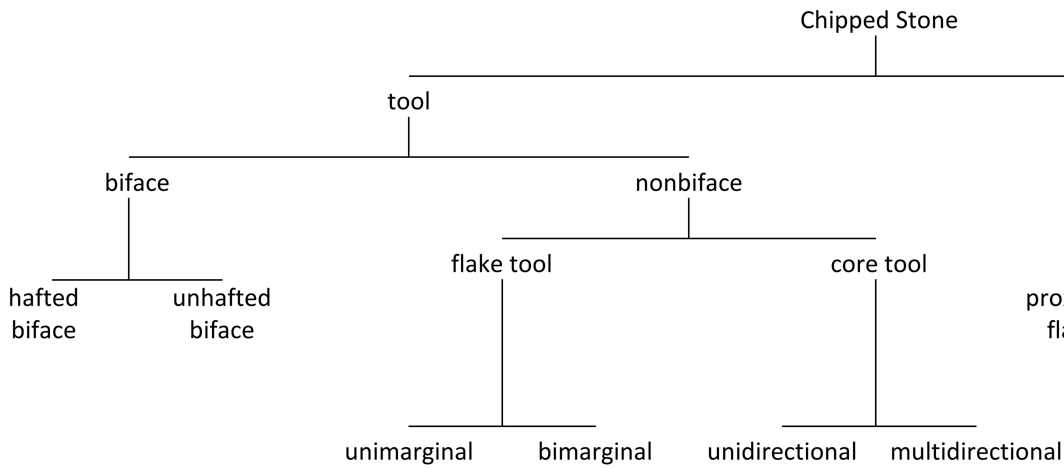

Figure 4.13. Chipped stone morphological typology (following and adapted from Andrefsky 2005:Figure 4.7).

further separated into *hafted* and *unhafted* types. Hafts are elements that may appear on bifacial tools that were created for attachment to a shaft as part of a composite tool.

Non-bifacial tools were grouped as either *flake tool* or *core tool*. Flakes are items that are removed during modification of a piece and that have both a dorsal and ventral face, as well as a striking platform and both distal and proximal ends (on complete flakes) (Andrefsky 2005:78). Flakes that have been used (either for cutting or scraping) and show signs of further modification or use-wear are classed as tools themselves. The flake tool class is sub-divided into unimarginal and bimarginal categories. Unimarginal flake tools show signs of retouch or use-wear on only the ventral or dorsal surface, or on both surfaces but at different locations. Bimarginal flake tools are those that have been retouched or display use-wear on both surfaces at the same location.

Core tools are artifacts that show signs of modification and that cannot be classified as bifaces or flake tools (Andrefsky 2005:81-82). Following Andrefsky, all cores are classified as core tools because they were modified and used as objective pieces. Thus, a core tool is a non-flake or non-bifacial item that has had flakes removed; core tools can represent chunks of raw material utilized for the removal or utilizable pieces, and they can also be blocky pieces that have had flakes removed for cutting, scraping, or chopping purposes. All core tools were further classified as either *unidirectional* or *multidirectional* cores. This distinction merely designates how flakes were removed from the objective piece. Unidirectional cores are tools having flakes removed in only one direction, whereas multidirectional core tools show evidence that flakes were removed in more than one direction.

All non-tool, chipped stone pieces were classed as debitage. Debitage "represents the discarded and unused detached pieces of lithic material produced from the reduction of an objective piece" (Andrefsky 2005:82). All debitage was initially sorted into *flake* and *nonflake* sub-categories (Andrefsky 2005:82-84). Flakes were further classified as *proximal flakes* or *flake shatter*. Proximal flakes are whole or broken flakes that maintain a striking platform where force was applied for removal of the flake piece. The flake shatter category subsumes all pieces of broken flakes other than those maintaining the proximal end.

Non-flake debitage is designated *angular shatter* (Andrefsky 2005:84). Angular shatter designates items removed from objective pieces that do not contain the recognizable dorsal or ventral faces of flakes, and can range from sizeable blocky chunks to small shattered items. Angular shatter can result during the modification of materials early on or late in the reduction stage.

A total of 3,194 chipped stone lithic artifacts was recovered from Washausen during the 2011 UM-WAP excavations. Table 4.8 displays sub-totals for each morphological type, grouped by feature. The majority of lithic remains (82.4%) were recovered from Structure 1 (n=1,480) and Structure 2 (n=1153). Very few bifaces are present in the total assemblage (n=6), only three from Structure 1, one from Structure 2, and two from Structure 4. Few cores are also present (n=47), the majority of which (87.2%) were recovered from Structure 1 and Structure 2.

A total of 2,672 flakes was identified in the total assemblage. Of these, 958 (35.9%) are flake tools, 933 (34.9%) are proximate flakes, and 781 (29.2%) are flake shatter. The angular shatter category accounts for 469 pieces of the total assemblage. Only 14 chipped stone artifacts were recovered in association with excavation of External Pit 1 (Feature 19), all of which came from the overlying plowzone. Therefore, discussion of lithic artifacts below will only involve those recovered from the five excavated structures.

Table 4.8. Results of Lithic Analysis.

Str.	Biface (hafted)	Biface (unhafted)	Flake Tool (unimarginal)	Flake Tool (bimarginal)	Core Tool (unidirectional)	Core Tool (multidirectional)	Flake (proximal)	Flake Shatter	Angular Shatter
1		3	428	31	8	16	378	450	166
2	1		294	50	1	16	371	243	177
3			53	6		2	54	43	22
4	1	1	73	1		4	85	37	76
5			19	1			39	8	22
Ext. Pit 1[1]			2					6	6

[1]All lithic artifacts from External Pit 1 originated from the plowzone.

As mentioned, few bifacial tools or cores are present in the Washausen lithic assemblage. Of the six bifaces, three were recovered from Structure 1, one from Structure 2, and two originated from Structure 4. The majority of cores (91.5%) were recovered from the three structures associated with the site's secondary plaza. Of the total 47 cores, 24 originated from Structure 1 fills, 17 from Structure 2, and only two from Structure 3. A total of six were recovered from Structure 4 fills. Structure 5's lithic assemblage lacks both bifacial tools and cores.

Looking at the flake tool and debitage categories, only minor differences are present across the five excavated structures. Table 4.9 shows the frequencies and percentages of flake tools (unimarginal and bimarginal types combined) and debitage (proximal flakes, flake shatter, and angular shatter combined) for all structures. The three structures associated with the site's secondary plaza (Structures 1, 2, and 3) have a slightly higher percentage of flake tools to unutilized debitage, compared to Structures 4 and 5. However, these differences are not statistically significant (x^2 = 5.505; *df* = 4; *p* = .239).

Table 4.9. Summary of Flake Tools and Debitage.

Str.	**Flake Tools**		**Debitage**	
	N	**(%)**	**N**	**(%)**
1	459	(31.59)	994	(68.41)
2	344	(30.31)	791	(69.69)
3	59	(33.15)	119	(66.85)
4	74	(27.21)	198	(72.79)
5	20	(22.47)	69	(77.53)

CHAPTER 5
FEAST, FAMILY, AND FIELD: COMMUNITY CONSTRUCTION DURING THE MISSISSIPPIAN TRANSITION AT WASHAUSEN

The Washausen site represents a short-term mound and village settlement occupied during the Mississippian transition in the American Bottom region of west-central Illinois. Major occupations of this early mound town occurred during the tenth and eleventh centuries A.D., most intensively during the late George Reeves, Lindeman, and early Lindhorst phases (Figure 1.2). Initial residence at the Washausen locality took place at a time when Cahokia was no more than a village – albeit likely the largest and most rapidly growing village in the region – prior to the construction of Cahokia's unprecedentedly large mounds and plazas (see Chapter 3).

Washausen experienced a period of growth and the construction of plazas and earthen mounds at the same time that villagers at Cahokia, and probably at a handful of other sites like Pulcher, also began reorganizing their communities around large, central public spaces and monuments. Thus, Washausen was a center of activity and residence in the central portion of the American Bottom at A.D. 1050, a date Pauketat has termed the "Big Bang" at Cahokia (Pauketat 1997; 2004:65-66) and considered the start of the local Mississippian period (Fortier et al. 2006; Hall 1991). Washausen was abandoned by the end of the eleventh century when Cahokia's (and likely Pulcher's) local population was nearing its peak. The abandonment of Washausen also corresponds to the initial construction of Monks Mound (Schilling 2013), the largest constructed monument north of central Mexico, and the third largest in all of the Americas, outsized only by the Mexican pyramid at Cholula and Teotihuacan's Pyramid of the Sun (Iseminger 2010).

Although some researchers have placed the start of construction of Monks Mound in the tenth century (see Dalan et al. 2003; Fowler 1997), new evidence suggests a start date of A.D. 1100 or later (Schilling 2010, 2013; see also Kelly and Brown 2014).

This regional sequence reinforces the view that knowledge of the histories of settlements like Washausen is important if we are to better understand the development of large and highly complex social formations like Mississippian Cahokia. In fact, with the recent acknowledgment that Cahokia represents a possible case of Native North American urbanism (Kelly and Brown 2014; Pauketat 2007), we benefit from understanding the full extent of social processes that were ongoing throughout the course of regional developments prior to, during, as well as after Cahokia's prominence as a major population center. This position rests on the starting-point that the development of Cahokia and the cultural complex termed "Mississippian" were neither the result of slow evolutionary developments nor one-time events. Rather, changing notions of identity and community were an ongoing process, not static or temporally bounded categories (Bernardini 2011; Lightfoot 2001; Pauketat 2001a, 2001b).

In Chapters 3 and 4, I presented data from my 2011 field investigations at Washausen. Chapter 3 discussed results of a high-resolution geophysical survey that were used to produce a map of the site, revealing information about community organization (see also Barrier and Horsley 2014; Horsley et al. 2014). These geospatial data allowed me to discuss Washausen's spatial layout, and I gave a description of distinct spatial elements of the community. The tenth-eleventh century community at Washausen was composed of numerous residential courtyard groups, each made up of several structures around small open courtyards. These courtyard groups were aligned around one of the earliest mound-and-plaza complexes in the American Bottom. Two, and potentially three, earthen mounds were built along the borders of a central plaza that measured approximately 72 x 68 m. Just south of the site's Mound B, the Washausen settlement also includes what I have called a secondary plaza. This secondary plaza was surrounded by several peripheral buildings, including a T-shaped structure along its western border. In its center was a rectangular building aligned 35-40 degrees offset from the alignment of the site's main and secondary plazas.

Chapter 3 also presented data that I used to construct a population estimate for Washausen. I compared population estimates and site-spatial information for Washausen to data for earlier villages located nearby at the Range site, as well as to global village sequences provided by Bandy (2004, 2008). The demographic profile that I constructed for the central American Bottom demonstrates a pattern of village growth and decline in the area after the onset of sedentism and agricultural intensification (Barrier and Horsley 2014). These data show that the development of larger communities resulted from frequent population movements as village segments fissioned and later aggregated at new communities.

In Chapter 4, I presented results of my 2011 excavations at Washausen. I detailed the results of artifact analyses, giving information about the botanical, zooarchaeological, ceramic, and lithic assemblages. In this chapter I also presented ten new AMS radiocarbon dates for the site, and provided a discussion of the dating of occupations and activities at Washausen.

In this chapter, I combine these multiple lines of evidence and consider how Washausen's residents constructed their local community during the tenth through eleventh centuries A.D., a time that corresponds to the Mississippian transition in the American Bottom. I take an historical approach by placing the Washausen mound town within a regional diachronic framework, one showing demographic changes that occurred through a fission-fusion process enacted by residential courtyard group migrations. As I have argued in Chapter 3, population numbers at

Washausen reached levels that would have required the development of new forms of institutional integration to allow settlement nucleation at this scale.

Here, the data I presented in Chapter 4 are used to investigate the operation of some of these institutions. Drawing upon my discussions from Chapter 1, I place these results within a theoretical framework focused on the political economies of kin-based agricultural societies. I argue that the histories of places like Washausen should inform our models about the development of the larger American Bottom centers, like Pulcher and Cahokia, and that they were part of the buildup to events sparking the historical transformations that archaeologists identify as "Mississippian" across much of eastern North America.

Community Construction in the American Bottom: The Washausen Case

In Chapter 3, I presented a series of population estimates for the transitional Mississippian period Washausen mound town. Population estimates were calculated using information about the remains of residential dwellings at the site, as known from an extensive geophysical survey. The geophysical data produced a relatively complete map of the site displaying a clear pattern of distinct, residential courtyard groups distributed about a centrally-located mound-and-plaza complex. This work demonstrates that the use of high-resolution, broad-scale geophysical techniques to survey entire sites (and even larger landscapes) can offer a productive method to complement more traditional archaeological approaches of data collection, and can be used in the formulation and assessment of anthropological research questions about the past (Horsley et al. 2014; Kvamme 2003; Thompson et al. 2011).

Together, demographic data for Washausen and earlier villages illuminate a punctuated history of village growth and decline that occurred through persistent population movements of residential courtyard groups, possible at time-scales approaching generational or even sub-generational scales (compare to Cobb and King 2005). Recurrent population movements are now more than ever recognized as prominent factors in the historical development of Mississippian communities in the American Bottom (Cobb 2005; Pauketat 2003:58) and the larger Mississippian world more generally (Blitz 1999:590). From this point of view, the short-lived Washausen site is an important part of the longer-term Mississippian history of the American Bottom.

This sketch of early village developments in the American Bottom also contributes to larger comparative studies that seek to understand the growth of large complex polities as a global phenomenon. The early village sequence that I presented in Chapter 3 for the Range and Washausen sites matches demographic expectations provided by Bandy's (2004; 2008) model for early village developments and farming communities. The Range and Washausen village sequences demonstrate a diachronic shift towards greater settlement nucleation and larger scales of integration, enacted through a protracted process of transformative community aggregations and dispersals.

Kelly (1990a; 1992) has discussed the development and operation through time of social institutions at the Range site during the centuries leading up to the Mississippian transition. Various institutions at distinct village occupations at Range are recognizable through the appearance of new architectural-spatial arrangements, specialized buildings, feature clusters, and particular material assemblages. These include the construction and use of larger buildings within and between courtyard groups that may have served socio-political functions, early temple-like buildings with central hearths and from which are recovered artifacts showing religious symbolism, quadripartite arrangements of pits and central wooden posts within open courtyards, and later on, central plazas between distinct courtyard groups. As Kelly (1992:186) states, villages at Range represent “the coalescence of various communities in the immediate area at a single location… In many respects the symbolism and affiliated ceremonies [at Range] were important in unifying disparate communities and hence served to mitigate against the… fission of settlements.”

After A.D. 1050 at Cahokia, new institutional relations are evident as the settlement was undergoing unforeseen levels of transformation and community reorganization, and as major investments were being made in earth moving, plaza construction, and mound building (Dalan et al. 2003; Milner 1998; Pauketat 1994, 2004; Schilling 2010). Monumental wooden posts and circular “woodhenges” were raised in public view (Pauketat and Alt 2005; Smith 1992), and extravagant burials were placed in unique ridge-top mounds as part of large-scale public performances (cf. Brown 2006; Emerson 1997; Fowler et al. 1999; Pauketat 2009; Zimmermann Holt 2009). Earlier residential spaces inhabited by small courtyard groups were replaced by larger residential zones distributed about plazas and mounds, and around new forms of architecture including T-shaped and circular buildings (Collins 1997; Mehrer and Collins 1995; Pauketat 1994, 2004). There is also evidence of large-scale public feasts indicating that great numbers of people were taking part in labor-intensive projects and ceremonial rites that arguably served to integrate disparate groups through commensal and politically-charged events (Kelly 2001; Pauketat et al. 2002).

If, as I have argued, the changes at Cahokia were part of larger ongoing processes, then what evidence exists at Washausen for the presence of social institutions indicative of new forms of local interaction and integration at this early mound town? In addition to Washausen's central mound-and-plaza complex, residents also constructed and used the settlement's secondary plaza. As described in Chapter 3, Washausen's secondary plaza was defined by a number of structures that marked the perimeter of a roughly 50 x 50 m space (Figure 3.2). In the center of this space was a structure offset about 35-40 degrees (Structure 1). The secondary plaza and its perimeter buildings appear to align to a potential site grid, as defined by the central mound-and-plaza complex. Washausen's secondary plaza, used throughout the tenth and eleventh centuries, measures approximately two times larger than the two early plazas at the George Reeves phase (A.D. 950-1000) Range site.

Across the Southeast United States and elsewhere, archaeologists have demonstrated that plazas were locations for a range of activities that often included public gatherings, performances, and inclusive ritual ceremonies that served to encourage a sense of community identity (Kidder 2004; Knight 1986; Lewis et al. 1998; Wesson 1998). Following Kidder (2004:515), "[a] plaza can be defined as a public area in a community or as an open space surrounded by or adjacent to buildings." As he states, however, "[p]lazas cannot simply be thought of as empty spaces that developed because architecture enclosed an open area; they must be understood as one of the central design elements of community planning and intrasite spatial organization" (Kidder 2004:515).

Thus, inference of the presence of a secondary plaza at Washausen is strengthened by consideration of the activities that established a community plaza-space, in addition to plotting the surrounding architecture. Like the main mound-and-plaza complex at Washausen, the settlement's secondary plaza, its buildings, and the public activities that took place there give us a glimpse at some of the institutions created by Washausen's residents as they constructed their mound-town community.

With a regional demographic trajectory of village development charted for the region, results from my 2011 excavations at Washausen provide insights into some of the new institutions created by Washausen residents and the social practices they used to integrate greater numbers of arriving courtyard groups. As detailed in Chapter 4, excavation of Structure 2, located on the eastern edge of the settlement's secondary plaza, revealed the presence of organically-rich fill zones that appear to have formed via intentional human infilling (Figures 4.4 and 4.5). Nine soil samples, totaling 91 liters of sediment, were removed from Structure 2's fills. A subset of these samples produced an overwhelming majority of the recovered botanical and faunal remains from the site. Structure 2's basin fills produced about two-thirds of all seeds, roughly 80% of all Eastern Complex (EC) cultigens, and almost 90% of all maize remains. More interesting is the deposit identified as Zone 21 (Figure 4.5). Two soil samples (Samples 22 and 27) produced about half of all recovered seeds, nearly two-thirds of all EC cultigens, and almost 75% of all maize recovered from the site – all from just 21 liters of floated sediment.

Also identified within Structure 2's fills were 33 of a total of 40 recovered morning glory seeds. Twenty-six of these seeds were identified from the two samples removed from Zone 21. The hallucinogenic properties of morning glory seeds, and the ethnohistoric record of their use by native groups, suggest their role during ceremonial and communal events. For example, sources depict the use of morning glory among native groups for medicinal purposes, often as a purgative (King 1984; Moerman 1985:235-236; Steyermark 1981:1216; Yanovsky 1936:53), and herbal guides today link the consumption of morning glory to rapid and violent emptying of the bowels (Lust 1974). In the American Bottom region, morning glory has been recovered from a handful of other locations that together support the interpretation that the plant was utilized as a specialized or ceremonial item. For example, specimens of morning glory have been identified within assemblages excavated from early Mississippian mound or nodal centers like the Pfeffer, WalMart, Olszewski, and Lehmann-Sommers sites (Dunavan 1990:401-402; Parker 1998). At Lehmann-Sommers specifically, morning glory seeds were directly associated with a T-shaped temple building (Parker 2002).

Structure 2's fills also produced the overwhelming majority of faunal remains collected during my excavations at Washausen. In many ways, Structure 2's faunal assemblage is similar to other contemporary American Bottom sites where faunal assemblages have been analyzed. However, it differs in some telling ways. For example, deer remains comprise a larger percentage of Structure 2's assemblage (85.7% mammalian NISP) compared to other contemporary sites. At the Range site, deer remains comprised between 30-35% of the mammalian remains from pre-A.D. 1050 assemblages (Kelly et al. 2007). For the early Mississippian feature clusters studied at Range, they varied between zero to nearly 50% of identified mammalian NISP, with muskrat remains many times outnumbering deer.

Fish taxa identified from Washausen are those that would be expected from a floodplain site and one located adjacent to a major creek. However, Structure 2's assemblage did produce a few noteworthy specimens. Three catfish MNI are from large individuals. Two would have weighed around 30 pounds each, and remains from one individual suggest that it weighed at least 70 pounds. Remains of paddlefish were also identified from Structure 2's fills. Paddlefish has rarely been identified in American Bottom assemblages. This oddly-shaped fish has a long paddle-shaped snout, and it is possible that this fish conveyed some special meaning, as evidenced by a rock art pictograph known from the Petty Jean and Arkansas rivers area (Fritz and Ray 1982).

Two bird taxa identified from Structure 2 are also rare. One is trumpeter swan. A wing bone (distal carpometacarpus) recovered from Zone 21 has light cut marks just above the break. Swan remains have a patterned distribution in the American Bottom during the Mississippian period, where they are concentrated at Cahokia and appear to have had symbolic significance (Kelly and Kelly 2007). Outside of Cahokia during the Lohmann phase (A.D. 1050-1100), wing bones have been recovered from two other mound centers (East St. Louis and Horseshoe Lake). At the upland Richland Complex Halliday site, a number of unmodified swan bones have been recovered, but none were wing elements. Kelly and Kelly (2007) note that the wings of swan may have been used for ritual performances during the early Mississippian period.

Two buteonine hawk wing bones were also recovered from levels 4 and 5 of Structure 2. Raptor bones are not commonly found at American Bottom sites, but do occasionally occur. The hawk has been linked to Mississippian ritual (Kelly 2010) and its occurrence here within Structure 2's unique material assemblage supports this view. Raptors, and the falcon specifically, are among the most commonly occurring images depicted in Mississippian iconography across the Southeast (Brown 2007:56). In more recent times, the hawk was an important component of Osage symbolism and material culture, as it was associated with the warrior and its skin curated as a sacred component of specific clan bundles (Bailey 1995; La Flesche 1921).

Across the secondary plaza from Structure 2, excavation of Structure 3 revealed its unique T-shape (see Chapter 4). Baltus and Baires (2012) class T-shaped structures together with a few other specialized building forms (L- and cruciform-shaped, and larger rectangular structures) that they call Cahokian "ritual structures." Besides their unique shapes, larger dimensions, and placement associated with mounds, plazas, or mortuary facilities, excavations have revealed that these buildings contain sets of material items and internal features that are not ordinarily found within domestic structures. Baltus and Baires state that these specialized buildings were likely associated with religious or priestly activities. Such structures often contain storage pits and hearths. In addition to some domestic debris normally recovered from this class of buildings, a variety of rare items are also variously found, including certain minerals, carved pipes and figurines, the wing bones of large birds (e.g., swan), miniature vessels, and tobacco seeds (Baltus and Baires 2012:177).

Baltus and Baires (2012:Table 2) list a total of eight T-shaped structures that have been located in the greater American Bottom – three at Cahokia itself, one at the Sponemann and East St. Louis sites, as well as one each at the Pfeffer, Grossman, and Halliday sites in the Richland Complex uplands. Within many of these ritual buildings, the repeated use of fire in sub-floor hearths and surrounding burned-floor areas appears to have been a common practice. Their thorough review of the use of fire in the Cahokia area and elsewhere in eastern North America led Baltus and Baires (2012:168) to "argue that fire was a means of animating and transforming spaces and objects, and, in doing so, transferring power to particular social agents within the Cahokian polity" and that fire "was used and experienced by Cahokians as both an object and an agent of power: meaning ancestors, mounds, and ancestral temples were created, manipulated, and transformed as persons and places of power in conjunction with or at the hands of fire" (Baltus and Baires 2012:172-173). Kelly (1992:176) also discusses the link between the placement of internal hearths and the ceremonial role of fire, going back in the region as far as the late ninth century. Kelly notes that by the tenth century at Range, internal hearths (or those “with fire”) were placed within the largest buildings that were centrally located within settlements, and that these structures show signs of re-building through time.

As detailed in Chapter 4, my excavation of Structure 3 on the western edge of Washausen’s secondary plaza revealed that it contains several of the distinctive traits that Baltus and Baires (2012) and Kelly (1992) associate with specialized ritual buildings or temples. In addition to its location, rare T-shape, and the deep pit within the floor of its T-wing extension, a sub-floor hearth and surrounding burned soils were located in its center. Samples from these intramural features exhibited unusually high botanical diversity, with seeds from a minimum of 19 cultivated and wild plants. Maize fragments were few by comparison to the highly diverse seed taxa. The thin lens of carbonized materials lining the base of the interior hearth (that was capped by a layer of yellow clay) produced seeds of tobacco (10 of the 13 recovered from Washausen).

Tobacco was an important ceremonial and medicinal plant used by native North American groups (Haberman 1984; Swanton 1946; Wagner 2000). An exotic specialty plant, tobacco was also likely used for ceremonial purposes in the American Bottom from the Late Woodland through early Mississippian periods (Simon and Parker 2006). Like morning glory, tobacco may have been valued during ritual events for its potential hallucinogenic effects.

In the American Bottom, tobacco has been recovered from non-domestic contexts at Cahokia (including the sub-Mound 51 feasting deposits, see below), Sponemann, and several other early Mississippian sites that served “nodal” or ceremonial functions (Emerson 1997; Pauketat et al. 2002; Pauketat and Emerson 1997; Simon and Parker 2006). Within Washausen’s T-shaped structure, samples from the burned sediments surrounding the hearth produced one tobacco seed along with specimens from at least 18 other plant taxa, an unusually diverse roster from such a small area. Activities in this T-shaped building likely centered around the interior hearth and involved Eastern Complex domesticates and wild edible resources, including the represented wild bean, hog peanut, fruits of persimmon and black nightshade, and of course, tobacco.

The fact that the T-shaped Structure 3 was used (and likely rebuilt) throughout the duration of major occupations at Washausen supports the hypothesis that this building did hold a specialized role for the community. As I reported in Chapter 4, both the earliest and latest AMS radiocarbon dates for the site come from Structure 3's internal features. Following Baltus and Baires (2012) and Kelly (1992), the remains recovered within Structure 3 and its unique morphology and placement at the edge of the settlement's secondary plaza are used to infer that Structure 3 was a temple building at Washausen, and its repeated use was a central feature of community integration. An important institution at early Mississippian places like Cahokia, religious/ritual practices that repeatedly took place within T-shaped temples were already being performed by individuals or groups at pre-Mississippian Washausen.

Feast, Family, and Field: Political Economy at Washausen

In this dissertation, I have detailed a regional sequence of village developments that took place after the onset of sedentism and agricultural production in the American Bottom. What is somewhat unexpected from this case study is the speed at which these developments took place. In Bandy's (2008) comparative dataset, his "large villages" like Washausen did not develop, on average, for several centuries after the onset of local, sedentary agricultural life. In the American Bottom, "large villages" appear within 200 years or less after the founding of the first agricultural villages. Further, the expansive urbanization of Cahokia during its height took place within a mere 300 years after regional farming villages were first constituted (Kelly and Brown 2014; Pauketat 2007).

From a comparative perspective, this is a rapid sequence, but one that was nonetheless drawn out across generations (Beck et al. 2007:842-844). What this points toward is greater appreciation that in the American Bottom people may have had reasons to abandon their communities other than the commonly mentioned development of intra-settlement competition and factionalism (e.g., Brumfiel and Fox 1994; see also Brown 2006; Pauketat et al. 2002; Zimmermann Holt 2009) – although local conflicts were also likely factors during family's decisions to abandon their homes and migrate elsewhere. These conflict-natured explanations for village fragmentation assume that communities were pushed apart internally. However, at the same time, communities may have experienced external forces that acted to pull them apart as well.

As Beck et al. (2007:842) state: "Cahokia was built to attract people." Indeed, the rapid population growth at early Mississippian Cahokia occurred at a time when many pre-Mississippian villages were being abandoned or were significantly diminished in size and population, as well as at a time when groups originating from far beyond the American Bottom migrated to Cahokia and to the region (Alt 2006; Beck 2006; Cobb 2005; Emerson 1997; Kelly 1990b; Pauketat 2003).

However, as my research demonstrates, the Washausen settlement – although dwarfed by Mississippian Cahokia by practically any measure – also represented a new way of constructing community through coalescence during the tenth and early eleventh centuries A.D. in the American Bottom. By demographic measures, village populations reached previously unseen levels at Washausen (although, as noted, Cahokia was probably growing larger by this time). Earthen mounds were being built at Washausen, likely by sometime in the early eleventh century or before. And, as I argue below, the activities that took place within the settlement's secondary plaza and within its buildings are testaments to the creation of new scales of institutional integration, linking together numerous families (i.e., courtyard groups) within a newly-envisioned community. In many ways, then, it is also productive to think of Washausen as a community that was being built to attract others, and potentially an important lens into the processes that also shaped early Mississippian Cahokia.

During the late eleventh century at Cahokia, massive deposits relating to large-scale feasts dating to the early Mississippian Lohmann phase have been recovered from pits beneath the site's Mound 51 (Kelly 2001; Pauketat et al. 2002). These commensal events, assumed to have taken place within the settlement's central Grand Plaza, were attended by large numbers of individuals (and social groups) who took part in festivities and labor projects linked to mound construction and temple rebuilding, among other things. Pauketat et al. (2002) argue that these recurrent events were part of a larger participatory process whereby diverse and previously unrelated groups took active part in constructing Cahokia's Mississippian community, laying the foundations for social and political transformations at the settlement. As they state:

> the sub-Mound 51 [feasting-related] pit dates to the earliest phase of the youngest and largest Mississippian polity in North America and may encapsulate the process whereby people accepted or accommodated (or even resisted) a Cahokian organization, identity, or way of life. That process seems to have involved a dramatically enlarged and centralized sense of community, polity, and economy… That coordinated practices may have been components of a collective cultural process may be central to explaining how people accommodated the social and demographic shifts thought to have attended the [early Mississippian] Lohmann phase region in the Greater Cahokia area [Pauketat et al. 2002:275].

Likewise at Washausen: the act of building mounds and plazas, the inclusion of religious or ceremonial activities centered upon a new form of ritual temple and participation in public commensal events were ways that newly arriving social groups actively built their community that included greater numbers of people than was previously the norm. In many ways, the large-scale feasts at early Mississippian Cahokia could be described as quasi-potluck events. That is, many of the kinds of remains within the sub-Mound 51 deposits appear in ordinary domestic assemblages, like ceramic vessels used for cooking and many of the food items shared and eaten (Pauketat et al. 2002:275).

Studies of feasting have been a productive part of research that examines the development and expression of social relations and integrative practices and institutions in complex societies (Blitz 1993a, 1993b; Dietler 1996; Dietler and Hayden 2001; Hayden 1996; LeCount 2001; VanDerwarker 1999; VanDerwarker et al. 2007; Welch and Scarry 1995). Variation in material remains and depositional processes have been used to elucidate special deposits related to commensal events. Research on feasting has shown that both the types of foods prepared and consumed, as well as the scale at which consumption or feasting occurred, can vary based on where meals were taken (i.e., "private" versus "public" settings), the social status of the groups attending or hosting, or the extent of local sociopolitical complexity. Several lines of material evidence have been used to demonstrate variability in foodways and feasting, including: the presence of specialized foods; the scales at which foods were prepared, consumed, or discarded; and the types and sizes of ceramic vessels used for preparation and serving.

From early Mississippian Cahokia's sub-Mound 51 feasting deposits, it appears that people from throughout Cahokian society attended these events, and brought with them many of the resources consumed during the feasts (Pauketat et al. 2002). But at the same time, the sub-Mound 51 deposits are unlike domestic refuse in many ways. Differences exist in the overall quantities of food remains, in the paucity of corn and barley grass, in the high frequencies of purslane, grapes, persimmons, and other fruits, and in the high frequency of tobacco seeds. Also, deer was overly represented in the sub-Mound 51 deposits, fish remains were from large individuals, and birds like swan and prairie chicken were abundant.

The assemblage described for Washausen's Structure 2, located on the eastern edge of the settlement's secondary plaza, similarly attests to its unique composition. Although they do not match entirely Cahokia's sub-mound 51 deposits (especially when it comes to scale), I argue that stratified layers within Structure 2's fill accrued through the deposition of debris from public commensal events that took place at Washausen, and that they appear in many ways to have been held quasi-potluck style. Notable extraordinary inclusions are hallucinogenic morning glory seeds, increased numbers of deer and large fish, as well swan, hawk, and prairie chicken. Unlike Cahokia's late eleventh century feasts, however, feasting events at Washausen included consumption of maize. Thus, it appears that while local courtyard groups were intensifying their agricultural economies, these groups were also funneling a part of their surpluses into new institutions that included communal feasting.

This convergence of multiple lines of evidence portrays what Dietler (1996, 2001) calls commensal politics. In this realm, feasts are a particular form of ritual activity that articulates social relationships and action. He states that feasts "create and maintain social relations that bind people together in various intersecting groups and networks on a wide range of scales, from the local household cluster to the regional political community" (Dietler 2001:68-69).

Importantly, as Dietler (2001:69) also points out, feasts "also provide a crucial mechanism for the process of labor mobilization that underlies the political economy."

Commensal events at Washausen likely involved the numerous courtyard group families living there, and provided venues for each corporate group to provision large-scale public festivities. In these situations, otherwise communal gatherings have the potential to take on a political life as some groups may, over time, be more successful providing foods and services, and may even take on roles as hosts. Through time, the integrative institution of feasting in kin-based political economies can become more highly competitive ventures. As some groups may be able to continuously serve as hosts, systems of debt and reciprocal obligations can develop (Dietler 2001:79). Within this type of political-economic situation, kin groups must intensify agricultural production to continue their participation. In the Mississippian case, agricultural intensification relied on enlarging access to productive lands and more laborers (Beck and Brown 2012; Smith 1978). Otherwise, less productive households and groups risked falling into a relationship marked by long-term indebtedness. Indebted corporate groups could also choose to relocate elsewhere, as was often the case across the Mississippian world (Anderson 1994; Blitz 1999). As Dietler (2001:77; emphasis original) is right to point out, the polysemic political nature of feasts give them the power to "both unite and divide *at the same time*."

An argument along these very lines has recently been put forward by Brown and Kelly (2014). Discussing the development of social inequalities at Mississippian Cahokia, they write:

> that communal feasting in a kin-ordered society sets up the conditions for social stratification when the number of participating social units climbs past a certain threshold. Social surplus plays a key part in this process because large communal feasts are invariably underwritten by the combined efforts of the *surplus labor* of each unit [Brown and Kelly 2014:2; emphasis original].

Although commensal feasts at Washausen appear to have been small-scale events relative to the massive feasts that took place at Cahokia, I stress the point that the process of participatory engagement that involved communal feasting was occurring at early mound towns like Washausen and, potentially, at multiple locales and scales within such settlements. These new institutional practices were ongoing as previous demographic thresholds were being crossed; that is, as more and more courtyard groups aggregated to new mound town communities, these families were actively creating avenues for political transformation that we see in hypertrophic form at early Mississippian Cahokia.

Thus, it was through ongoing transformations in a kin-based political-economic system that villages developed into larger and more complexly-organized communities in the American Bottom. As Brown and Kelly (2014) argue, emerging leaders at early Mississippian Cahokia would have sought to attract laborers and their surpluses that could be used during increasingly competitive communal events. More broadly, Beck (2003, 2006) has proposed a model that describes how regional consolidation can occur through population aggregation in regions and at specific settlements. Of importance here is Beck's "persuasive aggregation," a concept that he uses to contrast the development of many Mississippian polities with other hierarchically organized polities that develop under conditions of coercive expansion. As Beck states:

> [l]ocal leaders striving to expand [chiefly] institutions must increase the production of surplus, a goal that may be achieved (1) by promoting the intensification of production technologies… or (2) by attracting new followers to augment their pool of human labor available for surplus production [Beck 2006:20-22].

Within a Mississippian context dominated by field agricultural regimes organized by kin-based corporate groups (Muller 1997:394-396), requirements for sustained accumulation of surpluses would have made aggregations desirable, as access to labor was restricted to those with claims of kinship. Beck (2006) argues that persuasive politics likely accounts for the growth of large Mississippian centers like Cahokia, as corporate groups would not have been bound to specific field technologies like irrigation systems. Rather, Mississippian "farmers enjoyed relatively open mobility… [and leaders] seeking to expand their political economies – unable to do so by coercive expansion – competed with one another to persuasively aggregate more followers than their rivals" (Beck 2006:25).

My research has demonstrated that indeed, within the American Bottom region, farming families maintained high levels of residential mobility, and large villages and communities both grew and were abandoned in part due to the itinerant predispositions of corporate farming groups. A similar scenario has been discussed for the late prehistoric American Southwest, where archaeologists have referred to the fluid social landscapes there by terms such as "short-term sedentism" and "serial migration" (Bernardini 2005; Nelson and LeBlanc 1986). Bernardini (2005) describes migration events by household groups as ways that clans could grow in size and importance at new Hopi villages. He states that Hopi

> clans are not corporate groups united in their control of land and ceremony. Rather, a clan consists of a core household surrounded by a number of other household groups in an 'orbital' arrangement of dependence and support (Connelly 1979). Offices and privileges are thus held 'not in the clan as a whole, but in a maternal family or lineage in the clan' (Parsons 1933:23) [Bernardini 2005:38].

He goes on to state that:

> Migration in this type of landscape was not an event but an ongoing process (Duff 1998) in which *the most recent place of residence would be a relatively narrow description of a person's identity*. That is, labeling an immigrant as an 'Anasazi,' or a 'Silver Creek' person or even a 'Cottonwood Pueblo person' would be of

> little use in summarizing his or her identity because as little as a generation ago he, his parents, or his grandparents likely lived in a different (possibly even several different) village, region, or culture area [Bernardini 2005:39; emphasis original].

I do not intend to suggest that the courtyard groups at settlements like Range and Washausen or the groups living within the larger residential districts at Cahokia can be considered strict equivalents of the lineages and clans described by Knight (1990) for the early historic period, as described in Chapter 1. However, using Knight's analysis as a starting point for thinking about the migrating groups in the American Bottom before, during, and after the Mississippian transition lends support to the multi-clan model for early Mississippian Cahokia. This line of reasoning also dovetails with models that see Cahokia as a place that was built to attract people (Beck et al. 2007). But we could alternatively phrase this as: it was the actual attraction of people to this rapidly growing settlement that built Cahokia.

For two- to three-hundred years before the start of the Mississippian period in the American Bottom, residential courtyard groups regularly moved across the landscape, constructing houses and forming and dissolving new villages. Through time, this ongoing process of group fissioning and re-aggregation led to the development of larger communities that also saw the active construction of new institutions that enabled larger nucleated settlements to exist. Fissioning of courtyard groups likely occurred due to increasing levels of local competition and factionalism within each new village, but it also likely occurred at times because corporate groups were being pulled into larger "clan"-like collectivities that allowed for the pooling of surpluses and for the support of increasingly important ceremonial responsibilities.

The Washausen site represents one short slice of time where we are witness to the unfolding of this ongoing historical process. While Washausen community members were living at population levels that only then were being reached (at Washausen as well as a handful of other villages like Cahokia), they were also building central mounds and plazas, creating new religious institutions like those centered upon novel T-shaped temples, and participating in commensal feasting events.

The Washausen mound town community would not last long, however. By the late eleventh century, the settlement was abandoned, either through the independent fissioning of courtyard groups or through the movement of the Washausen community as a whole to an emerging center like Pulcher or even Cahokia itself.

At the start of Chapter 1, I outlined a variety of ways that scholars have defined "Mississippian," going back to Holmes's (1903) original use of the word. Today, archaeologists use the term in a more general way to describe a variety of historically connected yet diverse set of late pre-Columbian societies across eastern North America. It is possible that Washausen residents may not have considered themselves "Mississippian" in any way similar to how archaeologists have employed the term. A distinctive "Mississippian" identity may not have materialized until later at Cahokia. However, my research has demonstrated that Washausen's residents were contributing to, and taking active part in, sets of social processes involved with rapidly changing demographic and institutional conditions that were involved with the "Mississippian" transition in the American Bottom.

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