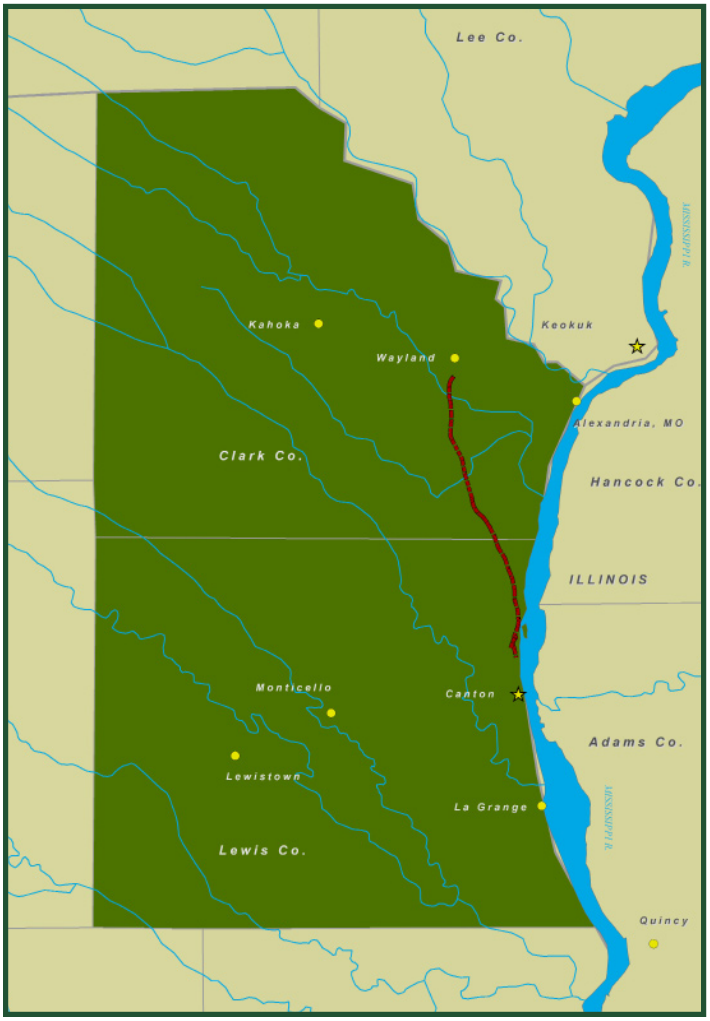
Archaeological Investigations Within the Proposed U.S. 61 Corridor North of Canton in Lewis and Clark Counties, Missouri (Job Numbers J3P0424B and J3P0423B)

Volume I: Background, Research Design, Methods, and Site Summaries



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This version of the report has been modified for public viewing. Figures indicating archaeological site locations have been removed to maintain site location confidentiality.

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ABSTRACT

Under contract with the Missouri Department of Transportation (MoDOT), archaeological investigations were conducted by Cultural Resource Analysts, Inc. (CRAI), in conjunction with the U.S. 61, Avenue of the Saints (AOS), highway reconstruction project in Lewis and Clark Counties, Missouri. (Job Numbers J3P0424B and J3P0423B). The archaeological work entailed two primary investigations intended to accomplish the overall goals of mitigating adverse effects to archaeological sites for this project. The first investigation consisted of examining the project utility corridor for archaeological deposits, and the second part of this work entailed collecting data from National Register of Historic Places (NRHP) eligible sites that would be impacted by highway construction.

Fieldwork began in November of 2004 and continued through August of 2006. In all, 55 archaeological sites' locations were examined during the geoarchaeological survey, had NRHP evaluations conducted at them, or were subject to data recovery. Data recovery was conducted at a total of 15 archaeological sites that would be impacted by project construction, 9 of which were in Lewis County and 6 that were in Clark County. The data recovery investigations at these sites entailed hand excavation of block areas and/or stripping of large areas of plow zone and the excavation of the exposed features. These sites had archaeological components representing the Early Archaic, Middle Archaic, Late Archaic, Early Woodland, Middle Woodland, Late Woodland, and historic periods. The remaining sites were in areas that would not be impacted by the project, or they are sites that were determined to be not eligible for the NRHP.

Due to the size of the project, the reports have been divided into 10 volumes. This volume (Volume I) presents the background information for the project and the project area, the research design, the methods, and a summary of the sites investigated. Chapters 1 and 2 include an introduction and summary of the project. Chapter 2 contains pertinent background information regarding the NRHP evaluations and project impacts. Chapter 3 provides detailed information regarding the archaeological research design. Chapter 4 provides a background to the effective environment. Chapter 5 provides a cultural history for the region. Chapter 6 provides the field and laboratory methods. Chapter 7 provides a summary of the investigations at the Lewis and Clark County sites. And finally, Chapter 8 provides a brief synthesis of the data presented in this volume.

Subsequent volumes provide data on the paleoenvironment in the project area vicinity (Volume II), the individual site reports and artifact analyses (Volumes III through IX), and finally, a synthesis volume (Volume X) that summarizes the results of the environmental and archaeological data recovered during the project and addresses relevant research questions pertaining to chronology, settlement patterning, site structure, subsistence, and technology.

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The size and scope of the work conducted to complete this endeavor necessarily required the efforts of many people to bring it to a successful conclusion. The authors would like to take this opportunity to acknowledge the contributions made by these individuals and express our gratitude for a job well done.

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The field lab was directed by Jennifer Haney with assistance from Kreg Ellzey, Cori Gale, Leslie Holder, Matt Kell, Susan Pearman, and Christina Servetnick. Processing of the recovered materials in Lexington was directed by JoAnn Wilson with the assistance of Heather Burge, Leslie Holder, and Sean Watkins-Harris. The majority of the flotation was conducted by the field laboratory crew; however, what flotation work that was not completed in the field was completed in the office laboratory by Paul Paternostro and David Stevenson. Eric Thomason prepared the majority of the figures and artifact photos included within these report volumes. The authors would also like to thank Shanna Wilbur and Charles Hitch who assisted with the report layout, design, and editing. In addition to the regular field crew, we also benefited from Jeff Christ and Darrel Peak's skillful work with their trackhoes.

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Chapter 1. Introduction

Archaeological investigations were conducted by Cultural Resource Analysts, Inc. (CRAI), in conjunction with the U.S. 61, Avenue of the Saints (AOS), highway reconstruction project in Lewis and Clark Counties, Missouri (Figure 1.1). The archaeological project was conducted under contract with the Missouri Department of Transportation (MoDOT) (Job Numbers J3P0424B and J3P0423B).

Initial work on the Lewis County portion of the project was conducted between November and December 2004. Data recovery excavations in the Lewis County portion of the project were conducted between May and September 2005. Initial work on the Clark County portion of the project was conducted between June and August 2005. Data recovery excavations were conducted in Clark County between August and December 2005, and again between March and August 2006.

Figure 1.1. Map of Missouri showing the location of Lewis and Clark Counties.

Project Location

The AOS project covered approximately 9.66 linear km (6 linear mi) within Lewis County, Missouri, and approximately 14.3 km (8.9 linear mi) within Clark County, Missouri. The Clark County portion of the project was situated between the Fox River and the Lewis County line. The Lewis County portion of the project area began at Route B, approximately 2.4 km (1.5 mi) north of Canton, Missouri, and ended at the Clark/Lewis County line.

Nature of the Undertaking

The undertaking included grading, bridge construction, and paving of a four-lane expressway for 6 mi in Lewis County and 9 mi in Clark County, Missouri, as part of a new highway along U.S. 61 between Canton, Missouri, and Mt. Pleasant, Iowa. The highway has been referred to as the "Avenue of the Saints" because it will complete the final segment of a four-lane corridor between St. Louis, Missouri, and St. Paul, Minnesota. The improve-existing alternate, which was the focus of the current archaeological investigations, consisted primarily of adding two lanes east of the existing U.S. 61 two-lane road between Canton and Wayland, Missouri. These additional two lanes represent an area of potential effects encompassing an approximately 121.9 m (400 ft) wide corridor that expands to 243.8 m (800 ft) at intersections. The environmental study for this undertaking began in the 1990s, and this archaeological work represents the final portion of this study.

Responding to public concerns over the high accident rate on this section of Route 61, and the urgent need to improve the roadway, the State of Missouri accelerated the upgrading of the highway. Therefore, the archaeological investigations had to follow an expedited schedule. The highway construction schedule planned the project to begin with utility relocation followed by roadway

construction first in Lewis County and then in Clark County. Therefore, archaeological work within the utility corridor followed this same schedule, and as it was completed in each county, utility construction began. Similarly, archaeological data recovery within the remainder of the right-of-way (ROW) occurred first in Lewis County followed by Clark County.

Prior phase I and phase II investigations for this project documented numerous sites (Markman et al. 1996, 1997; Snow 2000). In places, archaeological remains were documented to depths of over 2 m below the current ground surface. The Federal Highway Administration (FHWA) determined that 18 of these sites were eligible for the NRHP and would be adversely impacted by the proposed highway construction activities. The State Historic Preservation Office (SHPO), FHWA, and MoDOT determined that those sites which would be directly impacted by project related construction would be mitigated through a data recovery program. Those sites that would not be adversely affected by project construction would be preserved in place. However, at most of these sites, the previous archaeological work did not adequately determine the horizontal and vertical extent or integrity of significant archaeological deposits, the number of components present, the component(s) chronology, or site organization. In addition, there were 4 archaeological sites to which access was denied during the initial surveys and that still required NRHP eligibility evaluations. Ultimately, 4 objectives were identified for the mitigation of adverse effects to archaeological sites within the project:

1) to delineate areas of significant archaeological deposits at each site that would be adversely affected by the project;
2) to better understand the research potential of those deposits;
3) to collect data for directing efforts to preserve the deposits in the highway corridor;
4) and to develop plans to manage those deposits.

CRAI was contracted by MoDOT to conduct this data recovery work for the AOS project. The data recovery process entailed two main investigations intended to accomplish the overall mitigation goals. The first consisted of examining the utility corridor. An approximately 2 m wide utility corridor ran the entire length of the project area in both Lewis and Clark Counties. This utility corridor was to be impacted by trench excavation to relocate existing utility lines and to place new utilities along the reconstructed Route 61. The utility corridor archaeological investigations used an integrated geoarchaeological program that employed coring, trenching, and hand excavated test units to collect additional data from the project corridor. The utility corridor investigations were used to supplement the previous archaeological investigations and geomorphological data conducted for this project (Hajic et al. 1996; Markman et al. 1996, 1997; Snow 2000).

Specifically, the utility corridor investigation helped identify if additional buried sites were within the project area and provided information regarding the known site boundaries (vertical and horizontal). This also allowed for an evaluation of the integrity of archaeological deposits, a determination of the number of components represented, and a better understanding of the age and character of the components at the sites. Ultimately, based on these data, at the completion of the utility corridor investigations, a revised list of NRHP eligible sites was provided and compared with project construction plans to determine the amount and nature of impact to those sites. The results of the utility corridor were summarized in 3 previous reports, with 9 sites in Lewis County and 11 sites within Clark County determined to be NRHP eligible (Bradbury and Martin 2005; Martin 2005; Martin 2006a).

The second part of this work entailed collecting additional data from the NRHP eligible sites that would be directly impacted

by highway construction. Archaeological data recovery was conducted within portions of those NRHP eligible sites located within the ROW that would be subject to significant ground disturbances. Two types of impacts were recognized: 1) near surface impacts and 2) subsurface impacts. Near surface impacts would result from grading, rutting, and compaction to create a stable surface for the placement of fill in the project area. Archaeological materials or features in the plow zone and at the base of the plow zone would be impacted by such activities. These site areas were designated "fill areas." Subsurface impacts are those that would disturb more deeply buried deposits (i.e., sub-plow zone). Ditch construction and the flattening of high spots in some areas will remove up to 2 m of sediments; therefore, they will impact more deeply buried archaeological components. These site areas were designated "cut areas."

Ultimately, a staged data recovery approach, which considered the project impacts, was used for the data recovery at each NRHP eligible site. Each stage of investigation at each of these sites was used to guide the work conducted during the subsequent stages. For example, if initial test units at a site determined that archaeological deposits were limited to just below the plow zone in one portion of the site area, subsequent block excavation and/or plow zone removal only occurred in those areas. The completed data recovery excavations in each county were then summarized in interim reports so that SHPO, FHWA, and MoDOT were aware of all data recovery results (Bradbury 2005; Martin 2006a, 2006b).

Summary of Findings

Archaeological investigations in Lewis and Clark Counties were conducted at 55 sites within the project area. These sites ranged from those with archaeological deposits found in shallow plow zone contexts to sites with deposits that were deeply buried in alluvium or colluvium. Early Archaic through Late Woodland and historic components were investigated at sites in both counties.

Archaeological work was initiated on the project within Lewis County in 2004. This entailed the geoarchaeological survey and archaeological testing along the utility corridor. During these investigations, additional data were collected at 18 previously recorded archaeological sites and 1 newly recorded site within the proposed project corridor. As a result of this work, 4 archaeological sites (23LE45, 23LE170, 23LE168, and 23LE371) were determined not eligible for the NRHP, and no further work was recommended. Fourteen of the sites examined were considered eligible for the NRHP. Nine of these sites (23LE41, 23LE174, 23LE178/357, 23LE327, 23LE342, 23LE346, 23LE348, 23LE365, and 23LE369) were to be impacted by the proposed construction activities. The remaining 5 NRHP eligible sites (23LE320, 23LE44/319, 23LE366, 23LE367, and 23LE378) were situated within fill areas and therefore were not directly affected by construction activities. No further archaeological work was recommended or conducted on these 5 sites.

Data recovery at the nine sites in Lewis County (23LE178/357, 23LE342, 23LE174, 23LE327, 23LE346, 23LE348, 23LE365, 23LE369, and 23LE41) began in 2005. Four of these sites (23LE178/357, 23LE174, 23LE348, and 23LE41) had significant archaeological deposits and would be directly impacted by project construction. Late Woodland features were documented directly below the plow zone at the Artesian Branch site (Site 23LE178/357). Two excavation blocks sampled Late Woodland and Middle Archaic deposits at the Berhorst site (Site 23LE174). The Carskadon site (Site 23LE348) contained Middle and Late Woodland features, Late Archaic deposits, and a historic component, all of which were found just below the plow zone. Finally, Early Archaic deposits were recovered from shallow deposits at the Baxter Lake site (Site 23LE41). Limited excavations occurred at the remaining five NRHP eligible sites in Lewis County. The initial stages of work at these sites determined that the portions of these sites within the project area did not retain sufficient integrity

or that they had a limited extent of significant archaeological deposits.

Geoarchaeological survey and archaeological testing along the utility corridor in Clark County were initiated in 2005. After state acquisition of the previously denied properties occurred, utility corridor investigations were completed in 2006. During these investigations, additional data were collected at 37 previously recorded archaeological sites within the proposed project corridor. Twenty-six of the archaeological sites (23CK22, 23CK60, 23CK61, 23CK63–23CK65, 23CK239, 23CK244, 23CK245, 23CK246, 23CK266, 23CK269, 23CK270, 23CK275, 23CK280, 23CK281, 23CK286, 23CK291, 23CK298, 23CK303–23CK307, 23Ck311, and 23CK312) recorded in the project area were determined not eligible for the NRHP or no archaeological deposits were found at them. Eleven sites (23CK57, 23CK59, 23CK66, 23CK243, 23CK267, 23CK273, 23CK274, 23CK299, 23CK302, 23CK308, and 23CK310) were determined eligible for the NRHP. Five of the NRHP eligible sites (23CK243, 23CK267, 23CK273, 23CK274, and 23CK308) were located in fill areas that were not directly impacted by construction activities. Furthermore, no significant archaeological data was found in the near-surface deposits below the plow zone at these sites; therefore, no further archaeological work was recommended or conducted on these five sites.

Data recovery at the remaining six sites in Clark County (23CK57, 23CK59, 23CK66, 23CK299, 23CK302, and 23CK310) was initiated in the summer and fall of 2005 and spring of 2006. The Late Woodland component at the Sugar Creek site (Site 23CK57) had cultural features identified at the base of the plow zone. The Early Archaic component at the Logsdon Fan site (Site 23CK59) was identified in deep deposits on an alluvial/colluvial fan. Shallow, sub-plow zone, possible Archaic features were identified at the Windy Hill site (Site 23CK66). An intact and buried Early Woodland component was identified at the Britton Fan site (23CK299). Woodland and Late Archaic components were documented in deeply buried deposits at the Big Branch Fan site (Site 23CK302). Finally, Archaic and Woodland features, as well as a historic component, were investigated in shallow deposits at the Killdeer site (Site 23CK310).

Summary information concerning all the sites investigated in Lewis and Clark Counties is provided in Chapter 7 of this report.

Organization of the Volumes

This volume (Volume I) provides the background information on the project and sites investigated, the research design, an environmental synopsis, a regional culture history, the methods used for the fieldwork and analysis of the recovered materials, and a summary of all the sites within the project corridor. Ultimately, this volume is largely descriptive in nature. The subsequent volumes present more detailed information on each of the sites and analysis of the recovered materials.

Volume II contains detailed paleoenvironmental analyses and landform reconstruction conducted for this project. These data were derived through a combination of soil coring, trenching, sediment analyses, and analysis of phytolith and pollen data recovered from various contexts within the project area. Ultimately, Volume II provides the context for interpreting the settings in which the archaeological deposits were originally left.

Additional volumes of this report contain the individual site analyses. Larger, more complex sites are discussed separately within their own volume. Smaller, less complex sites are combined into volumes that are similar with regard to time period represented. Volume III of this series summarizes the work at smaller sites that did not undergo extensive archaeological investigations. Volume IV presents the results of excavations at two Early Archaic sites (Sites 23LE41 and 23CK59). Volume V presents the results of investigations at Site 23LE174 (Middle Archaic and Late Woodland) and Site

23CK302 (Late Archaic and Late Woodland). Site 23LE348 is the subject of Volume VI. A major Middle Woodland component and minor Late Archaic, Late Woodland, and historic components were also examined at Site 23LE348. The Late Woodland site 23LE178/357 is the subject of Volume VII. Volume VIII presents the results of investigations at Site 23CK57, a Late Woodland site. The final site volume, Volume IX, contains the results of investigations at Site 23CK310. Early, Late Woodland, and historic components were investigated at the site.

A final synthesis volume (Volume X) is used to tie all of the sites together and examine them in light of a more regional perspective. Comparisons with other sites are presented in more detail in the synthesis volume. The organization of the volume is around the major research themes first presented in this volume (see Chapter 2: Research Design). Within these major areas we examine specific research questions/objectives.

Chapter 2. Research Design

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The Avenue of the Saints project (AOS) provided a unique opportunity to conduct archaeological research on various site types from different time periods in northeastern Missouri—particularly along the margins of the Mississippi River valley. The overarching goal of this research was to establish a baseline comparative dataset for similar settings in the region. The Memorandum of Agreement for the AOS project was developed by MoDOT, FHWA, and the SHPO in consultation with the Iowa Tribe of Kansas and Nebraska, the Iowa Tribe of Oklahoma, the Osage Nation, the Peoria Tribe of Indians of Oklahoma, the Sac and Fox Nation of Oklahoma, the Sac and Fox Tribe of the Mississippi in Iowa, the Sac and Fox Nation of the Missouri in Kansas and Nebraska, and the Advisory Council on Historic Preservation. Furthermore, the memorandum of agreement for this project (FHWA, Missouri SHPO, MoDOT; October 21, 2004) presented five broad themes to be addressed by the archaeological research for the AOS project: 1) chronology; 2) settlement patterns; 3) site structure; 4) subsistence; and 5) technology. These themes are not mutually exclusive, rather they, and the data used to investigate them, are intertwined and best examined within the framework of the broad objectives of contemporary American archaeology (c.f., Thomas 1989a): defining cultural chronologies and inferring lifeways while working toward the ultimate goal of identifying cultural processes. The research design developed for the project, as detailed below, incorporated the five broad themes along with other regional topics.

The initial objective of constructing a cultural chronology utilizes chronometric methods, such as radiometric dating and stratigraphic interpretations, to order the remnants of material culture into intelligible temporal segments across the landscape. The second objective, reconstructing past lifeways, breathes life into the chronologies. As Thomas (1989a:145) states:

> Simply put, lifeways are the what and who of culture, embracing economy, organization of domestic life, kinship, maintenance of law and order, social stratification, ritual, art, and religion.

Various "middle-range" approaches for inferring past lifeways were used to link the static data from the archaeological record with the dynamic processes that formed it. Use of experimental lithic data sets, ethnographic comparison, and paleoenvironmental models are a few examples of the lines of inquiry that were used to identify behaviors and the setting in which they occurred. Actualistic approaches, such as the study of faunal and floral remains, lithic refitting, and micro-wear analyses, also contributed to the modeling of the past.

However, exploring chronologies and lifeways are particularistic endeavors: particular to specific artifacts used for specific activities at particular times and in particular places. Thus, the reconstruction of a past lifeway remains fixed in time and space and is mostly descriptive. The toughest goal is to determine the processes that worked to produce the descriptions of past cultures. "Components of a cultural system remain static until the processes that propel the system are defined" (Thomas 1989a:146). Essentially, the third and final objective of the AOS archaeological research will be an attempt to understand the various cultural subsystems in relation to one another and the external environment in which they worked.

The goals discussed above guided the archaeological investigations at the various sites within the AOS project. Integrated excavation and analytical methods were designed to collect, analyze, and categorize data necessary to address these general goals. The archaeological investigations followed a theoretical orientation

based on the concept that identifiable patterns in cultural remains (site structure) have resulted from human behavior that was similarly patterned. It is recognized that disruptions in the archaeological record do occur through natural processes such as erosion as well as post depositional animal and human activities. Moreover, we are well aware of the fact that such disruptions tend to obscure our ability to ascertain culturally defined patterns. Nevertheless, the recognition of non-random distributions of cultural remains provides the major avenue of inquiry for all archaeological endeavors. The complexity of recognizing patterns in the archaeological record is expressed by Binford:

> …tools with specific tasks performed by social segments results in a structured set of spatial-formal relationships in the archaeological record. People do not cooperate in exactly the same way when performing different tasks. Similarly, different tasks are not uniformly carried out at the same locations. As tasks and cooperative groups vary, so do the implements and facilities of task performance. The loss, breakage, and abandonment of implements at different locations, where groups of variable structure performed different tasks, leaves a "fossil" record of the actual operation of an extinct society. This fossil record may be read in the quantitatively variable spatial clustering of formal classes of artifacts. We may not always be able to state differential distributions, but we can recognize that activities were differentiated and determine the formal nature of the observable variability [1972:136].

It must also be realized that post depositional natural and cultural processes can affect the patterning of cultural remains. Essentially floral, faunal, and climactic influences, as well as the influence of past and present human actions on sedimentation systems, affect the preservation and visibility of archaeological deposits. In turn, our understanding of these environmental systems affects our perceptions of prehistoric settlement and land-use patterns. Therefore, the most productive research is that which seeks to explain the relationships between cultural and environmental systems through time.

The five general research themes are discussed within these broad goals of archaeology and guided the archaeological research at the various sites within the project. Appropriately, the research questions being asked under each theme, and the methods used to answer them, are relative to the significance of the data recovered.

Cultural Chronology

The data recovered from the investigations at the various sites in the AOS project offer an excellent opportunity to refine the cultural chronology for northeastern Missouri. But it should be noted that this chronology is limited to the geographical setting and site-specific activities, which likely provide a limited range of settlement patterns within the geographical confines of the project area. Regardless, investigations at many of the sites have demonstrated the presence of intact, stratified sub-plow zone archaeological deposits. Many of the sites contain temporally sensitive artifacts (e.g., hafted bifaces and ceramics) associated with these deposits. Based on the data recovered from the excavations, the Early Archaic through Late Woodland cultural periods and Historic period are represented at the sites. In many cases, several of the periods (e.g., Middle Archaic and Early Woodland) are only represented at single sites. Other cultural periods (Early Archaic, Late Archaic, Middle Woodland, and Late Woodland) are represented on multiple sites (see Chapter VII).

The search for evidence of these cultural periods followed a structured methodology at each site investigated. First, test units and trenching sampled stratigraphic deposits in search of indications of archaeological material that could be dated. At this point in the investigations, the natural depositional context was important for identifying spatially discrete archaeological deposits that could be associated with temporally significant artifacts or placed within culturally homogenous stratigraphic sequences (e.g., components). The resulting chronological placement of each site component helped guide the recovery of research-oriented data. Each site component contributes to the project-wide chronology

across the landscape, further providing regional comparison and refinement.

Several lines of inquiry were used to develop the cultural chronologies from the project data. In general, this involved dating site deposits, determining the temporal and stratigraphic placement of artifact classes at each site, and comparing the site component organization with identified regional phases. Each of these lines of inquiry is discussed below.

Relative and Absolute Dating of Deposits

A basic objective of archaeology is to place sites and their contents in either a relative or absolute temporal context. Stratigraphic principles and radiometric dating techniques can be used to accomplish this (Waters 1992:7).

The determination of sites' sediment stratigraphy offers a relative dating method that applies geological principals to archaeological deposits. Essentially, archaeological deposits found layered above or below other archaeological deposits can be said to be stratified, with the lowest deposits determined to be the oldest. The amount of separation between stratified archaeological deposits, as well as the overall depositional setting, contributes to the determination of age. To refine the stratigraphic sequence of a site and place archaeological deposits within a better context, radiometric dating methods were used at various sites.

To accomplish the overall goal of determining chronology, several lines of inquiry were used. These included the following approaches:

- Identify the various aspects of prehistoric material culture that are temporally and geographically diagnostic. Assess the chronological potential of additional items beyond those of hafted bifaces and ceramics.
- Apply diachronic ceramic wall-thickness curves (i.e., Braun 1985, 1987) to Woodland Period assemblages in northeastern Missouri. Compare these with those obtained in other areas. For example, the Carrier Mills locality in southern Illinois (Hargrave 1982), the lower Illinois Valley (Braun 1987), and in east-central Missouri (Herndon 2006; O'Brien and Hoard 1996).
- Examine the nature of the Late Archaic components within the project area and assess their relationship to the Sedalia Complex of northern Missouri.
- Examine the temporal placement of the various Late Woodland components present throughout the project area and assess their placement in the larger framework of Late Woodland groups in this segment of the Mississippi River valley.
- Examine the relationship of possible early Late Woodland components in the project area to neighboring South Branch, Mephitis, and Ralls phase groups in the neighboring region.
- Examine the relationship of possible late Late Woodland components in the project area to neighboring Bauer Branch, Louisa, Ralls, and Maple Mills phase groups in the neighboring regions.
- Document temporal differences in the adaptive strategies employed during the various time periods, particularly during Middle Woodland to Late Woodland subperiods, and throughout the Archaic period.
- Early Archaic groups have been described as highly mobile populations. The recovery of nonlocal or exotic raw materials is often used to infer this high mobility. Do the Early Archaic occupations on the AOS sites reflect this pattern of nonlocal or exotic raw material use?

Study of Site Structure

It has long been CRAI's philosophy that the key to fulfilling the overall objectives of contemporary archaeology (develop cultural chronologies, reconstruct lifeways, and explain cultural processes) is the study of site structure. Site structure can be defined as "the patterned distribution of artifacts, features, and

other materials in site space" (Wandsnider 1996:319). The assessment of the contents of a site (artifacts, features, and economic and production debris) in terms of its spatial, temporal and behavioral contexts provides the data necessary to address those broad archaeological issues. For example, most prehistoric cultural chronologies are built on synchronic and diachronic trends in material culture, settlement and subsistence patterns, and other aspects of technology. Detailed site structure analysis (including geoarchaeological analysis of the natural processes working on the site) allows us to more precisely define temporal and cultural contexts of material cultural and to identify specific landscape/behavioral relationships. Through detailed site structure analysis, the archaeologist stands a much better chance of determining the temporal distribution of a distinctive artifact type because they can weed out the material from poor temporal context. Two classic examples spring to mind: hafted bifaces recovered from a thin midden that represents several thousand years of site use or the case of a stratified site where ceramics from an older occupation are incorporated into the matrix of a feature associated with a later occupation that was excavated into that level.

The analysis of site structure also provides the means to assess the spatial relationship between material remains within the site, to identify patterning within those remains, and through middle range theory postulate the natural and cultural processes that created the site. Recent strides in ethnoarchaeological research pertaining to site structure have shown that the documentation of formation processes at inhabited or recently abandoned sites provide the archaeologists with models for the study of spatial patterning of material remains encountered at prehistoric sites (Yellen 1977; Stevenson 1991; Jones 1993). The findings of the ethnoarchaeologists provide the links between the material remains of the culture, what archaeologists find, and the corresponding behavior that produced those remains. A number of important observations made from ethnoarchaeological illustrate this.

The organization of space can be viewed on two levels: how people position themselves in relationship to others and how space is allocated or used within activity areas. The former reflects social constraints or norms, whereas the latter may be conditioned by function and gender. From his work with !Kung Bushmen of Africa, Yellen (1977) developed a "ring model" to describe the intrasite spatial organization of the residential camp. According to this model, most activities occurred around a hearth located in front of the family habitation. The residential camp was made up of several of these family activity areas (or nuclear areas) which, among the !Kung Bushmen, form a ring. Other special activities, such as hide processing, were located away from the structures in the outer ring. Only rarely did activities occur in the inner ring or communal area. Binford (1983), however, has pointed out that not all camps exhibit this ring site arrangement. Some groups, such as the Seri Indians of Mexico, had camps laid out in linear pattern. What is interesting, and important, in Yellen's (1977) model is that each family has their own hearth in front of their own hut where most activities take place. This pattern of a structure and hearth based activity area was generally repeated for as many family units as occupied the site. The nuclear area was defined by discrete loci of material remains. The cultural debris associated with each nuclear area generally did not overlap with adjoining nuclear areas. The relative position of the nuclear areas to one another was conditioned, to a large degree, on the relatedness of the families. The closer the relationship, the less distant the family areas were spaced.

Consistently, ethnoarchaeological studies have emphasized the relationship between activities and features. The feature tethering of activities within the site seems to be characteristic of all groups studied by ethnoarchaeologists. Jones (1993) provides an illustration of this point:

> …Nearly all activities in an Ache camp take place within the ring of fires. From the time camp is made until broken the next morning, people spend most of their

> time in the camp, very near to their family hearth. ...Each fire is the focus, the magnet, for all activities. Nearly all activities in the camp take place within less than one meter of a fire [Jones 1993:104].

The pattern of debris left in the Ache camp closely mirrored the patterns of site use observed. Most of the debris was deposited within 1 m of the hearths, and all of the refuse was in primary context because the Ache did not clean or sweep the camp. "Each family built its own hearth although individuals would move freely between hearths" (Jones 1993). The close association between hearths and refuse is not unexpected considering the Ache occupied their camps only for a single day (night) before moving on. The tethering of activities to fixed features is characteristic of sites occupied for longer periods of time and may occur around a single feature or group of related features.

The !Kung camp was divided into public and private areas. The private area, which consisted of a hut, hearth, and surrounding space, was the domain of a single nuclear family (Yellen 1977). Very few activities took place in the hut, the primary function of which was for storage and shelter during the rain. On the other hand, “The hearth provides warmth in winter, is used for cooking, and serves as a focus for activity” (Yellen 1977:87). The focus of activity around individual family hearths formed discrete, but similar, clusters of material remains within the !Kung camp. Since little activity was associated with the hut, these spaces contain little in the way of debris. Not all activity, however, took place at the family hearth. "Some activities require a lot of space, others are so messy that they would disturb the nuclear family area if carried out there" (Yellen 1977:92). Many of the activities conducted away from the family hearth were also feature tethered. Yellen states:

> …Activities that involved heating in pits are segregated...ash-filled depressions in which animals heads are roasted for eating, or roots warmed in the process of transforming them into quivers, are also set outside the camp circle [Yellen 1977:92].

In the previous discussion of the Ache and !Kung, the site occupations are considered to be of relatively short duration, one day to several weeks. However, the feature tethering of activities holds for sites of longer periods of occupation. Activities at Nunamiut winter sites were focused in the house, as well as around features located outside the house (Binford 1983). Within the house many activities were conducted around the hearth. The space around the hearth was divided partly by the task being performed and by gender. During good weather, work was moved out of doors. Outside activity areas were to some extent gender related (e.g., the women's kitchen area where food was prepared). Regardless of whether sites and activity areas within the site are of short or relatively long-term duration, they are characterized by the non-random and non-uniform distribution of features and material remains. The distribution of remains as well as the types of features at the site are important in the understanding of site formation processes.

Distinguishing between primary refuse (material occurring in its original context) and secondary refuse (material discarded somewhere other than its place of use or manufacture) is an important element in understanding the patterning of material remains, although it has not received explicit ethnoarchaeological attention. Detailed study of refuse composition and disposal patterns and their implications has been more fully explored by archaeologists investigating site structure (Metcalf and Heath 1990; Simms and Heath 1990). An important aspect of refuse disposal is its effect on size sorting of occupational debris. Ethnoarchaeological (see Simms 1988 for an example) and archaeological (Metcalf and Heath 1990) studies have shown that larger items are more likely to become secondary refuse than are smaller items. The effect of size sorting in refuse disposal is that it creates zones of smaller remains in regularly maintained areas and zones of large remains where the material from cleaning activity has been dumped

(Binford 1983; O'Connell 1987; Simms 1988). The parameters for what size of materials become candidates for secondary refuse are not well defined and would be conditioned by a number of factors, such as the intensity of cleaning, type of cleaning (picking or sweeping), soil (in loose soils materials migrate downward from trampling), and the initial size of the material. In his study of a Bedouin camp, Simms (1988) found that items larger than 3 cm in size were more likely to occur in areas of secondary disposal. In an archaeological study of refuse disposal patterns, Metcalf and Heath (1990) studied micro-refuse, items smaller than 1 cm. They found that intensively cleaned areas were characterized by relatively high frequencies of micro-remains.

Ethnoarchaeological data demonstrate that the creation of zones of secondary refuse was primarily a function of the duration of use or occupation, although in some circumstances it would be activity specific. The Ache, a group of hunter-gatherer foragers in Paraguay, created a camp each evening. K. Jones's (1993) ethnoarchaeological study of a number of the camps demonstrated that the Ache camps were devoid of zones of secondary disposal. The camp occupations were of such short duration (a single day) that generally all refuse was in primary context and it was not size sorted. !Kung sites, studied by Yellen (1977), that lacked secondary refuse zones were occupied for an average of 5–10 days. O'Connell (1987:100) reports that !Kung sites occupied for longer periods of time, more than 10–15 days, do contain areas of secondary refuse. O'Connell (1987) in a study of Alyawara sites found that sites occupied for an average of 50 days contained discrete areas of secondary refuse.

The creation of zones of primary and secondary refuse will not appear at every site or within each activity area at a site. The focal point of !Kung activity was the family hearth located in front of the hut (Yellen 1977). "One other characteristic of all camps are scatters of debris generally confined to the area immediately around each hearth" (Yellen 1977:87). This debris scatter consisted of primary refuse. Binford's (1983:152-156) ethnoarchaeological studies of the Nunamiut have noted refuse patterning around hearth areas. As work was performed around the hearth, materials were deposited in drop zones and toss zones. During activities associated with processing, manufacture, and maintenance, debris collected around the worker(s) positioned next to the hearth. As the activity progressed, large items were removed from the work area by tossing the item away. The collection of large items away from the hearth formed the toss zone, while the small items remaining in the workspace distinguished the drop zone. In Binford's hearth model, the dropping and tossing of materials formed semicircular rings of debris (material was also tossed across the hearth from the worker) that are size graded. The tossing of large items away from the hearth was done as 'preventive maintenance' to keep the work area uncluttered.

Secondary refuse areas were also created by the intentional cleaning of the activity area, or as the result of processing or maintenance. Certain activities may result in the tossing or dumping of material in mass. For example, the cleaning of a hearth may result in ash, charcoal, and rock being raked to one side of the hearth. The contents of a soup pot (bone) may be tossed as an aggregated mass or dumped next to the hearth. Discrete zones of secondary refuse within the site have been noted by ethnoarchaeologists and reflect cleaning and dumping behavior. Binford (1983) has noted that the Nunamiut Eskimo house was cleaned regularly and the material discarded in door dumps. Drop and toss zones were not created within the house "because people rarely throw waste materials against the walls of their home" (Binford 1983:57). In a study of Hadza residential base camps, O'Connell et al. (1991) noted the creation of discrete zones of refuse:

> Activity areas were kept clean of refuse, mainly by frequent sweeping with leafy boughs and grass brooms. Hearths were also periodically cleaned of ash. Much of the cleaned material was deposited in secondary refuse areas along the edge of

> the activity area. There it appeared as a diffuse scatter, in dense circular or subcircular concentrations up to 2 m in diameter, or in well defined windrows along the edge of the swept zone [1991:66-67].

The variation in refuse disposal patterns provides an indication of the relative duration of occupation for the archaeological record.

The absence of secondary refuse disposal at a site may be a good indicator of a relatively short stay. Conversely, the presence of secondary refuse would be a strong argument for a longer-term occupation. One could reason that the buildup of secondary refuse into midden-like deposits could result in the interpretation of a site as a sedentary occupation. At Orbit Inn, Simms and Heath (1990) found that a midden-like deposit of secondary refuse could be created by a series of intermittent occupations. Susan Kent (1991, 1992), investigating factors that influence site size, types of features, number and size of structures (houses), and site area per person among the San and Bantu speakers, found the strongest predictor of these attributes was anticipated mobility. Anticipated mobility was defined as the amount of time people expected to stay in a location, regardless of the amount of time actually spent. No formal storage facilities were constructed at sites where the anticipated occupation was to be short (less than three months). An exception occurred at sites that were planned to be reoccupied (a cache at a semi-sedentary forager's camp planned to be reoccupied). The size of habitation structures increased as the anticipated length of occupation increased. Variation in refuse disposal was also noted. Refuse was deposited at formal loci in sites of medium-term (three to six months) and long-term (greater than six months) duration more often than at short-term sites. A final observation made by Kent was that the diversity of artifacts increased with anticipated mobility: "...people who plan to stay a short time will bring less objects to a site than those who plan to stay a long time" (1992:641).

Spatial Analysis

To address questions of site and activity structure, spatial analyses were conducted where appropriate. A number of quantitative methods are commonly used in the investigation of spatial patterning at archaeological sites (e.g., Hodder and Orton 1976; Kintigh and Ammerman 1982; Whallon 1984; also see Kintigh 1990 for a comparison of the most common methods). Data requirements for such analyses vary depending on the method to be used. Applications of nearest neighbor (e.g., Hodder and Orton 1976) and K-means (e.g., Kintigh and Ammerman 1982) analyses require point provenience data, whereas methods such as unconstrained clustering (e.g., Whallon 1984) can use grid count data (note that unconstrained clustering can also be conducted on point provenience data). The use of spatial analysis methods for archaeological applications is best conducted through the use of several techniques (e.g., Rigaud and Simek 1991; Simek 1987). As used on the AOS data, these methods included the visual inspection of artifact and feature distributions, the application of quantitative methods of cluster analysis, and the determination of whether statistically significant differences are evident in assemblage content between clusters. For the analysis, counts of artifact classes are calculated for each unit/feature and then transformed into relative percentages. Artifact classes used in the analysis are site specific and discussed in the various site volumes. Since the sites were excavated in units, when quantitative methods were applied to the various AOS sites the unconstrained cluster analysis method was employed.

Artifact distribution maps were constructed using Surfer software program. Counts of various artifact classes were tabulated by excavation unit and level. From these data, distribution maps were constructed. Such maps can be viewed as heuristic devices that allow one to visually examine the distribution of artifacts across a site (e.g., Jermann and Dunnell 1979). For plotting

purposes, the center point of a unit or feature is used as the grid designation.

Following Whallon (1984:249), the first step in the analysis consists of constructing a correlation matrix. This analysis provides some indication of whether or not any of the artifact classes are correlated. If at least some correlations are indicated, the next step of the analysis consists of a principal component analysis. Examination of the component loadings provides information regarding the assemblage. That is, are there artifact classes that commonly appear together that may represent a "tool kit?" If the analysis suggests some groupings of artifact classes, then the analysis proceeds to the next step.

The formal part of the spatial analysis consists of an unconstrained cluster analysis. This form of spatial analysis seeks to group areas of a site with respect to proportional artifact class composition (Whallon 1984; also see discussions in Kintigh 1990 and Gregg et al. 1991). In short, the data are used in a cluster analysis to combine the data points into groups that tend to be homogeneous with respect to relative densities. Once the clusters have been identified, a map can be constructed that shows each cell and its cluster assignment. These can then be inspected for spatial integrity. The clusters, and their spatial relationships, can then be summarized by size, shape, and composition.

While Whallon originally developed the method for use with point provenience data, he (Whallon 1984:245) notes that the method can be applied to grid count data. Kintigh (1990:194-196) also demonstrates the use of unconstrained clustering using grid count data and suggests that in many cases, the use of grid count data for unconstrained clustering actually produces better results (i.e., more easily interpretable results) than when used with point provenience data. Grid count data were used for the analyses of the AOS data as point provenience information was not obtained for these materials.

As the unconstrained cluster method relies on the k-means clustering algorithm for the determination of clusters, a brief discussion of the k-means method is in order (for a more detailed treatment of the k-means method see Doran and Hodson 1975; Kintigh 1990; Kintigh and Ammerman 1982; Simek 1987). K-means is a nonhierarchical, divisive clustering technique that attempts to minimize the intra-cluster variances while maximizing the inter-cluster distances (Kintigh and Ammerman 1982:39). Unlike hierarchical methods (e.g., nearest neighbor, average linkage, Ward's method), nonhierarchical methods avoid problems of "chaining" and artificial boundaries and work on the original input data rather than on a similarity matrix (Doran and Hodson 1975:180-184; Kintigh and Ammerman 1982:39,48). The k-means method works by searching for cluster formations that minimize the global Sum of the Squared Error (SSE), where SSE is defined as the total of the squared distances between the cluster's centroid and each of its members (measured in Euclidean distance). The basic process is to 1) partition the data into K initial clusters; 2) proceed through the data and assign items to the cluster whose centroid is nearest, then recalculate the centroids for each cluster and determine if any item is actually closer to the centroid of another cluster; if so, reassign the item to that cluster and recalculate the centroids; 3) repeat step 2 until no further reassignments take place (Kintigh and Ammerman 1982:39-41; Johnson and Wichern 1992:597). A plot of the SSE versus the number of clusters can be used to determine where optimal clustering is occurring. A drop in the SSE curve at a specific cluster number, compared to the surrounding solutions, identifies an optimal solution. It should be noted that more than one solution might be seen as "optimal." In these cases, there is an indication of spatial patterning at several levels of detail. The k-means module in Keith Kintigh's "Tools for Quantitative Archaeology" computer package (the program that is used to conduct the k-means analyses) also uses Monte Carlo methods to produce a series of random runs using the input data. Randomization is accomplished by randomizing the order of the values in each of the data columns. When plots of the SSE versus cluster number for the

simulated (random runs) and actual data are made, deviations in the SSE curve for the actual data that do not have corresponding deviations in the random data indicate the "optimal" solutions. As noted by Kintigh and Ammerman (1982), if there is clustering evident in the analysis, the SSE will decrease more rapidly for the actual data than for the randomized data. In addition, the difference between the SSE for the random runs and the original data can be plotted. A spike in the difference should represent the optimal clustering level (Kintigh 1990: 189; Gregg et al. 1991). Once "optimal" solutions are found, more in-depth analyses can be conducted to further examine these "optimal" solutions.

Site Structure Questions

Our goal is to determine the intrasite organization and patterning at each site (i.e., how prehistoric peoples used and organized space across the site) through the identification and evaluation of activity areas, particularly those that may relate to households or specialized activities. These goals are:

- Examine intrasite artifact distribution and feature patterning to ascertain whether cultural components are the result of contemporary occupations at site location, or are separate, reoccurring occupations (i.e., palimpsests).
- Where appropriate, conduct quantitative analyses of artifact patterning.
- Assess the functionality of intrasite activity areas on the basis of specific artifact patterning based on feature type and artifact functions (as determined by morphology and use-wear analysis).
- Assess the duration of occupation through the analysis of refuse disposal patterns.

Settlement and Subsistence Strategies

Archaeological research conducted in conjunction with this project provides an opportunity to investigate the nature of aboriginal settlement and subsistence along the Mississippi River valley in northeastern Missouri. The study of settlement and subsistence can best be facilitated by the study of site structure and formation processes as noted above (also see Creasman 1994a, 1994b for a more in depth discussion). Only by determining the functional and organizational role of individual sites can archaeologists hope to reconstruct the overall cultural system(s). Understanding how individual sites were formed (the behaviors that created the site) allows us to examine, document, and trace the variability of these behaviors across the landscape (settlement system) and through time (cultural processes). Of particular interest for the project at hand was to document the types and distribution of functional features, types and associated remains, and further, to examine the intrasite patterning of the feature types and other remains. These data, supplemented with radiometric dating techniques and especially in conjunction with diagnostic artifacts, subsistence remains, and burial patterns, may allow us to determine the presence or absence of culturally related, or unrelated, groups and to trace changes in the data through time.

The settlement system of humans, at any given point in time, can best be perceived as a series of interrelated and interactive components. The structure of a specific system is dependent upon people's adaptation to their environment and their attempts to exploit and distribute subsistence resources. Binford (1978, 1980) has described two distinctive subsistence strategies for hunter-gatherers that appear to be supported by studies of numerous ethnohistoric and modern hunting and gathering peoples. These two strategies, termed foragers and collectors, focus upon the distinction between moving entire groups of people to the subsistence resource versus a "logistically organized" subsistence strategy whereby specialists locate, procure, process, and transport subsistence resources to a larger social unit. Aboriginal populations that practiced a mixed hunting-gathering and agricultural system are expected to have a collector type system (R. P. Davis 1990).

Foragers normally do not store food, but rather, they gather it on a daily basis.

According to Binford (1980:5), they tend to organize resource exploitation by a series of residential moves and adjustments in group size. Binford's observations suggest that foragers "... range out gathering food on an `encounter' basis and return to their residential bases each afternoon or evening" (1980:5). A critical variable that would allow such a subsistence strategy is a stable environment in which there are a wide variety of resources to exploit on a predictable seasonal basis. Binford (1980:9) recognizes two different types of archaeological sites that would represent a forager subsistence system: 1) Residential Bases and 2) Locations. Residential bases represent the occupational locus of the main social unit. Locations represent the locus at which such people would "encounter" food (e.g., the locality in which a turkey or deer is dispatched or mast crops gathered). As Binford (1980:9–10) suggests, the implications for archaeological sites representing such a strategy focus upon a high visibility for residential bases where repeated occupations occurred. Such sites should display a broad array of socioeconomic activities, as inferred from a great deal of artifact variability, which are shared from site to site within the settlement system. Conversely, locations or extractive sites representing functionally specific activities will be underrepresented due to their low visibility.

In contrast to a foraging strategy, collectors are "logistically organized" in such a manner that small task groups supply the subsistence requirements of a larger social unit. These task groups do not necessarily return to the main social unit on a daily basis, but rather, an extended period of time may be necessary for them to locate, procure, process, and transport subsistence resources. By necessity, collectors do store food. Binford (1980:12) recognizes four different site types associated with a collecting strategy: 1) residential bases, 2) field camps, 3) stations, and 4) caches. The first kind of site represents the occupational locus of the main social unit. Such sites will be located in favorable locations in terms of fairly level living space sufficient for larger numbers of people and in close proximity to permanent water. Field Camps may be perceived as temporary operational loci for task groups. Stations are special purpose localities where "... task groups are localized when engaged in information gathering" (Binford 1980:12). Such "information gathering" may take the form of hunting stands or observation points. Finally, Caches are food storage facilities that may be found along transportation routes or in combination with any of the other site types described. Binford (1980:12) acknowledges that these site types are not mutually exclusive and that:

> …the greater the number of generic types of functions a site may serve, the greater the number of possible combinations, and hence the greater the range of intersite variability which we may expect.

In summary then, a collector subsistence strategy should reflect an archaeological record that yields a broad range of socioeconomic variability between sites within the system as a whole. In addition, special extractive sites should be represented in the settlement system and these will be located near the resource that was being sought. Such sites will exhibit specific tool kits and technologies.

How do we get from the recovery of material remains to the interpretation of subsistence and settlement system dynamics? Our position follows the premise that to understand or determine the function of a site, we have to be able to identify and understand site formation processes and those human behaviors that led to the cultural material patterns we observe on the ground. Middle-range research, as proposed by Binford (1983, 1989), provides a link between the static remains of culture and human behavior. Middle-range research is a form of investigation needed to determine whether an assumption about the past is actually true. Middle-range research involves looking at the present to understand the material remains of the past. By observing and documenting in the present how static remains (artifacts and features) are created, we are provided with a

quantifiable link between behavior and the formation of static litter. Middle-range research has also focused on other processes in the formation of the archaeological record. Natural processes (e.g., erosion, natural transport, or animal agents) act to distort the behavioral patterns. In order to reconstruct the behavioral system, we must be able to determine how a site was formed in both human and environmental terms. As Binford notes, "to reconstruct the entire pattern of land use, archaeologists have to be able first to identify the specific function of each separate site and then to fit all the individual parts together" (1983:131-132). We view this approach as a series of logically ordered stages from the fine-grained, site specific level to the coarse-grained, synthetic level.

A good body of middle-range investigations exists in the form of ethnoarchaeological studies. Ethnoarchaeological research on site structure has lead to the documentation of site-formation processes. Moreover, such studies provide a vehicle by which one might elucidate the relationship between the static material remains and aspects of the corresponding behaviors. This body of data then provides means by which to interpret the material remains of the past.

At the fine-grained level, the first step is to understand the site's structure (i.e. spatial distribution of the "facilities," or structures, and other features). The examination and recordation of the spatial clustering of the fire-cracked rock, chipped stone tools, pottery sherds, groundstone, and plant and animal remains within and around these facilities will provide clues to the character of the activities conducted at the site. This will allow for the defining and understanding of the various "activity areas," or use areas. Given this fine-grained information on site organization from several individual sites, these data then form a catalog of activity area types that can be grouped into "functional types" based on the kinds of activities represented. Comparisons of the various functional types across the landscape will provide information on the more coarse-grained problem of the total settlement and subsistence pattern of the prehistoric people of the area. Then and only then can the more traditional problems concerning the definition of archaeological cultures, their origins, and their demise be considered.

Regional Settlement Patterns

The excavation and analysis of the cultural remains from the various sites in the right-of-way corridor for the Avenue of the Saints project provide baseline information and insight and an understanding of site-specific organization, activities, and subsistence. Although we do not expect that the present investigation will yield sufficient data to make a definitive statement on the nature of the settlement/subsistence systems present in this area, Binford's work provides a valuable theoretical foundation for examining the prehistoric components encountered at the various sites. To gain a regional perspective and to begin building a regional model using Binford's approach, the data from these sites can be augmented by drawing in data from other excavated sites in the general region throughout northeastern Missouri and the surrounding areas of Illinois and Iowa.

The approach to modeling prehistoric settlement patterns will start with placing the sites within a functional framework. Creasman (1994a and 1994b), following Binford, has summarized the characteristics of sites created by hunter-gatherers and groups practicing mixed gardening and hunting-gathering that will provide the basis for classification. Once the site (or individual occupation zones within the site) is functionally classified, the site will be grouped by temporal period and/or cultural unit. Our initial settlement model(s) will consist of simple pattern recognition through qualitative analysis of the data. The objectives will be simple: 1) to detect trends in the variation of site distributions on the landscape, 2) to detect trends in the locations of functional classes of sites, and 3) to consider variations between temporal periods. The following discussion summarizes the characteristics of the functional types.

Residential Camp

Residential camps (or residential bases) are the loci out of which foraging parties originate and where most processing, manufacturing, and maintenance activities take place (Binford 1980). The residential camp is the only habitation site created by foragers and the primary habitation site created by logistical collectors (and part-time farmers). The artifact assemblage at the residential camp reflects the broad range of activities conducted there. The assemblage may also contain non-portable site furniture, such as grinding stones and ceramic vessels, that may be cached at the site for future use. Habitation structures, if present, at the residential site may reflect the season and duration of occupation. The duration of occupation will also influence the pattern of refuse disposal and arrangement of activities within the site. The character of the residential camp is expected to be highly variable. Because foragers are characterized by high mobility, low-bulk, and daily food procurement strategies, the contents of residential camps will be rather homogeneous with variation reflecting differences in seasonal scheduling and different duration of occupations. Collectors on the other hand are characterized by food storage for at least part of the year and logistically organized food-procurement parties. The character of residential bases of collectors will tend to be less homogeneous, not only due to seasonal and occupation duration differences, but will reflect high-bulk input and storage and logistical procurement and processing. Residential sites, because of their diversity and intensity of activities, will have high archeological visibility.

Location

The places where extractive tasks are carried out are termed locations (Binford 1980). Among foragers, locations are generally low-bulk procurement sites that are occupied for a very short period of time. The rather low intensity of procurement and processing generally leaves little evidence of the activity, and therefore, the location has little archaeological visibility. One forager location that would have a higher visibility would be the site for the procurement of lithic raw material. Collectors also procure and/or process raw materials at locations. Unlike foragers, collectors seek resources for a far larger group that will result in high-bulk procurement and processing events (e.g. bison kill sites). High-bulk locations may have a higher degree of archaeological visibility, and such sites will be characterized by a single resource type (e.g. fish) and a very restricted artifact assemblage.

Field Camp

The field camp is a temporary operation center for a task group and is created only by logistically organized collectors (Binford 1980). The field camp is the place the group sleeps, eats, and maintains itself while away from the residential camp. Field camps are associated with the procurement of specific resources and can be differentiated from residential camps based on the limited range of maintenance, manufacturing, and processing activities (Fisher 1993). The contents of field camps will reflect the procurement and processing activities according to the nature of the targeted resource. The field camp will generally have a lower artifact and feature density and diversity than residential sites. The arrangement of dwellings and disposal of refuse will be unstructured when compared to residential sites (Fisher 1993). Recognition of a field camp function for sites in the archaeological record can be complicated by the nature of logistical organizational patterns. The rather low density of artifacts that characterize field camps can become a location of rather dense artifact concentration through redundant use of the location. As well, the limited spectrum of activities characterizing field camps can be altered by reoccupation of the location for a dissimilar function (Binford 1982). This type of reuse tends to obscure any internal structure of the material remains.

Local Center

> Archaeologically, local centers can be defined as large, artifactually dense village sites with evidence of civic architecture (e.g., substructure mounds or townhouses) and having an intrasite community plan with domestic structures surrounding an open plaza. The site may also have been palisaded for defensive purposes [R. P. Davis 1990:19].

Hamlet

> Hamlets are domestic settlements containing several houses and lacking civic architecture and central plazas. ...this settlement type usually is characterized as incorporating 10-20 domestic structures. This settlement type is postulated to represent a satellite community of a larger local center but which is economically self-supporting. It is considered functionally similar to the next settlement type, the homestead, representing simply an aggregated cluster of domestic structures [R.P. Davis 1990:19-20].

Homestead

"The homestead settlement type can be characterized as the 'permanent year-round settlement of one to several nuclear-extended families' (Smith 1978:500) and, as such, represents the lowest-order residential site type..." (R.P. Davis 1990:20).

Discussion

Because most archaeological excavations (especially excavations done in conjunction with development projects) focus their attention on sites with features, or the portion of the site with features, these efforts (intentionally or not) result primarily in the documentation of household areas, or residential sites. But the presence of hearths alone, or even temporary habitation structures, is not sufficient evidence to infer residential function, because field camps also contain hearths and, at times, habitation structures (Fisher and Strickland 1991; Griffin 1984 and 1985). As noted in the discussion above, distinguishing characteristics for residential bases would primarily be the greater diversity of manufacturing, maintenance and processing activities (as expressed by diverse facility and artifact assemblages), and greater diversity of subsistence resources. The distribution of these activities and patterns of refuse disposal would also serve to distinguish between residential camps and field camps as well as variability within residential camps (see Creasman 1994a for a discussion).

While we would be the first to acknowledge the fact that single site investigations may be inadequate to determine whether or not any one specific temporal component represents one or the other site types referenced above, it is assumed that an analysis of the artifact assemblage recovered from a given component may serve to support one interpretation over the other. Since the Avenue of the Saints project focused on a series of sites spaced over a relatively short distance, this project provided an excellent opportunity for the collection of archaeological data employing standardized methods. In addition, augmenting the data from sites in the Avenue of the Saints project area with comparable regional sites should provide a means to model a regional system. Moreover, it is assumed that a techno-functional analysis of the assemblages recovered would assist in the formulation of additional hypotheses that could be addressed subsequently. Any attempt to differentiate between settlement/subsistence strategies is only a first generation vantage point from which to analyze the prehistoric settlement system(s) that exists in this area. In order to apply Binford's (1980:4-20) models to the database, we must begin with the rather simplistic collector-forager dichotomy, fully cognizant that it does not exhaust the entire range of possible behavioral postures. Moreover, the model provides a foundation by which to examine changes over time (see Stafford 1991b; Carr 1991; R.P. Davis 1990; Blanton and Sassaman 1989; Kimball 1981).

In relation to the above discussions on defining types of sites (e.g., base camp or hunting camp), quantitative methods are used to allow each component at the site to be viewed within a continuum. Non-quantitative

methods are inherently subjective and are compromised by two major pitfalls. First, prehistoric occupation of any location is best viewed within a continuum. This continuum ranges from single activity locations occupied by a few individuals for several hours to large, residential locations that were occupied by numerous people for several years. Contained within this continuum is much variation in the length of occupation, intensity of occupation, and activities performed at these locations. Condensing this variation to a few types (hunting camp or base camp) suppresses it (also see Bettinger 1979 for a critique of such arbitrary designations). Modeling site occupation as a continuum does not preclude the examination of settlement organization. In fact, the use of a continuum model allows for a greater amount of variation in occupation intensity to be examined.

Second, one of the criteria used to define site type is based on the presence or absence of certain "functional types" of artifacts (e.g., scraper or preform). This type of analysis equates form with function, which is often inaccurate (e.g., Ahler 1971). It should also be noted that, especially in the case of "curated" artifacts, many implements recovered from a specific location may not have been used at that location. For example, hafted bifaces are commonly recovered from sites; however, one would not expect that prehistoric people merely stepped out the front of the structure and hunted game. Many hafted tools may have been used away from the site, broken, and transported to another location where the tool was removed from the haft and another tool placed in the old haft (Keeley 1982).

The above issues are further complicated, especially so in the context of CRM archaeology, when only portions of the site are excavated. These portions may only represent specific activity loci within a larger complex. To infer site function only confuses the record of prehistoric land use within the region. In this regard, it is more informative to define the activities that occurred at that location.

The perspective taken in this study is to view sites (locations on the landscape) within a continuum, from single activity locations to long-term residential sites. Doing so allows us to examine the variation in the prehistoric use of specific locations. Rather than relying on subjective criteria to examine these questions, diversity analysis can be conducted. While the preceding paragraphs may seem contradictory to the previous statements concerning Binford's model, the differences can be rectified and the model restated (see below).

In summary, diversity analysis measures how the number of specimens is distributed among various artifact classes under investigation (see Baxter 2001, Kaufman 1998, and Kintigh 1984, 1989 for further discussion concerning the use of diversity analysis in archaeology). Two dimensions of diversity are computed: richness, which measures the number of different classes present; and evenness, which measures the uniformity of distribution of relative proportions of the classes (Bobrowsky and Ball 1989; Jones and Leonard 1989; Kintigh 1989).

Simulation and regression approaches (e.g. Kintigh 1984, 1989; Grayson 1984) have been traditionally used to quantify diversity among archaeological sites and assemblages. However, problems have been noted with these techniques, and it has been recently shown that the Jackknife technique (Kaufman 1998) presents a solution to the theoretical and methodological constraints found with such approaches. Most significant is that jackknifing does not require any prior assumptions about, or knowledge of, the structure of the original data (Kaufman 1998:83).

This Jackknife technique entails repeated recalculations of the data and removing one of the original observations after each calculation, resulting in a series of jackknife estimates. No population models to compare the data against are needed, and no particular requirements of the data are necessary. But, like the regression and simulation methods, richness and evenness scores for the data are acquired. The richness and evenness scores can be tested statistically to determine if the

observed differences are real. A computer program designed by CRAI personnel (Bradbury 2000) was used to perform these diversity statistics. The diversity program is based on the Jackknife technique presented in Kaufman's 1998 paper.

Diversity measures are used because they are not subjective and allow for direct comparisons between sites. The diversity measures allow us to view separate temporal components of each site within a continuum (i.e., from small ephemeral limited activity areas to large residential bases where many activities would have occurred) based on the artifact assemblages, rather than arbitrarily defining the sites as specific types (e.g., hunting camp or base camp). The use of diversity analysis does not allow for sites to be divided into different "site types" such as base camp or field camp but can be used to rank different assemblages along a scale of relative residential intensity (Thomas 1989b:91).

Our assumption is that as a site is occupied for longer periods of time a greater number of activities would have been conducted by the site's inhabitants (e.g., Jones et. al. 1989; Magne 1989). This should be evident in the tool classes represented at each location. Even in the case of activities occurring offsite, a number of implements would still have been returned to the residential location and deposited. This is especially true of those implements that were hafted (Keeley 1982; Towner and Warburton 1990). Numerous tool classes should represent a long-term occupation, as many activities would likely have taken place. Conversely, few tool classes should represent a short-term occupation. In terms of diversity, long-term occupations will exhibit high richness and lower evenness scores, whereas short-term occupations should exhibit low richness scores. In addition, sites that represent limited activity loci should exhibit high evenness scores, due to an emphasis on only a narrow range of activities. Residential sites would be expected to have higher diversity because of the number of activities, even if occupied for a short period of time. The length of occupation should be reflected in the density of materials. Therefore, high diversity and high density would indicate a long-term residential site; high diversity, but low density would indicate a short-term residential site; low diversity and high density would indicate a long-term, specialized task site; and low diversity and density would indicate a short-term specialized task site. Low diversity and high density could also indicate reoccupation. Additional data would be needed to examine this aspect. For example, subsistence remains can also provide indications of occupation intensity. Longer occupations should, all other things being equal, exhibit a greater diversity of plant and animal species than a short-term occupation or specialized procurement or processing. In addition, the amount of these remains also provides indications concerning the length of stay and the number of people involved.

The presence or absence of features, the types of features present, and the presence and types of refuse are additional sources of information concerning the occupation. Large storage pits and burials would be expected on sites that are more residential in nature. Short-term sites may only exhibit a few hearths, or other sources of fire. In some cases, limited activity sites may not evidence any features. Ceramics can be another indicator on Woodland and Mississippian period sites. On short-term or specialized activity sites, few, if any, ceramics are expected. Larger residential sites would be expected to have a large assemblage of ceramics. The determination of the number of actual vessels represented for an occupation provides additional information.

The above data must all be considered when inferences concerning occupation intensity and site use are being made. Each of the separate artifact classes provides a separate line of evidence for the examination of certain aspects of prehistoric use of the site. When taken as a whole, the data can provide a clearer picture of the prehistoric use of the site.

Restatement of the model

In the preceding sections, Binford's settlement strategy model was discussed. In the section that followed, several aspects of the Binford model were called into question. More specifically, how various parts of the model were defined was questioned. Simply put, Binford's model can be seen as the "ideal." Groups are either foragers or they are collectors. Sites are either residential bases or locations (for foragers). For collectors, sites are residential bases, locations, or field camps. In the past, people may have been organized as foragers for part of the year, and as collectors for the rest of the year. During one season, a site may be used as a residential base, then as a hunting camp during another season. A residential base may have been occupied in the spring, abandoned during summer, and then reoccupied as a residential base during the fall. Horticultural groups may form large, residential sites during the early spring planting season, splinter into smaller groups for the summer, then aggregate at the residential base for the fall harvest. Hunter-gatherer groups may use an upland site in the fall for both the procurement of mast species (hickory nuts, acorns) and as a hunting stand. All of these factors, and others, seek to complicate the archaeological record so that one cannot simply state: during the X sub-period, hunter-gatherers were organized as foragers, and during the Y sub-period, hunter-gatherers were organized as collectors. Likewise, we may not be able to state definitively that site A was a location while site B was a field camp.

While oversimplified, Binford's model can be used in examining prehistoric groups. Above, it was suggested that defining sites as bases, locations, and field camps suppresses much of the variation in prehistoric use of an area and can be detrimental in such examinations. Further, it was suggested that quantitative methods provide the means by which we can better understand prehistoric settlement systems. Using quantitative methods, as suggested above, allows us to operationalize the model developed by Binford.

In using quantitative methods, such as diversity analysis, we can restate the model. If groups are organized as foragers, then we should see a distinct pattern where some assemblages exhibit high diversity (residential bases) and others exhibit very low diversity (locations). Taken a step further, a site that was being used as a location should exhibit a high evenness score and a low richness score due to the emphasis on only a few activities taking place. Conversely, a site being used as a residential base should exhibit a high richness score but a low evenness score due to many activities taking place. We note that locations, due to the exploitation of a narrow range of resources and short occupation span by small numbers of people, are not very visible archaeologically. In some cases, we may only see the larger residential sites. By this we mean that during sub-period X, for example, we may only be able to define residential bases. Locations may be so archaeologically "invisible" that we cannot detect them or they appear as isolated finds. When viewed on a site by site basis, such a pattern may not be discernible. However, at the regional level, such a pattern may become evident. As an example, we can take two hypothetical sites (A and B) (Table 2.1). Site A shows a much higher richness score, because all artifact classes are represented. In contrast, Site B shows a much higher evenness score, because the majority of artifacts were of one class. According to the model, Site A would be seen as a residential site and Site B would be seen as a location. While oversimplified, the example presents an ideal situation with which to view the model. We also note that, in many cases, locations will not be archaeologically visible unless they have been reoccupied a number of times for the same purpose.

Table 2.1. Theoretical Forager Sites.

Artifact Class	Site A	Site B
Class 1	2	0
Class 2	1	5
Class 3	2	1
Class 4	3	0
Class 5	2	0
Class 6	2	0
Class 7	3	0
Class 8	1	0
Class 9	2	0
Class 10	2	0
Total Artifacts	20	6
Richness	3.2599	0.9094
Evenness	0.3391	1.8855

In contrast to foragers, we should see a wide range of diversity scores if groups are organized as collectors, because there are a wider range of site types being used. Residential sites would still be represented by high richness and low evenness scores. Also, a greater number of artifacts would be expected in relation to a forager residence, because the length of occupation would likely be longer. Like a forager location, a collector location would also exhibit low richness and high evenness scores. Field camps would exhibit values between these two extremes. Table 2.2 shows hypothetical data for four sites (A, B, C, and D). According to the model, Sites A and D would be considered field camps, Site B a residential base, and Site C a location.

In conjunction with the above, it should be noted that assemblage composition must also be taken into account. Assemblage composition will vary based on the types of activities taking place. It is expected that a collector system will exhibit a number of sites with small assemblages and variable artifact content. These sites represent various field camps being used to exploit specific resources. The artifact composition will vary depending on the resource(s) being exploited. From the example above, both Sites A and D exhibit the same artifact counts, richness score, and evenness score. However, different artifact classes are represented (see Table 2.2).

Also in conjunction with the above, we note that in addition to artifacts, facilities, structures, and economic remains must also be considered, and they provide additional lines of evidence. That is, if we determine that during sub-period X people were organized as collectors, and site A represents a residential base, then we should see evidence of storage pits, structures, and a range of economic remains associated with this occupation.

The above can be further complicated due to the reuse of a site (i.e., palimpsest effect). That is, if a site is occupied during the spring as a fishing camp, then occupied in the fall as a nut processing camp, and finally occupied the following year during the winter as a hunting camp, the wide range of activities represented at the site could be mistaken for representing a residential camp utilized for much of the year. Seasonal indicators (e.g., botanical or faunal materials) are needed, in conjunction with other analyses, to tease out this information. In the above example, we may see that all of the seasonal indicators of a spring occupation are from a few features in one part of the site, while indicators of a fall occupation are all from features on another part of the site. If the site was occupied year round, then we should see multiple seasons represented in individual features. Structures, or lack thereof, can also be used as indicators of season. More substantial, and therefore archaeologically more visible, structures would be expected during cold weather occupations. In contrast, warm weather structures may be represented by nothing more than wind breaks or other light structures.

Table 2.2. Theoretical Collector Sites.

Artifact Class	Site A	Site B	Site C	Site D
Class 1	6	4	1	0
Class 2	0	6	0	5
Class 3	4	6	0	0
Class 4	0	4	5	6
Class 5	5	2	0	0
Class 6	0	2	0	5
Class 7	5	6	0	0
Class 8	0	2	0	4
Class 9	0	4	0	0
Class 10	0	4	0	0
Total Artifacts	20	40	6	20
Richness	1.252	2.302	0.9094	1.252
Evenness	0.1792	.4064	1.8855	.1792

Likewise, the diversity of feature types present provides some input into the occupation. If the site represents a residential site, a wide range of activities would have taken place; therefore, a wide range of features would have been used in conjunction with the conduct of these activities.

For the reasons noted above, the importance of excavating small, stratified sites cannot be overstated. Such sites can often represent a short slice of time and, in some cases, a single occupation event. The palimpsest effect is not exhibited at such sites, so a clearer picture of prehistoric lifeways can be identified from the analysis of the recovered materials.

Settlement Pattern Questions

The goal is to provide a description of the environmental setting of the sites during the different periods of use, providing a contextual environmental overview for the activities represented in the archaeological record. Productive avenues of research include:

- Reconstruct the paleoenvironment using geomorphic data, pollen, and phytolith analysis, as well as fauna and flora data recovered from secure contexts at the various archaeological sites. This would also include detailed examinations of Government Land Office (GLO) land records to reconstruct the nineteenth-century pre-settlement vegetation.
- Identify the range of site types within the project area and assess temporal variation of those sites.
- Examine the effects of geomorphic processes, including both colluvial and alluvial factors, on archaeological site preservation or destruction within the project area. When were the colluvial fans forming? Do these fans represent isolated events or re-occurring events over a longer span of time? What effect did fan formation have on the sites situated on the same landform (i.e., did the fan formation preserve or destroy the sites)?
- Assess the level of relative group mobility/sedentism during the Archaic period, and identify possible differences between the sub-periods.
- Identify diachronic trends in community patterning during the Woodland period.
- Investigate site catchment areas in order to assess potential environmental factors in site location and length of occupation.
- Examine the geographic relationship of the Middle Woodland Havana groups in the project area to neighboring groups along the Mississippi River valley.
- Investigate the role of bluff base settlements (i.e., Struever 1968b) in the overall settlement pattern during the Middle Woodland period.
- Assess whether Woodland occupations represent seasonal or year-round occupation.
- Assess the role played by the Late Woodland groups in the east-to-west expansion of Weaver-like groups (or ideas) from western Illinois or Ralls phase from the south.
- Assess differences in architecture through time.
- How do the AOS Late Woodland sites fit in with Green's Frontier Model for Illinois?
- How do the AOS Late Archaic sites fit with the various Late Archaic phases defined for Illinois? How do these sites compare with other Missouri sites, such as Callaway Farms Site?

Environmental Change and Subsistence

Diachronic study of prehistoric subsistence strategies will be addressed through an analysis of the archaeobotanical and archaeofaunal data. One focus would be the study of changes in representation of plant taxa for different prehistoric components, which should provide information pertaining to both subsistence and environmental dynamics. For example, pollen and plant macrofossil studies suggest an expansion of forests along riparian corridors after 3000 BP, preceded by an eastward expansion of a tall grass prairie

(e.g., Baker et al. 2001; Bettis 2003). Faunal remains, although primarily culturally conditioned, also reflect environmental conditions at the time the site was occupied. For example, during the Middle Archaic occupation at the Black Earth site, beaver represented the primary meat source taken from the aquatic/riparian habitat (Jefferies and Butler 1982:1474). Beaver was also the main aquatic/riparian habitat meat source during the late Middle Woodland occupation, indicating that the aquatic zone may have been relatively stable from 6000-200 B.C.

The formulation and testing of a settlement-subsistence model(s) for the project area comprises the main objectives of this research. Of particular interest is the relationship of subsistence strategies to the distribution and abundance of resources. In considering stability of, or changes in, subsistence strategies, it becomes necessary to reconstruct the prehistoric environment in which the human system operated. Changes in subsistence or settlement systems can be triggered by cultural (e.g., new technologies) or environmental (e.g., a drier climate) changes. In the reconstructing of prehistoric environments, consideration should be given to both plant and animal resources, both locally and regionally. Brown and Vierra (1983) noted in a study of Middle Archaic settlement and subsistence at the Koster site that not only do paleoenvironmental studies need to distinguish changes in terrestrial environments, but also changes in aquatic environments, which many have not. The study of changes in aquatic environments would be of greater importance when dealing with sites situated in riverine and/or lacustrine settings. The point is that potential changes in the totality of the potential resource base needs to be considered.

Subsistence Analysis

The time depth represented by sites investigated as part of the AOS Project provides a potential basis for investigations of changes in subsistence strategies between different cultural/temporal periods or archaeological cultures. The model of hunter-gatherer locational and mobility strategies used in this research is characterized by a dichotomy between residential and logistical mobility (see Brown and Vierra 1983). Binford's forager strategy, in which the co-residential group makes seasonal short-term moves among a series of resource patches, is characterized by high residential mobility. Conversely, hunter-gatherers employing a collector or logistic mobility strategy exploit resource-specific locations by dispatching work parties from a centralized residential camp to acquire one or a few desired resources.

The strategy employed by any hunter-gatherer group is predicated on the nature, distribution, and density of resources. In general terms, a hunting-gathering strategy employing high residential mobility will occur in areas with high resource dispersion and low resource density, or environments of low economic production. The acquisition of desired foods requires frequent moves of the co-residential group as the resources within the exploitation zone of a settlement are depleted. In environments of low economic production, the cost of the resources, in terms of search time and transportation, make it more advantageous to move the entire camp to a new location. Strategies employing residential mobility are characterized by a greater dietary diversity, (i.e., a broader range of foods are exploited). In environments where resources are localized and abundant, desired foods can be procured through a pattern of logistical mobility from a centralized camp. The high economic production of resource-rich zones negates the effects of search and transport costs because of high yields. Where preferred resources are particularly abundant, residential stability, may increase even to the point of sedentism.

The adoption of strategic locations for exploiting preferred food resources should promote the appearance of the following new features of settlement through longer occupation:

1. There will be investment in more permanent facilities of all types, including shelters. The anticipated rewards of extended use will encourage investment in

facilities for long-term benefits [Woodburn 1980].

2. With increase in the length of occupation there should be an increasing number of permanent facilities integrated into the settlement and those facilities will become more organized within the layout. Trash will tend to be cleaned from certain areas and disposed of in special locations [Binford 1982; Carlson 1979].
3. A number of effects will be exhibited in the character of the record of food remains, raw material usage, and other aspects of material culture [Lurie 1982].

The subsistence base is divided between plant and animal resources. The capture and processing of plant and faunal resources are reflected in the archaeological remains of these resources. However, the exploitation of faunal and plant resources also result in different material technologies and social patterns (i.e., division of labor, creation of task specific groups, cooperation, food sharing). The formation and structure of the site is highly conditioned by subsistence pursuits. Questions relating to subsistence resources not only tell us about the specific site, but how that site may fit within the large system. Questions pertaining to plant resources are outlined, but a similar set of questions are appropriate for the study of faunal resources, with the exception of the area of domesticated remains.

Faunal Analysis

Faunal materials recovered during the AOS project were processed and analyzed as follows. Bones and teeth were washed, dried, and identified to lowest taxonomic category, element, and symmetry. Comparative faunal collections housed at the Illinois State Museum and personal collections of Jessica L. Allgood were consulted during this analysis. In addition, several identification guides were used, including Parmalee (1967) and Gilbert (1980, Gilbert et al. 1985). Data recorded included sex, age, degree of epiphyseal fusion in long bones, and modifications to the bones, including carnivore and rodent gnawing, chopping and cutting marks resulting from butchery practices, and the presence of burned or calcined bone. Fragment size for each element was recorded and placed into the following categories: less than 25 percent complete (< .25), more than 25 percent complete (.25 +), 50 percent complete (.5), more than 50 percent complete (.5 +), 75 percent complete (.75), more than 75 percent complete (.75 +), and complete. Bones were weighed to the nearest 0.01g. Degree of fusion of the long bone epiphyses allowed juveniles and adults to be distinguished, and deer teeth were aged using comparative specimens. From the raw data, zooarchaeological measures of species and element composition were generated using zooarchaeological quantification methods.

A number of methods have been developed that were used to describe the number of animals recovered from sites investigated during the project and, more importantly, the relative abundance of taxa at the site. Relative abundances serve to establish the relative importance of species or animal parts to the occupants of the site, thereby offering more detailed and precise descriptions of animal usage than can be provided by a taxonomic list alone. The methods of zooarchaeological quantification that were used in describing the faunal assemblage include 1) number of identified specimens (NISP), 2) minimum number of individuals (MNI), and 3) bone weight. Each is able to measure subsistence with varying success (Grayson 1984). Despite the many biases that effect NISP values, it can be a useful measure to evaluate the degree of fragmentation of taxa. For example, if large mammal bones are highly fragmented, they may have been intentionally broken for marrow extraction. MNI also has potential for bias; however, it is a useful measure to look at the contribution of individual animals to the sample. To prevent overestimation of MNI, this measure was only calculated for the assemblage by site or component, not as provenience subsets (i.e., by unit and feature). In order to assess the overall subsistence pattern of the occupants, relative species abundances were generated by proportion of weight (percent weight), NISP

(percent NISP), and when possible MNI (percent MNI). The relative use of aquatic vs. terrestrial species was evaluated, where appropriate, to elucidate land-use patterns at the site.

Each occupation of the sites investigated was assessed individually using other temporally diagnostic artifacts to determine which occupation deposited the faunal refuse. The composition of the faunal assemblage was analyzed in terms of species class, terrestrial vs. aquatic species utilization, seasonality, element representation, taphonomy, and cultural modification of bones (e.g., butchering marks, burning, and bone tools). In addition, the fish recovered were assessed for species and size composition in an attempt to assess the method and season of procurement. Larger species, such as deer, were assessed for element representation to determine if the entire carcass was brought to camp, or if only certain portions of the animal were consumed there. In addition, life profiles of such species were used to determine if a certain age/sex of a species was targeted, and did this change over time.

Archaeobotanical Analysis

Plant remains are typically recovered from flotation samples obtained from feature and unit contexts. Because of imperfections in flotation recovery methods, the remains are typically present in both the heavy and light fractions of flotation samples. Prior to sorting, the light and heavy fractions from each sample are gently sifted through a nested series of geological sieves (mesh sizes 2mm, 1mm, and 500µm). This procedure facilitates sorting by producing three fragment size classes: larger than 2mm, 2mm–1mm, and smaller than 1mm. Both the light and heavy fractions are sorted separately and data recorded for each. Counts and weights are then combined for presentation and discussion. Typically, 100 percent of the light and heavy fractions from each flotation sample are examined.

All carbonized plant material in the larger than 2mm size screen are sorted, counted, and weighed according to several material classes (e.g., nutshell, wood charcoal, seeds, maize cob fragments, squash rind). Nutshell and seeds are further quantified by genus/species. Carbonized plant materials retained in the 1mm and 500um mesh screens and catch basin are scanned, and any seeds or other plant parts lacking from the larger sorted fraction are removed, counted, and weighed (if appropriate) by taxon and type of material. The combined weight of carbonized plant material remaining in the less than 2mm screens after removal of seeds and fruit rind are estimated based upon random checks of actual weight and are reported as residue.

Randomly selected sub-samples of wood charcoal are analyzed to the finest possible taxonomic level. If there are a sufficient number of wood charcoal fragments, the sub-sample typically consists of at least 20 specimens. For samples containing fewer than 20 specimens, an effort is made to identify all of the wood charcoal fragments. Identifications of plant remains are substantiated using comparative collections. Secondary sources include various identification manuals (Core et al. 1979; Martin and Barkley 2000; Montgomery 1977; Panshin and de Zeeuw 1980; USDA 1974).

Discerning patterns and inferring trends in archaeologically recovered plant remains requires consideration of both non-cultural and cultural factors that influence the content of archaeobotanical assemblages. Plant populations are [were] active participants in the cultural-ecological equation. Plant species, and even individuals within species-specific populations, present some variability in their physiology and behavior/ecology within dynamic local environmental contexts. Phenology and autecology of the various taxa work together to effectively define preferred habitats. Variability in plant physiology and morphology (particularly relevant for our purposes is morphology of annual plant propagules) affect the relative competitive abilities of individual plants within populations and influence the level of availability of species that may become "preferred" by humans.

Cultural patterning of human-plant interaction begins with people's beliefs (Ford 1979:320-323). Consequently, patterning in the archaeobotanical record varies in concert with culturally prescribed activities related to plant selection, collection, processing, storage, and disposal (including subsequent cleaning of cooking facilities, storage pits, and redeposition of debris) (see Hillman 1984; Jones 1984). For open-air sites in mesic contexts, other factors directly affecting interpretation of the archaeobotanical record include the relative preservability of various plant parts, variability in the contexts of carbonization, post-depositional biogeochemical conditions, and the different kinds of methods used for sample recovery/processing (Butzer 1982:114-117; Hally 1981; Lopinot 1984; Miksicek 1987; Munson et al. 1971; Wagner 1988).

Because of the impact of the factors mentioned above on sample composition, density and ubiquity figures are presented in an effort to accommodate the impact of differential preservation and/or use contexts and inconsistent flotation sample size. Density ratios represent an effort to standardize sample data. They are appropriate for the site data because of inconsistent flotation sample size, the presence of differing use/depositional contexts, and the presence of different "categories" of plant remains considered generally equivalent ecologically and/or in terms of depositional and preservation characteristics. Density ratios yield abundance values that allow comparisons of count or weight of a specific plant remain category per volume of processed matrix. This procedure facilitates evaluation of assumptions of uniform deposition, preservation, and recovery. The underlying assumption (assuming consistency in use, deposition, and preservation) is that larger flotation samples will yield more plant remains.

Ubiquity indices represent recognition of the impact of differential preservation on the archaeobotanical record by considering the number of samples in which a taxon occurs within a group of samples. As such, ubiquity scores are comparative and not absolute measures of importance in the assemblage. Since all discernible features within recognized cultural/functional contexts are sampled, sampling is considered adequate.

Pollen Analysis

Pollen represents the cells that carry the male DNA of a seed plant. Microscopic analysis of pollen can be a good tool for examining both the paleoenvironment and cultural records, including evidence of diet and food processing. Pollen are relatively durable in many sediments, as well as in bogs and lacustrine deposits. Tree (arboreal) pollen, which is released several feet above the ground, usually travels well on the wind, providing a record of trees growing in the region. In fact, pine pollen is known to travel up to thousands of miles. Shrubs, which are not as tall as trees, release their pollen at a lower level. Although pollen from some shrubs, such as Artemisia (sagebrush), travels well on the wind, this is due, at least in part, to the fact that it grows in areas where wind movement is not hampered by a dense growth of trees. Grasses and forbs, which grow even lower to the ground, release their pollen relatively close to the ground. Usually this pollen is not as available for wind transport over long distances (tens to hundreds of miles). These are just some of the dynamics that contribute to pollen transport and produce ambient or local pollen rain. Use of pollen as a proxy for past vegetation often provides valuable information concerning the paleoenvironment. Not only can one describe past vegetation, it also is possible to interpret vegetation communities and the associated climatic conditions that might have led to community formation. When interpreted by an experienced palynologist, a stratigraphic pollen record provides information concerning both local and regional vegetation. The pollen record has the potential to inform concerning use of plants that have been processed for food or medicine or any number of other uses. In fact, construction elements of dwellings are sometimes represented in the pollen record, such as use of sagebrush in constructing the superstructure of a house pit. Use or processing of plants as foods or medicines often is well represented in the pollen record. In areas with agriculture, *Zea mays* (corn, maize) pollen

often is noted in samples from floors, niches, benches, storage pits, near hearths, in hearth deposits, and in washes of ceramic vessels and groundstone, to mention but a few locations. Pollen from gathered plants such as *Chenoams*, *Cleome* (beeweed), *Opuntia* (prickly pear cactus), and a large variety of other plants often is either present, or present in an elevated frequency in areas as a result of food processing activities.

One means of identifying food processing areas within any bounded space (structure, room, or patio) is to grid the floor and collect samples from each grid, noting proximity to features. This provides a map of evidence of plant use across the floor. We have found that pollen analysis of compacted floor sediments is more productive than macro-floral analysis, although for floor fill, which is looser, both pollen and macro-floral analyses are productive and complementary.

Phytolith Analysis

Phytoliths are silica bodies produced by plants when soluble silica in the ground water is absorbed by the roots and carried up to the plant via the vascular system. Evaporation and metabolism of this water result in precipitation of the silica in and around the cellular walls. Opal phytoliths, which are distinct and decay-resistant plant remains, are deposited in the soil as the plant or plant parts die and break down. Phytoliths are usually introduced directly into the soils in which the plants decay. Transportation of phytoliths occurs primarily by animal consumption, man's gathering of plants, or by erosion or transportation of the soil by wind, water, or ice. Phytolith analysis can be a good tool for examining both the paleoenvironment and also cultural records, including evidence of diet and food processing. Samples taken from both feature and unit contexts were analyzed. Phytoliths are analyzed by morphometric type and grouped by taxonomic affiliation and also are used as environmental indicators. This set of phytolith samples is used to reconstruct the paleoenvironmental conditions at the site by graphing the relative frequencies of phytoliths representing plant taxa through the stratigraphic column.

The analysis of wood charcoal provides a complimentary data set, but one that is heavily biased by anthropogenic processes. Wood charcoal in cultural features is the result of human selection. In a general way, the wood charcoal provides the means to reconstruct the prehistoric floral environment, but one that is biased by human selection. Pollen and phytolith analysis of stratigraphic samples provide a more complete record of site vegetation. It can also provide an aid in the interpretation of macro-floral data with regard to subsistence strategies.

The pollen and phytolith analysis section also includes the development of a site-specific climatology model based on modern climate data and the paleoclimate work of Reid and Robert Bryson. The pollen and phytolith data from the site are then used to test the model and describe the local vegetation. Synthesis of the pollen and phytolith data and comparison with the model result in a more complete, site-specific paleoenvironmental interpretation. The pollen and phytolith records have the potential to inform concerning use of plants that have been processed for food or medicine or any number of other uses, because the full record of plant use is not preserved as carbonized remains.

In areas with agriculture, *Zea mays* (corn, maize) pollen and phytoliths can be an important part of the record. Maize pollen may be recovered from living and working surfaces, particularly those around the rim of hearths and other food processing features. When maize/corncobs are burned as fuel in hearths there should be a sizeable population of cob phytoliths for recovery. Even more important is recovery of maize/corncob/glume phytoliths from ceramics or groundstone. Recovery of maize/corncob/glume phytoliths from residue that built up on ceramics during their use (some of these appear burned or charred, while others do not) can contribute more than just an identification of the presence of maize/corn. Recovery of maize/corncob/glume phytoliths in a context of food processing often provides a

population of phytoliths that can be imaged and measured. Part of the measurement process includes producing shape data. Since phytoliths represent silica casts of the inside of plant cells, they are considered a proxy for genetic information. Shape is considered to be under genetic control, while size should respond to environmental conditions. We are producing data bases for maize/corn of different prehistoric races in the hope that this data will be useful in identifying transfer of goods and movement of people across the landscape.

Other cultivated New World foods that are noted to produce phytoliths include beans and squash/pumpkin. Beans are particularly difficult to document in the archaeobotanic record. When green beans are processed, dried, stored, or reconstituted later, hook-shaped phytoliths can be recovered. Phytoliths are produced in the rinds of squash/pumpkin, which also can be elusive in archaeobotanical records. Some plants produce calcium oxalate crystals rather than opal silica phytoliths. Examples include *Chenopodium* (goosefoot) greens (also spinach greens), members of the legume family, and others. Plant use for subsistence is not always evidenced in the macrobotanical remains.

The possibility that wild rice was either used or cultivated at these sites may be explored using phytolith analysis. The stratigraphic samples yielded a few phytoliths typical of those produced by wild rice. Since one of the native grasses in the same grass tribe as wild rice has not been examined as a reference specimen, it is not possible to identify the phytoliths as exclusive to wild rice. Examination of this wild grass is recommended. Exploration of the feature record, particularly deep features, as well as the ceramic record for evidence of wild rice processing will further explore the question of whether or not wild rice was exploited by occupants of these sites.

Use of the FTIR (Fourier Transform Infrared Spectrometer) in identifying organic remains adds another dimension to the traditional suite of archaeobotanic analyses. Soaking ceramic sherds in a solvent releases fats, lipids, esters, proteins, carbohydrates, and other organic material. These are recovered and identified through use of the infrared spectrum. A signature obtained that points to the presence of plant or animal fats and lipids. All organic remains are then matched with an extensive library of plant remains, nuts, animal bloods and proteins, and a variety of both raw and cooked foods and condiments. Matches, whether specific to local foods or indicating plants that do not grow in the area, provide some information as to the probable group of plants or animals processed. Each match is evaluated as to whether it is most reasonable to be a good, specific match, or a more general match, indicating type of plant or animal, plant part, or plant or animal family. At present, ceramics are being evaluated to identify the first batch for FTIR testing that will identify foods processed in them. In addition, fill from various features is being evaluated for its potential for FTIR analysis.

Subsistence Questions

The goal here is to collect and interpret data for each site as they relate to diet, subsistence activities, and economic strategies through analysis of feature contents and artifact patterns. Productive avenues of research include:

- Identify the subsistence patterns for each of the time periods represented in the project area, and determine the range of technologies used to procure and process those subsistence resources.
- Determine the relative importance of riverine versus terrestrial resources (including both plant and fauna) for the various temporal components represented in the project area. Assess whether particular landforms were more important. Is resource abundance and predictability related to sedentism?
- Examine possible scheduling associated with the procurement of the various subsistence resources represented in the archaeological record.
- Examine how similar (or divergent) are the archaeobotanical assemblages recovered from features (or cultural horizons) that can

be placed in a temporal framework either by relative or by radiometric means.

- Assess the ecological consequences of the dietary preferences and subsistence strategies of the populations represented.
- Examine the nature of the subsistence shift from the Late Archaic through Late Woodland time span, and determine whether these shifts were dramatic or gradual.
- Determine whether the diachronic shifts in the functional attributes of ceramic vessels, such as wall thickness and temper type, are correlated to corresponding shifts in food storage and processing patterns.
- Determine the extent of resource intensification practiced by Late Woodland groups in the project area, as compared to neighboring groups in western Illinois (i.e., Styles 1981).
- Examine the contribution of native cultigens to the overall diet of Late Archaic through Woodland period groups.

The archaeobotanical and archaeofaunal data will provide another vehicle by which to examine any spatial patterns that are identified. Questions to be addressed might be posed as follows: What botanical or faunal materials are present in the pits? What do these types, and the densities thereof, indicate about the subsistence practices of each site's inhabitants? Are there any differences in the plant and/or faunal remains in terms of the proposed feature types, or in the distribution of those remains across sites? Do certain feature types, or features with similar contents, tend to cluster into identifiable groups? Which resources were of greater importance?

Paleoenvironmental Reconstruction

One of the first steps in understanding the archaeological patterns that reflect human behavior is the identification and understanding of the spatial and temporal patterns of the landscape systems those behaviors occurred in (Bettis, 2003; Bettis and Mandel 2002, Mandel 2006). In regards to paleoenvironmental reconstruction, data that provide information on environmental change will be important. This research utilized faunal, botanical, soil and sedimentological data, along with relative and absolute dating techniques in an effort to recognize the natural and/or human-induced changes in the landscape in the vicinity of the sites. These studies, in turn, provide data about the changing environment through time. Taken together, the data collected from the project provide a paleoenvironmental model for similar settings in the region. Along with the above-mentioned faunal, botanical, pollen, and phytolith data, this research utilizes various sedimentological and soil analyses discussed below.

Sediment Grain-Size Analysis

Grain-size analysis measures the size distribution of the individual particles of sediment of a sediment or soil sample. We use the pipette method to determine the content of sand, silt, and clay in the sample. These determinations allow for accurate comparison of sediment size composition between sediment zones. By interpreting these distributions, sedimentological patterns that affect the disposition of cultural material can be studied. Examples include recognition of sheet wash deposits, flood laminae, and documentation of changes in sedimentation rates. Grain-size analyses also provide insights into post-depositional soil-forming processes that may affect the disposition of the archaeological record and influence interpretations of artifact patterning.

Soil Micromorphology

Intact blocks of soil material from archaeological sites were routinely collected for production of soil thin sections. The thin sections were examined microscopically to determine the arrangement of the various components of the soil matrix. This method of sediment analysis was used to identify buried soils and occupation surfaces and to help document and understand how the post-depositional formation processes have affected archaeological deposits.

The recognition of buried soils within site stratigraphies is an important factor in

landscape reconstruction. Since buried soils represent past stable land surfaces, evidence for human occupation is usually more likely associated with them. The recognition of buried soils associated with significant archaeological deposits will allow for the comparison between different settings within the project area through time, and the assessment of prehistoric cultural patterns associated with these settings.

Soil micromorphology provides another line of evidence, along with sediment grain-size analysis, for the identification of soil formation and sedimentological processes acting on the site deposits. For example, through the study of the microscopic features of the soil, deposits formed in colluvium vs. alluvium should be distinguishable. Combined with the results of other analyses, a better understanding of patterns in the archaeological record can be accomplished.

Carbon-Isotope Analysis

Isotopes are atoms of chemical elements that have nearly identical properties to other elements but differ in atomic weight. For paleoenvironmental studies, carbon-isotope analysis can provide a measure of the past vegetation communities and can contribute to models of climate change. Essentially, carbon-isotopes can provide another alternative (cf. pollen and phytolith analyses) for estimating changes in forest and grassland vegetation at a locality through time. Isotope profiles from stratigraphic columns will further help with the recognition of buried soils and occupation zones while providing fundamental information for the understanding of how climate and vegetation change influenced prehistoric peoples in the area.

Paleoenvironmental Questions

The goal is to interpret data that will describe the temporal and spatial patterns of environmental change within the project area. The following research questions and topics are relevant to this discussion:

- Identify the spatial and temporal relationships between sediments and soils (stratigraphy) for each site.
- Determine if natural and archaeological deposits are differentially but systematically preserved across the project area.
- Identify the factors that are responsible for deposition and erosion of deposits at each site and across the project area. Develop a chronostratigraphy for each site and the project area.
- Date episodes of deposition, erosion, and stability at each site.
- Record the order in which these episodes occurred, as well as the age and duration of each episode, at each site.
- Compare the stratigraphic record between sites and look for correlates.
- Do the AOS data relate to regional patterns of Holocene landscape development?
- What vegetation and climate influences affected the sediment systems within the project area?
- How have regional sedimentation processes affected our perception of prehistoric settlement patterns?
- Do the colluvial-alluvial fans within the project area fit with regional sediment aggregation models? For example, Bettis (2003) notes that aggradation episodes on large fans are generally occurring between 8500–6500 B.P., 6000–4000 B.P., and 3000–2000 B.P., and that small fans only contain deposits dating after 6000 B.P. How does the AOS data compare?
- What are the local patterns of landscape development?
- How has the landscape utilization by prehistoric populations shifted in response to landscape change through time?
- Is there a relationship between fan size and associated drainage patterns within the project?
- How has the distance to the main Mississippi River channel changed through time? Has this affected the

distribution of resources and/or human settlement systems?

- A model of archaeological potential of similar settings in the region should be discernable from the study of such topics as sedimentation rates at the sites, the temporal and spatial occurrence of buried soils across the landscape, and the visibility of archaeological deposits within certain deposits.

Study of Technology

The goals associated with the study of technology were to collect a sample of artifacts sufficient to document the assemblage(s), and adequate to characterize and interpret the range of activities conducted at each site, and to provide intra- and inter-site comparisons to culturally and temporally similar components known from other sites in the region. These goals include:

- Assess the degree to which the Middle Woodland Havana groups in the project area were involved in the interregional exchange of nonlocal items.
- Assess the degree of regional interaction of Late Woodland groups in the project area.

Lithic Artifacts

One aspect of the artifact analysis centered on the lithic assemblages recovered from the various sites. Three fundamental components of the lithic assemblages were analyzed: 1) technological analysis of lithic manufacture; 2) use-wear analysis of modified implements; and 3) stylistic comparison of modified implements. Each of these three aspects of the lithic analysis is discussed below.

For the analysis of lithic debris and modified implements, a paradigmatic classification system (Dunnell 1971:70-76) was used to classify the lithic recovered material. In this form of classification, dimensions, or mutually exclusive features, are recorded for each artifact. Within each dimension are several possible attribute states. Artifact classes can then be formed by the intersection of these attribute states (Dunnell 1971:73). The classes examined, and the detail of the analysis, will depend on the assemblages examined and potential research questions to be answered. This form of classification is preferred over typological formats for several reasons:

1. lithic reduction is a dynamic process, therefore the forcing of lithic material into static 'types' is counter productive to the actual understanding of prehistoric lithic technologies;
2. no a priori assumptions concerning the meaning of the classes, as is common in typological formats, are necessary;
3. mutually exclusive categories are formed;
4. analysis is possible at various levels of detail;
5. classification does not obscure artifact variability (i.e., functional, stylistic, technological, and morphological) to the extent that typologies do; and
6. classification allows for several different analytical techniques to be used, thus allowing multiple lines of evidence for support or rejection of hypotheses generated of the assemblage. This form of classification lends itself to comparisons with other commonly used formats in the region.

In using a classification format as described above, several different forms of flake debris analysis can be examined using the same assemblage. This allows for multiple lines of evidence to be used in the analysis. The use of multiple lines of evidence in archaeological investigations has been suggested as an effective method of strengthening inferences or revealing ambiguities (Binford 1987). The use of a number of attributes and approaches in flake debris analysis will help insure an accurate understanding of prehistoric activities. The type of analysis conducted at individual sites was dependent on the questions to be asked of the data, appropriateness of the method for the data in question, and sample size for analysis. All lithic data was entered into an Access® database table. The lithic table links up with other tables (e.g., feature data, unit data,

provenience information) in the AOS database.

Recent approaches to lithic analysis have examined lithics from an organization of technology approach (e.g., Amick 1987; Carr 1994; Nelson 1991). The organization of technology refers to the manufacture, maintenance, and final discard of lithic implements. This technological perspective calls for a thorough understanding of complete reduction systems or continuums of reduction. These include 1) the selection of raw material, 2) the pre-treatment of the raw material (thermal alteration), 3) reduction of lithic material into modified implements, 4) the hafting of the modified implements, 5) use of the modified implements, 6) rejuvenation or resharpening of the modified implements and 7) the deposition of modified implements into the archaeological record. The ultimate goal of the prehistoric knapper was to create and maintain flaked stone implements intended for many activities such as cutting, projectile penetration, scraping, incising, grooving, and chopping. The manufacture of flaked stone implements correlates with certain cultural and functional needs.

Flake Debris Analysis

Flake debris is defined here as lithic waste flakes that exhibit evidence of intentional removal from a parent piece and exhibit no evidence of further modification or use. Flake debris is a useful indicator of prehistoric site activities because, unlike modified implements, it is usually deposited where it was generated. The analysis of flake debris provides information concerning prehistoric lithic technology and, in conjunction with other analyses, aids in determining site use. Flake debris also occurs in large quantities on most sites making it conducive to statistical analysis.

The manufacture, maintenance, use, and discard of lithic implements are all part of dynamic processes that produce variation within an assemblage. These dynamic processes begin with the acquisition of raw material and continue through the manufacture, resharpening, and final discard of the implement (Collins 1975). Numerous approaches have been proposed for the analysis of flake debris. The determination of the appropriate method or methods to be used depends on the goals and scope of the research and the questions being asked of the data. The focus of the analysis was to 1) provide an inventory of the flake debris represented at the site and 2) provide a basic summary of the portions of the reduction continuum and technologies present.

While flake typologies are still used in many archaeological investigations, there are a number of problems that make the use of these typologies questionable at best. These problems include 1) inconstancies in the definition of each type; 2) flake types are only reliable for complete flakes; 3) type names are often very subjectively defined or not defined at all; and 4) flake types are not always technologically specific and can be produced by several different modes of reduction (Ahler 1989a, 1989b; Bradbury and Carr 1995; Carr and Bradbury 2000; Ingbar et. al. 1989; Sullivan and Rozen 1985). Bradbury and Carr (1995) demonstrated that the use of a common flake typology that used primary, secondary, and tertiary flake types produced results that were not significantly different than a random guess when assessing reduction mode. In addition, comparisons based on these forms of analysis were likely to be inaccurate (Bradbury and Carr 1995).

The flake debris analysis focused on the technological characteristics, such as raw material type and quality, the presence or absence of cortex, type of cortex, platform configuration, flake portion, platform facets, dorsal scars, size and shape characteristics of the flakes, and presence or absence of thermal alteration. Ultimately, the lithic materials are categorized based on technological attributes that reflect how chipped stone tools were manufactured and used. An emphasis was placed on relative percentages or proportions of technologically defined reduction stages that are recognized in the assemblages. These data in turn allow certain inferences to be made regarding human behavior in any given temporal component that is recognized. As

noted above, several forms of flake debris analysis can be examined using the proposed classification system. Two of the more useful and common methods used for the AOS data were Magne's reduction stages and aggregate flake analyses. These are discussed in more detail below. Both of these methods have been shown to be reliable based on the results of an independent assessment.

Magne (1985), building on the work of Collins (1975), used discriminant function analyses to determine which of a number of variables could be used to separate flakes produced by experimental reduction into early, middle, and late stages. Unlike traditional typologies, Magne's stages are explicitly defined and represent mutually exclusive classes. For platform bearing flakes, platform facet count was determined to be the best single attribute. Dorsal scar count was determined to be the best single attribute for non-platform bearing flakes. Magne (1985:120) determined for platform bearing flakes that zero to one facets indicated early stage, two facets middle stage, and three or more facets late stage. In addition, flakes with lipped platforms and three or more facets were the result of biface thinning. For non-platform flakes, zero to one scars indicated early stage reduction, two scars middle stage, and three or more scars late stage. This approach is useful for examining technological characteristics of an assemblage.

Aggregate trend analysis was the second type of analysis used in classifying the flake debris recovered during the AOS project. In the aggregate trend analysis approach, all flake debris is size graded by passing flakes through a series of nested screens of varying mesh sizes—0.64 cm, 1.28 cm, 1.9 cm, and 2.56 cm (0.25 in, 0.50 in, 0.75 in, and 1.0 in) in the current analysis. All flakes were hand manipulated through the screen. If a flake can fit through the mesh in any direction, it is included with the size below. Standard geologic sieves were used in the size grading.

The flakes in each size grade were then counted and weighed and recorded by raw material and provenience (i.e., unit and level). In addition, the number of flakes with two or more platform facets, the number of blocky debris, and the number of flakes with cortex (in any amount) is recorded. Blocky debris is defined as angular flakes with no discernible ventral or dorsal face (also termed 'debris' by Sullivan and Rozen 1985). These are byproducts of the knapping process (i.e., show compression rings) that do not exhibit flake attributes like a platform or termination such that the flake can be oriented and often each of several faces might have been the ventral surface. These are not truncated cores and occur in all size grades from 1 inch to .125 inch. Facets are negative scars on the platform that result from previous flake removals (Magne 1985). Negative scars that are less than 2 mm in size are not counted as facets, as they are most likely the result of platform preparation. In addition, the scar must extend across the entire face of the platform to be considered a facet.

Aggregate trend analysis combines aspects of mass analysis (e.g., Ahler 1989a, 1989b; Ahler and Christenson 1983) and stage analysis (e.g., Magne 1985). Like mass analysis, aggregate trend analysis examines batches of flakes rather than examining attributes of individual flakes. Bradbury and Carr (2004) suggest that several trends can be easily calculated to provide a general indication of the technological make up of an assemblage. These consist of several mass analysis trends and the examination of two other variables. The mass analysis trends are: percent by count of flakes in the .25 inch size grade and the average weight of flakes in the .25 inch size grade (e.g., Ahler and Christenson 1983). The other variables examined are: percentage of blocky debris and percentage of flakes with two or more facets. In short, as reduction continues, the percentage of flakes in the .25 inch size grade increases, the average weight of flakes in the .25 inch size grade decreases, the percentage of blocky debris decreases, and there is an increase in the percentage of flakes with two or more facets. General trends based on an experimental data set are presented in Table 2.3. These can be compared to the

archaeological materials to provide general characteristics of the assemblage.

In addition to these general trends, mass analysis equations can be applied to the data to determine the technological make up of the flake debris (i.e., core reduction, tool projection, or small tool production). As many sites contain flakes that are the product of mixed technologies (i.e., core reduction, tool production), the aggregate trend analysis uses a series of equations derived from an experimental assemblage to determine what percentage of the assemblage is the result of tool production activities. Four equations are run on each flake aggregate. The results of all four equations can be compared to each other. While small errors between the results are expected, large errors indicate problems in the data (Bradbury and Carr 2004).

Because the aggregate trend method examines several characteristics of the assemblage, these can be employed as multiple lines of evidence in the examination of the flake debris. As noted by Magne (2001:23) "Multiple lines of evidence can be more accurate indicators of reduction realities than any single line of evidence is encouraging, since redundant measures, to a reasonable amount, can serve as internal checks to reality." If all of the various lines of evidence point to the same conclusion, then more confidence can be placed in the results. If ambiguous results are obtained, then further investigation into why there are discrepancies is warranted.

Several factors guided the decision as to which flake analysis method to use on each site. Large size assemblages were subjected to aggregate trend analysis because this method allows for high quantities of flakes to be recorded in an expedient manner. Smaller assemblages were typically analyzed using an individual flake method. While two primary methods of analysis were used, the data between the two are comparable, as several of the attributes recorded were the same in each analysis. This allows for compatibility between datasets.

Table 2.3. General Trends for an Experimental Assemblage (Data from Bradbury and Carr 2004).

Reduction Group	Percent 2+ facets	Percent blocky	Ave. Wt. 1/4 inch	Percent Count 1/4 inch
Core	0.9%	15.2%	0.94	60.1%
Bipolar	0.0%	17.4%	0.745	84.6%
Biface Edge	12.1%	1.4%	0.555	83.2%
Biface Thin	26.0%	0.1%	0.348	95.2%
Final Biface	75.0%	0.0%	0.35	100.0%
Uniface	8.3%	0.0%	0.37	97.9%

Modified Implements

Modified implements were classified using a paradigmatic classification system as described above. This system allows modified implements to be analyzed at various levels of detail. Technological attributes form the basis of the classification format and allow technological and morphological attributes to be examined in conjunction with use related attributes as determined from micro-wear analysis. In addition, by examining technological characteristics of the modified implements, a better understanding of the modes of reduction and maintenance of the tool is possible. These technological characteristics can be examined to 1) determine modes of manufacture, 2) determine how differences in site types relates to different technologies, 3) determine if there are temporal differences in the manufacture and use of lithic tools, and 4) use in conjunction with the flake debris analysis to more fully understand the organization of technology.

The use of "functional types" of artifacts (e.g., scraper or preform) is common in archaeology. However, these terms are functionally loaded names and are not based on empirical evidence. As Ahler (1971) demonstrated a number of years ago, artifacts in the same morphological class (projectile point) were actually used for a variety of prehistoric uses (e.g., cutting, boring, or projectile tip). Form does not always equate with function. As another example, the term

"perform" is an often used lithic type that designates a stage in biface reduction prior to the final form. There are several fundamental problems with this. The term "perform" suggests that 1) the implement is not in its final form, 2) the analyst knows what the final form was to be, and 3) that the implement was not used as a tool. None of these can be substantiated. In many cases, these "performs" were actually used as tools, and many were hafted (e.g., Bradbury and McKelway 1996; Odell 1980; Shott 1995). In addition, Young and Bamforth (1990) have demonstrated that without the aid of magnification, identifying between used and non-used specimens from an experimental collection was highly prone to error (25 percent correct classification for 9 different individuals). For the above reasons, tool use will be assessed using micro-wear analysis, if appropriate (see micro-wear discussion below).

Modified implements are defined as chipped stone artifacts that have evidence of further modification and/or use. Cores are defined as nodules or blocks of cherts that have negative flake scars (previous flake removals) across at least one face. Eight attribute dimensions were recorded for all modified implements and cores and seven additional dimensions and cluster associations were recorded for all hafted bifaces (e.g., classes 204-3.2, 204-4.2, 204-5.2, 204-4.5). Metric attributes were recorded for all artifacts that were complete enough to allow it. Modified implement and core classes were formed by the intersection of attribute states (e.g. Dunnell 1971). For these analyses, generalized modified classes are defined by the intersection of attributes from dimensions 1 through 3. For example, class 204-1.1 is defined as all modified implements that exhibit bifacial modification that was produced with a hard hammer.

Cores (class 106) and Core Tools (class 206)

Cores (class 106) are defined as nodules or blocks of cherts that have negative flake scars (previous flake removals) across at least one face. Core tools (class 206) are cores that show evidence of use other than as a source of flakes. For cores and core tools, flaking orientation is the main attribute recorded. Flaking in one direction from a single margin is classified as unidirectional (106-2 or 206-2). Bidirectional flaking is described as flake removals from two directions, but not bifacial (106-7 or 206-7). Multidirectional cores (106-6 or 206-6) have random flake removals from several directions. Other analysts have also referred to these as amorphous cores (e.g., Faulkner and McCollough 1973:80; Johnson 1986). Flake removals that form a bifacial margin are termed bifacial (106-3 or 206-3). The edge angles on these specimens are greater than 60 degrees. Cores that are conical in shape with flake removals in one direction (106-5 or 206-5) are termed unidirectional subconical (i.e., blade core). Bipolar cores (106-4 or 206-4) are those that exhibit evidence of bipolar reduction techniques. Such cores often exhibit evidence of force being applied from two opposing faces and crushing along the striking platform. Indeterminate orientation is reserved for fragmented cores (106-1 or 206-1) where the flaking orientation was not determinable.

In addition to the primary attribute of flaking orientation, a secondary attribute was recorded. Each specimen is identified as core (.3), core fragment (.2), or tested cobble (.1). Simply defined, cores have in excess of three flake removals, tested cobbles exhibit three or fewer flake removals, and core fragments are portions of cores that have been truncated.

Retouched Flakes (class 201)

Retouched flakes are defined as flakes that have one or more uniform removals from at least one edge or that exhibit a ground or crushed edge. These specimens generally do not show signs of intentional shaping or systematic flake removals. For these specimens, basic data concerning the form of retouch is recorded in the following ways: unifacial only (201-1), mostly unifacial (201-2), bifacial (201-3), or alternate unifacial (201-4). While the term "utilized flake" is still used by some analysts, it is not employed here. This is due to problems in identifying a used edge

without the aid of magnification (see Young and Bamforth 1990; Odell 1996 for a more in depth discussion of this problem). Simply stated:

1) Trampling and other post depositional processes can mimic use-wear.
2) Implements used on soft resistance materials (e.g., meat, hides, vegetal matter) exhibit damage that can only be seen under higher magnifications (often in excess of 40x).
3) With retouched flakes, the used edge is often not the edge that was retouched.
4) Without the aid of magnification, the identification of used edges will likely be biased towards those implements used on harder resistance materials (i.e., bone, antler). The identification of use-wear should not be conducted without the aid of a microscope.

Unifacial Implements (class 208)

This class is made up of implements that were predominantly manufactured by the removal of flakes in a unifacial fashion. Minor amounts of bifacial retouch can be exhibited on some specimens. The bifacial retouch is generally conducted to facilitate hafting. Unlike retouched flakes, unifacial implements exhibit systematic flake removals. Basic data concerning the location of retouch/morphological type is recorded in the following ways: retouch on the side (side scraper, class 208-1), retouch on the end (end scraper, class 208-2), and retouch on the end and side (disto-lateral scraper, class 208-3).

Bifacial Implements (class 204)

Biface reduction is viewed as a continuous process of reduction. A biface may have been taken out of the reduction sequence at any stage and used for a specific task; after use, it may have reentered the continuum and been further reduced. Bifacial reduction usually started with hard hammer percussion followed by soft hammer percussion. Pressure flaking was used for final shaping and haft modification (Johnson 1981) and to prepare striking platforms for the removal of large flakes during biface thinning. A generalized model of biface production is depicted in Figure 2.1.

The terms hard and soft hammer percussion are used in this analysis to reflect the form of flake scars present and not necessarily to determine the type of percussor used to detach the flake. Hard hammer scars exhibit prominent negative bulbs of percussion, usually circular in shape, and are relatively narrow and deep. The biface exhibits high intersecting ridges between flake scars and an irregular bifacial margin. Soft hammer scars are defined as flake scars that have small negative bulbs of percussion, are relatively shallow and broad, and often leave ripple marks in the negative flake scar. The biface usually has a regular bifacial margin, and the ridges between flake scars are not as pronounced as they are on bifaces with hard hammer scars. Retouch scars are defined as flake scars that have small negative bulbs of percussion and are usually small, shallow, and restricted to the edge of the implement. Hard hammer flakes are associated with early stage reduction. Soft hammer flakes and retouch flakes are associated with late stage reduction. Note that in some cases, bifaces (especially class 204-1.1) may have been used as cores (e.g., Kelly 1988).

Generalized biface classes are defined by the type of flake scars present. The general classes are 204-1 (hard hammer scars only), 204-2 (hard hammer and soft hammer scars), 204-3 (soft hammer scars only), 204-4 (soft hammer and pressure scars), and 204-5 (pressure scars only). An indeterminate class, 204-6, is used for those implements that cannot be assigned to one of the above classes, typically small fragments.

In addition to these generalized classes, a further breakdown describes the general morphology of the specimen. These descriptions correspond to traditional typological designations. The morphological classes are .1 (biface), .2 (hafted biface), .3 (drill), .4 (hafted biface reworked into a drill), .5 (hafted biface reworked into a hafted scraper), and .6 (hafted biface reworked into a boring implement).

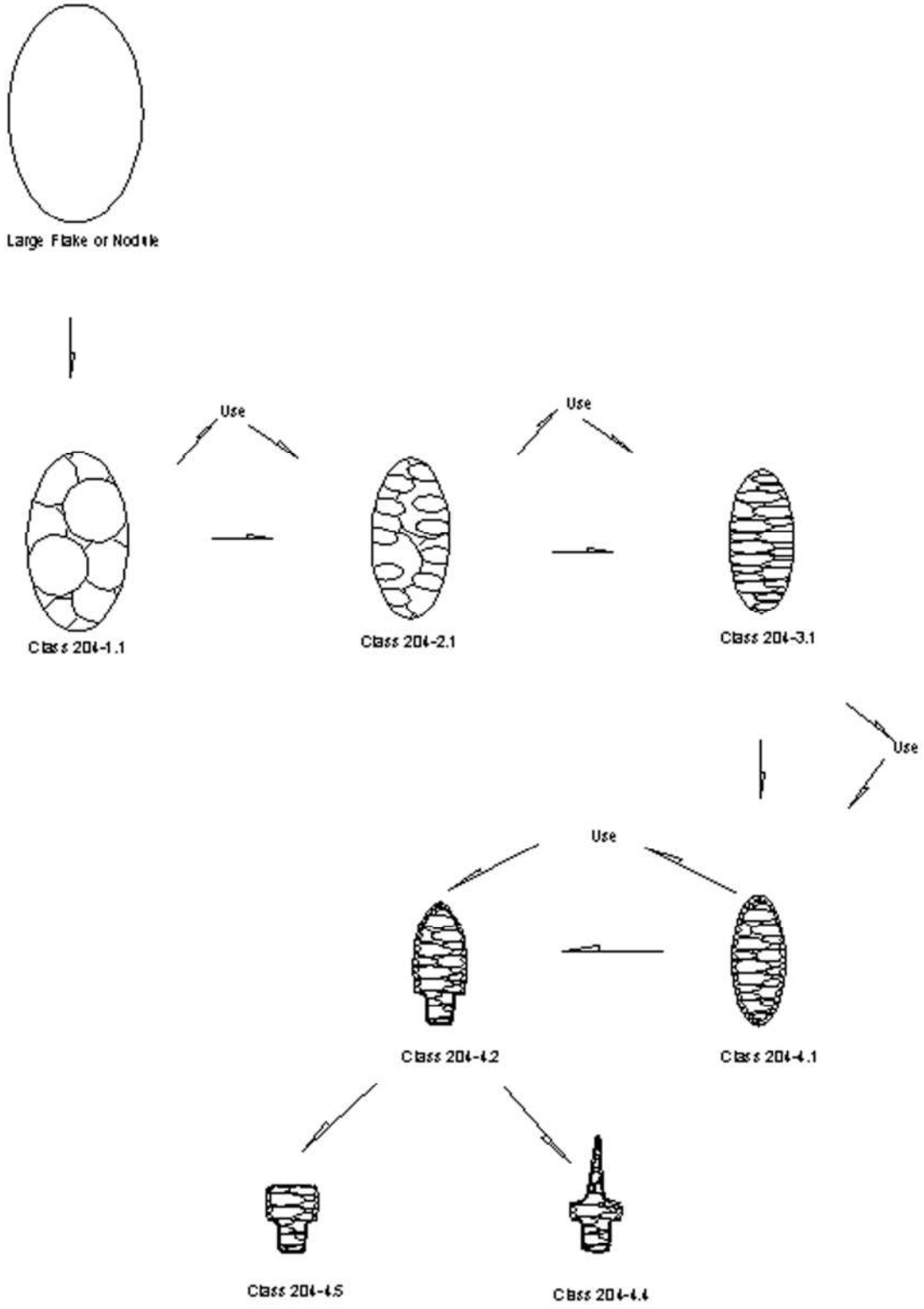

Figure 2.1. Generalized biface production model.

Using the above designations allows for finer descriptions of the implement. For example, class 204-4.5 defines a hafted bifacial implement that has been worked into a scraper. The implement was manufactured using soft hammer and pressure flaking techniques. Class 204-3.1 defines a generalized bifacial implement manufactured using soft hammer percussion techniques.

Hafted Bifaces

All hafted bifaces (classes 204-3.2, 204-4.2, and 204-5.2) recovered from the project were identified as to traditional cluster name when possible. In most cases, no attempt was made to separate any of these implements into individual type names within the defined cluster. In most cases, defining individual types within a cluster does not provide any additional information beyond that of the cluster definitions. Many traditional "types" have been shown to be the result of resharpening and reuse of a general morphological "type" (e.g., Goodyear 1974; Hoffman 1985). In addition, several researchers (e.g., Flenniken 1985; Flenniken and Raymond 1986; Titmus and Woods 1986; Towner and Warburton 1990) have demonstrated that hafted biface morphology can change with use and subsequent resharpening. Cluster names are used in this report only as a general means of description and relative temporal placement. It is recognized that the clusters represent analytical units created by archaeologists, not empirical units.

Cobble Tools (Class 205)

This class of tools consists of cobbles that exhibit evidence of use but that were not manufactured. Use-wear on these implements ranges from battering around the edges to pits on one or more face. These implements can be curated tools, such as quartzite hammerstones, or they can be stones from the immediate environment with no particular qualities other than a convenient size or shape to be of use in a simple task (e.g., anvil stones or grinding slabs). Attributes recorded for cobble tools include the type of wear (pits, battering, grinding), general location of wear, and the number of faces or facets exhibiting wear.

Ground Stone Implements (class 203)

This class includes artifacts that were manufactured using predominantly pecking and or grinding methods.

Minimum Analytical Nodule Analysis and Refit Analysis

The term "minimum analytical nodule" (MAN) refers to the grouping of chipped stone artifacts with related raw material characteristics (Larson 1994; Larson and Kornfeld 1997). These characteristics include fossil and other inclusions, texture, cortex characteristics, raw material color, mottles, and other identifying attributes. These aggregates of artifacts should be viewed as analytical groups, not necessarily reflecting the actual number of nodules. These analytical groups can help interpret the vertical distribution of the assemblage and account for the nonhuman, post-depositional, processes which have formed it, as well as lead to inferences regarding onsite behavior and technological organization (Larson and Kornfeld 1997:10).

The first step of minimum analytical nodule analysis (Larson 1994; Larson and Kornfeld 1997), involves recording and comparing specific characteristics of the material (e.g., inclusions, coloration, or fossils) within the assemblage, looking for intra-raw material similarities. Essentially, MAN attempts to find "the pieces in a nodule [that] share a specific constellation of features that differentiate these pieces from others of the same raw material type" (Larson and Kornfeld 1997:4).

The second stage of this analysis consists of attempting to identify refits between items within each of the identified nodules. The specifics of the refit analysis followed that of other such studies (e.g., Cahen et al. 1979; Hofman and Enloe 1992, T. Morrow 1996). Essentially, the first attempts at refitting start with trying to refit flakes within a reduction stage of the same chert type from the same

unit/level. Once all of the flakes have been tested for refits within the same level, adjacent level refits are attempted. The analysis then proceeds to refitting materials from adjacent units. Tools and cores were also pulled and used in the refit analysis. Once all materials from a unit have been tried for refits, the analysis proceeds to the next unit. All artifacts being examined in the refit analysis are laid out so that they can be easily observed. Each time an item is refit to another item, it is termed a case. If an additional item can refit to the original case, it is included within the same case. The final stage of the analysis entails testing all materials within a MAN for refits and attempting to refit other items to cases identified in the first analysis.

The vertical distribution of artifacts from a MAN throughout the site stratigraphy can be used as an indicator of natural site formation processes. Similar to refitting, the degree of separation between artifacts within a MAN acts as an indicator of the extent of post-depositional processes acting on the archaeological deposits (e.g. Villa 1982). For example, a greater degree of vertical separation of related artifacts from a MAN suggests a greater amount of natural movement through such action as bioturbation. Horizontal separation of a MAN or refits suggests possible behavioral indications. That is, a refit between a core and a flake some distance away suggests that the flake may have been used at a location other than where it was produced, or that the core is being moved around the site. In contrast, a refit between a flake and a core within the same unit suggests a different set of behaviors.

As a means for inferring activities associated with the site, the relationship between core, tools, and flakes within each nodule is studied (Hall 2004:140; Larson and Kornfeld 1997:10). Site activities can be inferred from the classification of MANs into one of two basic types: single or multiple item nodules, and by noting the presence or absence of tools associated with the nodule. For example, a single tool or flake representing one MAN would suggest offsite tool production and onsite tool use or maintenance. Several flakes and tools associated with a nodule would suggest onsite tool production, maintenance, and use. Several flakes without tools would further suggest onsite tool production or maintenance but offsite tool transport. An understanding of the available time and intended use of the material can be further derived from identification of the type of nodule(s) represented (Larson and Kornfeld 1997:12-14). For example, in the case of a short occupation in which future activities are unpredictable, little evidence of tool production should be evident in the nodule, and onsite tool use would be prevalent.

Micro-wear Analysis

A sample of modified implements recovered from the AOS sites were examined for indications of micro-scarring. Two main forms of micro-wear analysis are common in the analysis of lithic implements: low magnification (e.g., Odell 1977, 1979; Odell and Odell-Vereecken 1980; Tringham et. al. 1974) and high magnification analyses (e.g. Keeley 1980). The strengths and weaknesses of both methods have been discussed in detail elsewhere (e.g. Odell 1996); therefore, they will not be reiterated here. Based on the goals of the analysis and the data sets in question, the low magnification approach was chosen for analysis of the AOS materials.

Assessment of artifact use is only appropriate through use of microscopic examination. There are several main reasons that some form of magnification is necessary. The use of “functional types” of artifacts (e.g., scraper, or preform) is common in archaeology. However, these terms are functionally loaded names and many times are not based on empirical evidence. As Ahler (1971) demonstrated a number of years ago, artifacts in the same morphological class (projectile point) were actually used for a variety of prehistoric uses (e.g., cutting, boring, projectile tip). Form does not equate with function. As another example, the term “perform” is an often-used lithic type that designates a stage in biface reduction prior to the final form. There are several fundamental problems with this

designation. The term "perform" suggests that 1) the implement is not in its final form, 2) the analyst knows what the final form was to be, and 3) that the implement was not used as a tool. None of these can be substantiated. In many cases, these "performs" were actually used as tools, and many were hafted (e.g., Bradbury and McKelway 1996; Odell 1980; Shott 1995).

A study by Young and Bamforth (1990; also see Odell 1996:24 for similar comments) demonstrated that without the aid of magnification, identifying between used and non-used specimens from an experimental collection was highly prone to error (average 25 percent correct classification for nine different individuals). In addition, scarring on tools used on soft materials (e.g., plant and animal materials) does not show evidence of use except under higher magnification, often in excess of 40x. Scarring produced through post depositional processes (e.g., trampling, screen wear, excavation damage) may often be indistinguishable from that produced during the use of the tool without the aid of higher magnification (greater than 10x).

Micro-wear Methods

In the low magnification micro-wear approach, micro-scarring on the edges of lithic implements was examined to determine 1) if the implement was used, 2) the area of use, 3) the material being worked, 4) and the motion of use relative to the working edge. The specific methods used for this analysis follow that of other practitioners of the approach (e.g., Odell 1977, 1979; Odell and Odell-Vereecken 1980; Tringham et. al 1974). For the current analysis, a Wolfe stereoscopic microscope with a reflective light source was employed. The microscope was fitted with 20x eyepieces and 4.5x paired objectives. The magnification was continuously variable and ranged between 14x and 90x. Implements were generally scanned for evidence of wear at 14x. If no wear was observed, the magnification was increased to 20x and the piece scanned again. Magnification was then increased or decreased as needed to view any observable edge damage more clearly.

The unit of analysis is the artifact edge or what has been termed "functional unit" (e.g., Knudson 1973). Each edge of a specimen is considered separately when conducting the analysis. This allows one to account for multiple instances of use on a single specimen.

The low magnification approach does not allow for the determination of the exact material (e.g., dry antler, soft wood, meat), as is the case for the high magnification approach. Instead, worked materials are categorized as to resistance of the material (i.e., hard, medium, or soft). Hard resistance materials consist of materials such as bone, antler, and stone. Medium resistance materials consist of materials such as wood and soaked antler. Soft resistance materials include such materials as meat, hides, and vegetal matter. The advantage of the low magnification approach is that it is less time consuming, so a greater number of specimens can be examined.

The determination of what the observable wear represents in terms of prehistoric use is made through the combination of attributes. Examples of these are provided in Table 2.4. Variables such as scar form, scar size, and edge shape are useful for determining the resistance of the worked material. Rather than specify what activity created the wear (e.g., cutting, scraping), for this analysis edges of the implement in question were examined to determine the motion of the tool in relation to the worked material. In other words, it may be determined that a tool was used in a motion longitudinal to the working edge. This motion includes such activities as cutting, sawing, and slicing. Motions that are lateral to the working edge include such activities as drilling or boring. Scars associated with this motion are generally visible on the sides and tip of the implement. Motions longitudinal to the working edge include activities such as cutting and sawing. Scars are generally visible on the edge of the tool and on both faces. Motions transverse to the working edge create wear on one edge of the tool. These include activities such as scraping and planing. Direct motions are straight on the working edge and include activities such as projectile and hard hammer percussion.

Several non-use related wear patterns were also distinguished. These consisted of haft wear, edge grinding, and prehension. Edge grinding, also termed technological wear, is related to abrading the edge of a tool either to dull the edge for hafting/hand holding, or in platform preparation. Prehension wear results from a tool being hand held. This includes holding the tool in a bare hand or with a leather pad. Scars resulting from prehension occur on the edge or face of a tool depending on how it was held and how much pressure was exerted (see Odell and Odell-Vereecken 1980:102-109 for more detailed explanations). Typically, such wear patterns appear as aggregate bunches of feather terminations or the rounding of flake ridges on the face of the implement. Haft wear results from an implement being hafted. Such wear patterns usually appear as rounded flake ridges on the face of an implement towards its proximal end.

Goals of Lithic Analysis

The goals of the lithic analysis were to 1) provide information concerning the lithic technology utilized by the site inhabitants; 2) examine site use as indicated by the lithic artifacts; and 3) provide inferences concerning occupation intensity for the sites under investigation.

The technological analysis of the flake debris and modified implements was completed in order to compare the lithic reduction technologies represented by the temporal components encountered and to determine similarities and differences between the different sites and components of each site. The lithic analysis focuses on examining the technological origin of flake debris, the differential usage of various raw material types, and conducting a technological analysis of the modified implements.

Table 2.4. Combinations of Attributes Used to Define Use-Wear Classes.

Motion	Resistance	Wear Pattern	Edge Shape	Scar Form	Scar Size	Examples
lateral	soft	bifacial/facial	point	feather	any	boring, drilling
		bifacial/facial	point	scalar	small	
	medium	bifacial/facial	point	scalar	medium	
		bifacial/facial	point	scalar	large	
	hard	bifacial/facial	point	step	any	
longitudinal	soft	bifacial	straight	feather	any	cutting, sawing
		bifacial	excurvate	scalar	small	
	medium	bifacial	straight	scalar	medium	
		bifacial	excurvate	scalar	large	
	hard	bifacial	straight	step	any	
		bifacial	excurvate	step	any	
longitudinal/transverse	soft	bifacial	point	feather	any	graving
		bifacial	point	scalar	small	
	medium	bifacial	point	scalar	medium	
		bifacial	point	scalar	large	
	hard	bifacial	point	step	any	
transverse	soft	unifacial	straight	feather	any	scraping, planing
		unifacial	straight	scalar	small	
		unifacial	excurvate	feather	any	
		unifacial	excurvate	scalar	small	
		unifacial	incurvate	feather	any	
		unifacial	incurvate	scalar	small	
	medium	unifacial	straight	scalar	medium	
		unifacial	straight	scalar	large	
		unifacial	excurvate	scalar	medium	
		unifacial	excurvate	scalar	large	
		unifacial	incurvate	scalar	medium	
		unifacial	incurvate	scalar	large	
	hard	unifacial	straight	step	any	
		unifacial	excurvate	step	any	
		unifacial	incurvate	step	any	
direct	any	facial	point	snap/step	any	projectile
		facial	excurvate	step	hard	chopping, pounding

The lithic data is also used to examine site function and type as presented above in the Settlement Systems Section. The results of the lithic analyses are best viewed in conjunction with the results of the analysis of other artifact classes (i.e., ceramic, botanical, and faunal) represented at a site and the distribution and correlation of these classes across the site. The presence of formal features and structural information, or lack thereof, also provides additional means of evaluating the results of the various analyses.

Bias in classification has been noted as a potential problem by a number of researchers (e.g., Beck and Jones 1989, Fish 1978; Whittaker et al. 1998). Given that several different analysts examined lithic data from different sites, some measure of control was needed to insure that all data derived from these analyses were compatible. As the AOS materials were being classified, if an analyst was not 100 percent sure on the classification of an artifact, at least two other analysts examined that artifact to come to a consensus on classification. Random artifacts were also selected and shown to all of the other analysts to insure that all were classifying the materials the same way. In addition, one analyst (Bradbury) randomly checked materials classified by others. Any discrepancies were discussed with the original analyst. It should also be noted that all of the analysts have worked together at CRAI for several years and regularly compare their classifications with each other. These steps reduce the potential biases in the analysis.

Lithic Questions

- Examine the technologies of flaked stone tool production to assess their temporal and geographic variation within the project area.
- Examine the groundstone technology and assess temporal and geographic variation within the project area.
- Identify the various lithic raw materials used for tool production and identify temporal and geographic variation in the use of these resources during the prehistoric sequence present in the project area. Do assemblages associated with earlier groups exhibit a greater use of nonlocal sources than later groups?
- Assess the overall relationship between stone tool morphology and corresponding function using both macroscopic and microscopic techniques, including use-wear analysis.
- Examine the spatial patterning of lithic artifacts in order to assess the function of intrasite activity areas.
- Identify the relative importance of local versus nonlocal lithic raw material resources within the project area, and identify diachronic shifts in the proportions of these resources. Are “blue-gray” cherts represented in Middle Woodland components as they are elsewhere in the Midwest during this period?
- Provide inferences concerning relative occupational intensity and use at each site.
- Assess local lithic raw material procurement within the project area as it relates to workshop/quarry sites. Were cherts being procured from primary or secondary contexts?
- Elsewhere in Missouri, hafted bifaces of the Lowe cluster are common early in the Late Woodland sub-period, while later in the sequence Scallorn clusters are more common. Triangular types (e.g., Madison, Hamilton) are generally lacking. Is this same sequence evident in the AOS data? Are triangular forms present in Late Woodland assemblages from AOS?
- In the Illinois Valley, Odell (1996) noted a gradual decrease in bifaces and an increase in flake tool use and blade use only during the Middle Woodland period. Are similar patterns evident in the AOS data sets?
- In conjunction with the above, Parry and Kelly (1987) suggest that as a response to a decrease in mobility there is an increase in expedient core technology. Does such a pattern exist in the AOS data? That is, do the Late Woodland components exhibit a greater use of expedient core technology than Archaic components?

Prehistoric Ceramic Artifacts and Analyses

The analysis of prehistoric ceramics from the AOS project was guided by a series of variables that were recorded for each sherd. Variables ranged from descriptive characterizations to more detailed metric analyses. Variables recorded are described in greater detail below. When applicable, the description of each variable or category includes clarifications, sub-categories, methods employed, and operational techniques. As will become evident, both typological and attribute based analyses will be employed for the AOS ceramics.

Analytical Procedures

After the excavated materials were washed, sherds and other ceramic objects (including burned clay) were segregated for analysis. All sherds recovered, regardless of context (features vs. test units) were included in the analysis, although only sherds larger than 2 cm in diameter were included in the detailed analysis. All rims and decorated sherds, regardless of size, received further analysis. Vessel fragments smaller than 2 cm in diameter (referred to as sherdlets), with the exception of rims and decorated sherds, were counted and weighed by temper type but not otherwise analyzed. Burned clay and daub, when present, was separated, counted, and weighed. Vessel fragments too severely worn or damaged by natural or cultural factors were sorted by temper, counted, and categorized as eroded.

Cataloging of Ceramic Assemblage by Type and Attribute

Access® was used to create a database for the ceramic analysis. The ceramic table links up with other tables (e.g., feature data, unit data, provenience information) in the AOS database. The database was designed to accommodate both typological classifications and attribute-based analyses. For example, the analysis of Havana-Hopewell sherds from Site 23LE348 south used the existing Middle Woodland typology developed by Griffin (1952a), since most researchers have used, and are still using, his typology. The importance in maintaining Griffin's typology is that our results remain comparable to the research of other analysts who have conducted work in the region, making broader cross-site comparisons more meaningful. AOS analysis, however, diverges from Griffin's typology by not using his variety categories. This choice was made since "variety" has been variously defined and used by previous researchers. For example, some researchers use variety based on geographical variables, while others use variety to mark decorative or technological differences. Also, varieties tend to obscure or conflate possible variation in ceramic design over time since only a few traits are defined or used for the establishment of that variety. Instead, variety is replaced by attribute analysis, which supplies a much firmer basis for noting decorative or technological difference and also allows for greater chronological control of change over time.

The attribute-based analysis, on the other hand, tends to be site or project specific and is particularly useful for prehistoric cultural sequences that do not have well established ceramic typologies. Attribute-based analyses have proven useful in Late Woodland assemblages where highly decorated sherds are largely missing, making discrete types harder to identify. The attribute-based analysis was used at Late Woodland Sites 23LE178/357 and 23CK57 from AOS. Variables used in the attribute analysis include wall thickness, temper type, decoration type, and rim orientation, among numerous other variables.

This "hybrid model" for recording the ceramic assemblages at AOS thus fulfills numerous roles. Griffin's typological approach allows for the Middle Woodland ceramics at AOS to be meaningfully compared to other sites within the region. The attribute-based analysis allows for tighter control of technological and decorative variation of Middle Woodland sherds than strict use of "varieties" would have permitted. The attribute-based analysis is also well suited for the Late Woodland assemblages, where types

are not as defined or as often used, since decorative traits are rare or often lacking. However, when applicable, attempts are made to compare Late Woodland types from around the region in order to better evaluate the AOS material, (e.g., Graham Cordmarked, South Branch Net Impressed, and Weaver Plain, to name a few).

Quantification of Ceramic Assemblage Size

Quantifying the size of the ceramic assemblage at the AOS sites employs two main approaches. The first approach was simply a direct count of body and rim sherds excavated from all contexts at the sites. A systematic attempt will also be made to refit rims from across the site. In circumstances of refits, the refitted sherds will be counted as a single case. When body sherds can be refitted with a rim, the resulting single case is counted as a rim.

The second approach at quantifying the AOS ceramic assemblage was through a minimum number of individuals (MNI) program. For this study, the following procedure was employed. Each distinctive rim sherd from a provenience was given a separate vessel number. Rim sherds from across the site that could be refitted or intuitively related to the same vessel were designated with the same vessel number.

Temper and Natural Inclusions

Temper was used in the present study to refer to those aplastic materials intentionally added to a ceramic paste to enhance workability (Rice 1987:406-408). Inclusion refers to those substances that were natural to the clay source from which the clay was extracted to manufacture the vessel. Temper/inclusions were examined for each sherd (including the sherdlets) with a variable binocular microscope. Tempers identified in the current AOS assemblages included grog, sand, limestone, or crushed rock (grit-igneous or metamorphic). In cases where combinations of certain temper types occurred, for example limestone and grog, the percentage of each was recorded.

For the purpose of this analysis, the limestone category may actually include limestone, dolomite, or both. A distinction between limestone and dolomite was not attempted in the present study, given the inherent difficulties of differentiating the two short of petrographic or chemical analyses. This was especially the case when the most visually distinctive characteristic of dolomite, the saddle-shaped crystals, was not present, or, if present, not identifiable.

Attributes recorded for temper, other than type, consist of the percentage of temper in paste, roundness or sphericity of grains, degree of sorting, size and presence of natural inclusions.

Exterior and Interior Surface Treatment

Surface treatment is a non-decorative descriptive variable used to record how the vessel was modified during the construction of the pot from clay. These construction techniques often involved the use of paddles and anvils that were wrapped in some type of cordage (netting) or left plain. For this reason, the exterior of vessels often have the impression of the material that the paddle was wrapped around. The major exterior surface treatment categories for the ceramic assemblage at AOS were cordmarking, plain surfaced sherds, and net impressed sherds.

As noted earlier, sherds severely worn by erosion were classified as “eroded,” since the correct surface treatment category was not ascertainable. When possible, impressions or casts of cordmarking and net impressions were made for each sherd with modeling clay. Cordage-attribute data recorded with these casts included twist direction (S-twist vs. Z-twist), twist per centimeter or level of tightness (angle of twist), cord width, and orientation to lip. Level of tightness was modeled on Drooker (1992:39–52) and Minar (2001:94–113). Cordmarked sherds generally exhibit either a closely spaced, often-overlapping vertical or oblique pattern extending from the rim to the base of the vessel.

Plain surfaces in Woodland contexts in eastern Missouri include both smoothed-over-cordmarking and true plain-surfaced vessels. When possible, a distinction between smoothed-over-cordmarking and plain sherds was made. For example, smoothed-over-cordmarking (e.g., some Havana Cordmarked sherds), which results from an intentional act, was generally identifiable by the presence of residual cord impressions that had not been completely scraped down by the potter. In many of these cases, the residual cord impressions were barely visible except through angled lighting. True plain-surfaced sherds, on the other hand, never had an exterior surface treatment and were manufactured with the intent of having a blank or unmodified exterior.

Net-impressed sherds, the majority of which are assignable to the South Branch phase, were common at numerous sites from the project area, including 23LE178/357, 23LE174, and 23CK57. These early Late Woodland sherds have been documented on the Illinois side of the Mississippi River in and around the Bear Creek drainage (Green and Nolan 2000). Nolan (2001:7-8) indicated that this surface treatment was the product of two different construction techniques. The first is the use of net wrapped paddles that were used to thin the vessel walls to the desired thickness while the clay was still malleable. This process of forming a vessel often leaves numerous overlapping net patterns across the entire exterior of the pot (referred to as South Branch Net Wrapped Paddle). The second technique, which is referred to as South Branch Net Impressed, is a process that involves using a net-lined cavity and impressing the clay or pot into the cavity while forming it. This typically creates a single (non-overlapping) net pattern across the exterior of the vessel.

Vessel Morphology

Vessel forms at AOS mainly ranged from large to small jars, although a few possible bowls were identified from some sites. Jars tend to have restricted orifices and a height greater than their maximum diameter (Rice 1987:216-217). Bowls, on the other hand, may have restricted or unrestricted orifices and have a height anywhere from one-third to equal its maximum diameter (Rice 1987:216-217). The presence of bowls in assemblages throughout the project area was identifiable by the lack of an inflection point between the shoulder and lip of the vessel. These vessels also exhibit a maximum orifice diameter at the lip or rim of the vessel.

Vessel morphology consists of three main components: orifice, body, and base. Body sherds, consisting of that portion of the vessel between the orifice and base, are typically not very useful indicators of vessel form, especially given small sherd size. Bases provide some insights into vessel form, especially when large sections of the base are present and measurable—for example, the flat bases of many Havana Plain and Cordmarked vessels.

The best indicator of vessel morphology is the orifice, with the primary characteristic being the orifice to body orientation (incurved, everted, and vertical). Incurved vessels have restricted orifices that consist of rims with a diameter less than the maximum diameter of the vessel, creating a coconut-shaped morphology. These types of vessels (jars) are more common in Late Woodland assemblages. Everted or recurved vessels (generally jars) are generally unrestricted rims whose orifice diameter is equal to or greater than the maximum vessel diameter. Variation in the recurvature angle produces a series of subtle morphological differences ranging from prominent shoulders to gradual or weakly defined shoulders. Although these criteria are often difficult to employ when only using sherds, such determinations are possible if sufficient amounts of the vessel body are still attached to the rim area. Another category common in Late Woodland assemblages is rims that are more vertical (straight) than incurved or everted.

Exterior Body Decoration and Upper Rim Decoration

Exterior body decoration tends to be absent on Late Woodland ceramics from

eastern Missouri, while Middle Woodland assemblages usually have a much higher percentage of such sherds. Middle Woodland sherds exhibit Havana and Hopewell decorative characteristics, including zoning, dentates, noding, incising, cross-hatching, stylized bird representations, punctations, stamping, cord wrapped stick impressing, and brushing (or combinations of these characteristics). As noted earlier, many of the highly decorated sherds have been typed using Griffin's typological classification system. These same types were used in the current analysis. In addition to types, further recordation of stylistic variables was conducted using the attribute-based analysis, including spacing among decorative modes and width of decorative mode, among others. The added detail should provide the needed information for identifying possible changes over time. The recording of decorative elements in the Late Woodland assemblages will be largely based on attribute analysis, since formal types are rarer in such contexts (due to lack of highly decorated sherds).

Secondary Orifice Attributes and Decorative Elements

Secondary orifice attributes consist of lip treatment or decorative categories. The lip area is the edge of the rim of the vessel. The rim is defined as the area between the change of orientation of the lip and the side or neck of the vessel (Rice 1987:214). Lip treatment attributes are modifications made to the edge of the rim that are not considered to be decorative in function. Such categories will include squared, rounded, tapered, interior bevel, flattened, and Brandenburg, among others.

Other modifications made to the rim area include cordmarking on the superior portion of the lip. Decoration on the superior lip refers strictly to the top of the lip with no indication of interior or exterior intent. Another decorative attribute often present within the assemblage should include notching or slashing on the interior or exterior portion of the lip.

Notches tend to be applied with a broad dowel usually perpendicular to the rim, producing a U-shaped impression. Slashing, on the other hand, is made with a narrower tool in the same manner, producing a more V-shaped impression. Some dowels may have had cordage twisted around their shafts.

Wall Thickness and the Ceramic Chronometric Method

All rims, decorated sherds, and body sherds larger than 2 cm in maximum length were measured using digital calipers. Measurements (mm) were taken along three edges of each body sherd, with the range and mean being recorded. Wall thickness for rims was measured on the lip. Wall thickness was recorded since it is often employed as a technique to infer the approximate age of ceramic vessels. This technique was successfully used by Braun (1983) for Woodland ceramic collections in southern Illinois and the lower Illinois River valley, by O'Brien and Hoard (1996) at the Burkemper site in east-central Missouri, and by Hargrave (1982) at the Carrier Mills site in southeastern Illinois.

As noted above, in the late 1970s and 1980s, Braun (1983, 1985) highlighted the usefulness of employing the ceramic chronometric technique to Middle and Late Woodland contexts in southern Illinois and the lower Illinois River valley. The chronometric method is based on the premise of decreasing wall thickness over time, and when properly measured and calibrated could be used to predict absolute dates for the manufacture of ceramic vessels. These predicted dates can then be applied to the feature that the ceramics were derived from.

In terms of background context, Braun noticed cooking pots tend to decrease in wall thickness from the beginning of the Middle Woodland to the end of the Late Woodland. He surmised that decreasing wall thickness is related to the need for greater thermal control (i.e., conductivity and stress resistance) in cooking vessels, which is directly connected to an increasing reliance on oily and starchy seed consumption during this time period (Braun

1985). For example, in the Illinois River Valley, Braun's wall thickness curve gradually decreased from approximately 9 mm around A.D. 100 to approximately 5 mm around A.D. 800. From about A.D. 400 to 600, the curve plateaus slightly at approximately 6 mm before dipping to 5 mm 200 years later.

One drawback of this method is the need for fairly large ceramic samples from radiocarbon dated features. Consequently, the low number of radiocarbon dated features hinders the widespread use of this application.

Despite some of the limitations of using this method, some researchers (Hargrave 1982; Herndon 2002; O'Brien and Hoard 1996) have continued and, in some cases, expanded or revised Braun's original work. O'Brien and Hoard (1996), for example, successfully used Braun's original work to develop a similar ceramic chronometric method for the Middle and Late Woodland Burkemper site in Lincoln County, Missouri. In their analysis, O'Brien and Hoard identified the same curve at Burkemper as noted in the Illinois data set by Braun. One of the more interesting results, however, was that the Burkemper samples were consistently thicker throughout the sequence than their Illinois counterparts. What these data suggest is that while the wall thickness curve is roughly similar from one area or region to another, the actual wall thicknesses may vary at any particular point in time and be more region-specific. As such, it may be necessary that each region develop its own wall thickness curve to suit each area's own particular cultural development (i.e., adoption of certain foodstuff at different times, variable manner of cooking foodstuff).

Given the success of this technique in at least three separate regions (east-central Missouri, lower Illinois River valley, and southern Illinois) it was thought that perhaps this approach would be useful for the AOS sites as well, especially since the Burkemper site and the Lower Illinois valley are located fairly close to the project area.

Other Attributes Recorded

Other variables that were recorded include manufacturing marks (coil breaks, anvil depressions, or rim channels), the presence of carbonized residues, sooting, fire clouds, Munsel color, firing attributes (reduced vs. oxidized), presence of burnishing, shoulder shape on vessels, orifice diameter, basal shape, diameter of base, vessel type, cordage width, vessel height, and estimated vessel capacity.

Ceramic Research Questions

Employing the techniques and methods outlined above, it is expected that the following general research questions can be addressed:

- Identify stylistic and functional variation in contemporary ceramic assemblages, and identify diachronic shifts in ceramic form and function throughout the Woodland time span.
- Identify ceramic functional attributes, such as vessel wall thickness and temper type, which can be used for chronometric studies.
- Assess the potential reliability of cord-twist impressions in identifying various technologies related to ceramic vessel manufacture and as an independent means of determining group identity.
- Compare coeval assemblages from AOS and evaluate the amount of differences or similarities evident, particularly between 23LE178/357 and 23CK57, but also 23LE348 south.
- Compare stylistic features of the Woodland ceramic assemblages from the AOS project area to neighboring regions, like Sny Bottom, southeastern Iowa, lower Illinois River valley and eastern Missouri. Particular relevance in terms of the Late Woodland would be the South Branch phase materials from the Bear Creek or Lima Localities, or Putney Landing for the Middle Woodland (to name just a few).
- Assess the applicability of using chronometric techniques, like wall thickness measurements, for dating ceramic assemblages and sites in east-

central Missouri. This application will be based on previous such studies like Braun's work in the lower Illinois River valley, O'Brien's research at the Burkemper site, and Hargrave's study in southeastern Illinois. These studies have proven the value of wall thickness curves for predicting absolute dates for features that could not be radiocarbon dated.

- What do the ceramic assemblages indicate about site structure and mobility patterns? Are large storage jars present at more permanent sites, or are a wider array of vessel forms present at sites occupied longer?
- Analyze carbon residue on the interior of vessels to determine type of plant remains that were being processed at sites.

Historic Artifacts

A variety of research themes and objectives guide historical archaeology, a number of which are relevant to the current investigations in Clark and Lewis Counties. Although they will be outlined in more detail in the final report for the sites investigated during the current study, a brief summary of the types of questions that can be addressed for the historic residences/farmsteads is outlined below. The topics presented here constitute a range of possible studies upon which information can be drawn during the analysis of the historic components of the sites in Clark and Lewis Counties; however, it is imperative to note that the ability to address the research topics is contingent upon the recovery of sufficient relevant data to do so. Specifically, Sites 23LE348 and 23CK310 were the only two sites within the current project area that produced a significant enough sample size to examine these topics. A number of other sites excavated as part of the project contained lesser amounts of historic artifacts and probably represent road trash or small dump episodes.

Chronology

Chronology is the key framework for interpreting archaeological results and observations, as well as for selecting and addressing relevant research questions. When was the site occupied? Was it continuously occupied? Temporally sensitive artifact classes such as window glass, ceramics, nails, buttons, and bottle glass often exhibit datable attributes such as style, form, color, and decoration. Archival records supplement the archaeological data. Placement of the site in its correct temporal framework will enable synchronic and diachronic comparisons and the identification of historic trends on both a local and regional scale.

Site Layout

This topic relates to a resident's utilization of space and is often an important component of other research questions. This includes the spatial layout of outbuildings, the location of activity areas, and the distribution of trash about the yard area as evidenced by the location of features and the densities of the materials recovered. Variation in land use can reflect aspects of ethnicity, regional background, and socioeconomic level. By documenting the spatial relationships and functions of different areas of the site, the results can be compared with other sites and can address important questions regarding the use of space in a framework of ethnicity, regional background, and socioeconomic status.

Architecture

The materials recovered can provide clues to the method of construction used for any possible structures that may have existed at a site. They may also inform us about the size, appearance, and function of the structure. Certain artifact classes such as nails, window glass, brick, and other construction materials can provide clues as to the date and process of construction and/or demolition or dismantling of buildings.

Socioeconomics

For archaeological research, socioeconomic questions focus on the association between an individual's social position, wealth, and their artifacts. This area of research tells us how people display their position in society by the way they choose to

dress, the houses they choose to build, the food they eat, or the ceramics they may collect. Current research indicates that the material culture, with which individuals are surrounded in time and place, may be used to determine or signify social position or group allegiance, or even to manipulate the thoughts of others.

Consumerism

The research paradigm of consumerism addresses the access people have to commercial goods and the choices they make in acquiring those goods. People's access to goods can be related to numerous factors, including their distance from regional markets, their social position in the larger society, and access to local resources. People's choices of which goods to acquire can be affected by ethnic preferences, economic power, or a willingness to follow the current trends in consumption. Certain artifact classes, including ceramics and glass, exhibit attributes such as style, material, method of manufacture, or decoration that are characteristic of objects that originated from specific markets or sources, as do food products acquired through different means (hunting vs. purchasing, for example).

Methods

The historic assemblage includes artifacts classified and grouped according to a scheme originally developed by South (1977). South believed that his classification scheme would present patterns in historic site artifact assemblages that would provide cultural insights. Questions of historic site function, the cultural background of a site's occupants, and regional behavior patterns were topics to be addressed using this system.

South's system was widely accepted and adopted by historical archaeologists. However some, such as Orser (1988) and Wesler (1984), have criticized South's model on theoretical and organizational grounds. One criticism is that the organization of artifacts is too simplistic. Swann (2002) observed that South's groups can potentially be insufficiently detailed. She suggested the use of sub-groups to distinguish between, for example, candleholders used for religious purposes and those used for general lighting. Others, such as Sprague (1981), have criticized South's classification scheme for its limited usefulness on late-nineteenth and early-twentieth-century sites, sites which include an array of material culture—such as automobile parts—not considered by South. Despite its shortcomings, however, most archaeologists recognize the usefulness of South's classification system to present data.

Stewart-Abernathy (1986), Orser (1988), and Wagner and McCorvie (1992) have subsequently revised this classification scheme. For the AOS project, artifacts were grouped into the following categories: Domestic, Arms, Architecture, Furnishings, Clothing, Communication and Education, Personal, Maintenance and Subsistence, Floral and Faunal, and Unidentified. Grouping artifacts into these specific categories makes it more efficient to associate artifact assemblages with historic activities or site types. One primary change associated with the refinement of these categories is reassigning artifacts associated with the "Miscellaneous and Activities" under South's (1977) original system. Considering the potential variety of historic dwellings and outbuildings within the project area, a refinement of the artifact groupings was considered important to perhaps observe whether the distribution of specific artifact groups would produce interpretable patterns related to activity areas or structure types. Each one of these groups and associated artifacts is discussed in turn.

Information on the age of artifacts as described in the artifact discussions for each site is derived from a variety of sources cited in the discussion of the materials recovered. The beginning and ending dates cited need some clarification. Usually, an artifact has specific attributes that represent a technological change, an invention in the manufacturing process, or simple stylistic changes in decoration. These attribute changes usually have associated dates derived from historical and archaeological research. For example, bottles may have seams that indicate

a specific manufacturing process patented in a certain year. The bottle then can be assigned a "minimum date" of manufacture for the same year of the patent. New technology may eliminate the need for the same patent and the bottle would no longer be produced. The "maximum date" will be the approximate time when the new technology takes hold and the old bottles are no longer produced. Specific styles in ceramic decorations are also known to have changed. Archaeological and archival researchers have defined time periods when specific ceramic decorations were manufactured and subsequently went out of favor (e.g., Lofstrom et al. 1982; Majewski and O'Brien 1987). South's (1977) mean ceramic dating technique uses this information.

The dates presented for historic materials should not be considered absolute but are the best estimates of an artifact's age available at this time. A blank space indicates that the artifact could not be dated or that the period of manufacture was so prolonged that the artifact was being manufactured before America was colonized. An ending date of "present" was assigned for artifacts that may be acquired today. The rationale for presenting dates for the artifacts recovered is to allow a more precise estimate of the time span the site was occupied, rather than the mean occupation date of a site.

Historic Questions

- Identify period of occupation for historic component of site. Determine if occupation was continual or intermittent.
- Examine minimal archival documentation to determine who owned properties and what they may have been utilized for.
- Examine features/units/historic material distribution to see if site layout can be determined (i.e. what was the layout of the farmstead: structure, outbuilding, and/or activity area locations).
- Determine what type of construction was used to make the structures, what they may have looked like, how they may have been used. Other information architectural artifacts can provide may indicate if the buildings were modified or expanded, the estimated date of construction, and if the structures were dismantled, burned, or demolished.
- Examine what the degree of access to wider markets was and how this is reflected in the materials recovered from the sites. Maker's marks on ceramics and glass, the presence of "nonlocal" items, examination of the faunal and floral assemblage, and analyses of the types of ceramics, glassware, and other artifacts purchased are among the methods that can be employed to address this question.
- Occasionally, clues as to the gender or occupation of a site's occupants may be demonstrated by the historic artifacts recovered. The presence of a number of sewing items may indicate a seamstress or laundress, which are typically female, or the presence of a significant number items used for blacksmithing may indicate a blacksmith shop on or in the vicinity of a site, an occupation which is more commonly male-dominated.
- Determine the relative socioeconomic status of the site's occupants. The types of ceramics, clothing, and personal items recovered all provide clues as to whether or not the residences had money to afford finer items or if the available income was not utilized for these purposes.

Chapter 3. Archaeological Site Impacts

Andrew V. Martin, Andrew P. Bradbury, and Steven D. Creasman

Mitigation of adverse effects to National Register eligible sites in the AOS project were discussed among the SHPO, FHWA, and MoDOT and reported in the MOA for the project. Based on these discussions, it was decided that the data recovery program would focus on those areas of the sites that would be directly impacted by construction related activities in the ROW and easements. Those sites, or portions of sites, that would not be directly impacted by construction would be preserved in place by covering with geotechnical cloth and sterile fill. This requirement was a consideration as to what deposits would be mitigated by excavation and those that would be preserved in place.

In some portions of the project area, disturbance to significant archaeological deposits was minimal because fill was to be added over top of the deposits. These no impact areas were designated as "fill areas" during the project. Elsewhere, to level the road, excavate drainage ditches, and other construction activities, the ground will be cut below the existing grade, potentially affecting any significant, intact archaeological deposits within the area to be cut. These areas were designated as "cut areas." Recommendations for site treatment were made accordingly and mitigation efforts focused on those areas that would be directly impacted by highway construction activities. In most cases, this involved focusing excavations in the cut areas. The main exception to this was in cases where archaeological deposits were near surface (e.g., features at the base of the plow zone). Such deposits would be impacted by right-of-way preparation; therefore, they were investigated. In some cases, significant archaeological deposits existed at sites, or on portions of sites, that were deeper than the depth of cut. In such cases, these deposits would not be directly impacted by construction activities and the deposit(s) was (were) considered to be preserved in place. Further work was not conducted on such deposits.

Prior to the conduct of the project, little controlled archaeological work had been conducted in Lewis and Clark Counties, Missouri. The current project would, therefore, establish baseline data for future work in the area. Given this background, the research design, as recommended in the MOA, focused on five broad topics: 1) chronology; 2) settlement patterns; 3) site structure; 4) subsistence; and 5) technology. The research design was presented in more detail in Chapter 2 of this report. The research design played an integral role in determining the significance of the site under investigation as it detailed what was considered to be "information important in prehistory." This information was used in conjunction with the National Register Evaluation (detailed below) of a site to determine what deposits, if any, at a particular site were deemed "significant archaeological deposits." In short, significant deposits that warranted additional work were those that were intact, retained integrity, and could provide information relevant to answering questions posed in the research design. Deposits that did not meet these three criteria but that would be impacted were not considered significant archaeological deposits. The multistage fieldwork design employed during the conduct of the project revolved around determining these three basic criteria. Continued investigation of a particular site, or component within a site, was predicated on the deposits meeting these criteria. If it was determined during excavation that the site was not yielding important information, the excavations were halted at that particular site after consultation with MoDOT. If significant archaeological deposits were identified that would not be impacted by construction, no further work was conducted for those deposits. The following sections spell out how these criteria were applied during the project.

National Register Evaluation

At least three prior phase I surveys and two phase II testing projects were conducted for the AOS project within Lewis and Clark Counties, Missouri. These prior investigations (Markman et al 1996, 1997; T. Morrow 1997; Snow 2000) identified archaeological sites and evaluated their significance within the project boundaries. Previous work focused on determining the significance of the archaeological sites and involved the characterization of the artifact assemblages in relation to the context in which they were found. The research potential of the archaeological sites was a primary factor in determining site significance in all of the previous investigations. However, questions regarding site significance remained at the conclusion of the previous work. The extent and characterization of the archaeological deposits and age of many of the sites was not clearly demonstrated. Therefore, additional National Register assessment was conducted prior to, and sometimes in lieu of, any mitigation. The majority of this work consisted of investigations within the utility corridor in Lewis (Bradbury and Martin 2005) and Clark (Martin 2005) Counties. Through an integrated geoarchaeological program employing coring, trenching, and hand-excavated test pits, additional data was collected at sites within the 2-m wide utility corridor. These investigations provided additional information concerning the nature and extent of intact deposits and the materials contained within those deposits at a number of sites. This work, in conjunction with the previous investigations, provided data concerning the significance of deposits within the ROW.

The National Register Criteria for Evaluation specifies that:

> The quality of significance in American History, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that posses integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A) That are associated with events that have made a significance contribution to the broad patterns of our history; or
>
> B) That are associated with the lives of persons significant in our past; or
>
> C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D) That have yielded, or may be likely to yield, information important in prehistory or history. [36 CFR Part 60]

Furthermore, the National Register normally excludes certain property types from eligibility. Among others, some excluded property types include birthplaces, cemeteries and graves, religious properties, reconstructed structures, and properties less than fifty years old. However, in some situations, these property types can be eligible for the register. For example, a grave associated with a National Register eligible prehistoric habitation site would not be excluded from the register since it is included within the boundary of a property that is already eligible. For the National Register eligible sites within the AOS project, these criteria considerations did not apply since none of the identified sites match the excluded property types.

Therefore, since the archaeological sites within the AOS project may contain significant information regarding specific research issues and were not excluded from the eligibility process, all were evaluated under Criterion D. In essence, any archaeological site with intact archaeological deposits that could provide important information regarding any period of history or prehistory (i.e., its data content could address specific questions posed in the research design) was considered a significant resource and determined eligible for the National Register of Historic Places under Criterion D.

The evaluation of a site's information potential was applied by:

1) categorizing and establishing the presence of adequate data content;

2) establishing a cultural context and research design; and

3) demonstrating the integrity of the data.

This three-step process is outlined below, providing a framework for individual site discussions and research design (after Hardesty and Little 2000:11-49; Little et al. 2000; National Park Service 1986, 1991).

Step 1: Categorize the Property

The first step in the evaluation is to determine the type of property represented. For the AOS project, archaeological sites were the only property type identified. Thomas (1989a) defines an archaeological site as "any concentration of artifacts, features, or ecofacts manufactured or modified by humans." Binford (1964) provides an analytical framework for this concept by adding that "…characteristics of a site are defined by its formal content and the spatial and associational structure of the population's cultural items and features present." Therefore, although any concentration of cultural materials can be viewed as a site, only those concentrations demonstrating spatial relationships and integrity are important for characterizing, and understanding, the activities that occurred at that site. Ultimately the data content, as well as the extent and setting in which this information is found, contribute to the characterization of a site and is used to help determine its National Register eligibility.

The definition of "data content" takes into consideration the type and amount of artifacts and features recovered (Little et al. 2000). The significance of the data is assessed by how well it can be used to answer specific research questions. This, in turn, is tied to the extent and context of those data, which provide integrity. For example, a site with a small artifact scatter from the plow zone may have limited information potential because of the mixing and scattering of artifact concentrations. In contrast, a site with discrete, stratified archaeological deposits has a greater information potential. Furthermore, determining the horizontal and vertical extents of archaeological deposits may help place the data within a better context. For example, although a site may be limited to a small scatter of artifacts on the ground surface, if that scatter can be determined to represent a single occupation, the artifact scatter may retain good integrity of context. This takes into account that the area containing artifacts and features across the landscape (i.e., site dimensions) do not necessarily reflect a site's relative significance (cf., Raab 1976; Tainter 1979). Finally, the site setting, or the current and past surroundings of archaeological deposits, is also important for the understanding of past and present site formation processes. This is also related to site integrity and ultimately site significance. For example, if subsurface testing reveals that natural processes, vandalism, or past land use practices have mixed and adversely affected the context of the archaeological deposits, the disturbed portion(s) of the site would probably not contribute to the site's National Register eligibility. Such was the case for several sites within the AOS project. Most of the sites investigated were contained within colluvial or alluvial fans. In certain cases, the same processes that were burying the archaeological deposits were also destroying the deposits. High energy movement of soil and rock from the bluff, in some cases, mixed components of sites, or modified the cultural deposits to the extent that the data content of the site could no longer answer questions posed in the research design. In other cases, the creation of the fan deposits helps to bury and preserve the site with little to no modification. In the former case, such a site would not be considered significant. In the latter case, the site would be considered significant. With specific reference to the AOS project, the deposits within the cut area at Site 23LE346 appear to have been heavily modified by colluvial processes; therefore, the deposits are mixed and not considered significant. Sites such as 23LE174,

23CK302, and 23CK59 were contained in low energy deposits, and the archaeological materials were intact. Fan deposits at these sites preserved the archaeological deposits and contributed to their integrity.

Each individual site's extent, data content, and setting are described in each site evaluation.

Step 2: Cultural Context

The second step centers upon determining the cultural context of the site. Historic or prehistoric cultural contexts are defined as "those [past] patterns, themes, or trends …by which a specific occurrence, property, or site is understood and its …meaning (and ultimately its significance) is made clear" (Little et al. 2000). This is tied to the first step of this evaluation by drawing from the site's data content to determine appropriate research themes to focus on. In determining property significance within its cultural context, five considerations are often discussed:

1) What is the aspect of history of the local area, state, or the nation that the property represents;
2) whether that aspect of history is significant;
3) whether it is a type of property that has relevance and importance in illustrating the historic context;
4) how the property illustrates that history; and
5) whether the property possesses the physical features necessary to convey the aspect of history with which it is associated.

These considerations take into account that while the artifact assemblage recovered from a site may readily allow one to differentiate between historic and prehistoric components, a much finer approximation than this simple dichotomy is required. The National Park Service staff, in an attempt to provide guidance to federal land managers and archaeologists who have been charged with the responsibility of employing National Register criteria, have stated explicitly that:

> A property that cannot be related to a particular time period or cultural group and that as a result lacks any comparative context within which to evaluate the importance of the information to be gained, is not eligible [National Park Service 1986:29].

However, sites shown to have discrete boundaries, good integrity, and good cultural context are not automatically considered eligible. It is also necessary that they possess uniqueness, or that they hold a direct relationship to significant persons or events that have contributed to the "broad patterns of our history" (36 CFR Sec. 60.6[a]) on a local, state, or national level. With respect to archaeological sites, this step represents the interface between the site and its potential to yield information important to the resolution of problem-oriented research questions (Little et al. 2000; Raab and Klinger 1977; Schiffer and Gumerman 1977). Important research topics for the AOS project are listed in Table 3.1 and were discussed at length in the Research Orientation and Questions section of this report (Chapter 2). Table 3.1 represents an evaluation matrix, which comprises several primary areas of research at several levels of topical interest. Therefore, a prehistoric archaeological property would be eligible for the National Register if its archaeological record contains information with sufficient integrity to address at least one of the topics in the matrix (Little et al. 2000:32-33).

In a few rare cases during the AOS project, excavations were continued within deposits at sites that had not produced diagnostic materials (e.g., 23CK59). In such cases, stratigraphic position, geomorphic data, or relative dating based on other deposits at the site were used to provide general time period estimates. Materials such as charcoal and nutshell were recovered from such deposits that allowed for the dating of the deposit in lieu of diagnostic (e.g., hafted bifaces, ceramics) cultural materials. The recovery of carbonized plant remains that could be radiocarbon dated allowed for the materials recovered from such sites to be placed in time.

Table 3.1. Selected Research Themes at Various Levels of Significance.

	Research Level		
Research Domain	National	Regional	Local
Site Structure	Apply comparative data on occupational patterns from different regions	Identify patterns of similar types and occurrences of occupation(s) from the region	Define site component(s) and spatial extents of occupation(s)
Chronology	Document differences in adaptive strategies employed during various time periods	Asses components placement within regional temporal framework	Determine temporal placement of site components
Settlement/Subsistence	Compare extra regional settlement patterns during various time periods	Identify functional and temporal trends in the variation of sites distributed on the landscape	Assess the occupational structure and organization of each component to define functional activities
Environmental Reconstruction/ Change	Compare the local and regional environmental data with other regions	Identify patterns of similar environmental change from the region	Determine the terrestrial and aquatic setting(s) of each component
Technology	Assess the degree of extra-regional interaction and technological similarities	Determine if regional interaction (e.g., trade) was occurring	Classify lithic and ceramic technological organization
Mortuary Practices	Identify changes in preferred burial placement during different time periods.	Examine location of mortuary areas between sites in the region	Identify burial practices

Essentially, the site's data content determines its cultural context and significance. This includes the ability to address appropriate, site specific research questions, representing the framework in which the property is evaluated under the criteria. The nature of the data also determines the appropriate methods for the investigation and analysis of the remains. Generally, for the AOS project, a prehistoric context is developed from the site's categorization and involves the synthesis of the data content, comparison with other regional data sets, and establishment of site chronology. This information is then associated with specific research topics on a site-by-site basis.

Step 3: Determine if the Property Retains Sufficient Integrity to Convey its Significance.

As defined by the National Park Service, integrity is "the ability of a property to convey its significance" (1991:44). For properties eligible under Criterion D, especially archaeological sites that do not exist today as they did in the past, less attention is given to their overall condition. This is largely related to the realization that disturbed sites can, and have, yielded significant data (cf., Talmage and Chesler 1977). Nevertheless, for properties where there is information potential, integrity still depends on the presence of those parts of a property that contain the important data and that survive in a condition capable of yielding important information (National Park Service 1986:30, 37). However, the determination of archaeological site integrity often requires a subjective approach related to how archaeological data is qualified. Essentially, archaeological site integrity is the sum of the information potential the site's data has and the context of that data. In general, clear spatial patterning of surface or subsurface artifacts or features and a lack of serious disturbances to the archaeological deposits may demonstrate good archaeological integrity (Little et al. 2000:37).

To assist in the integrity determination, the National Register recognizes seven elements of integrity that are important for conveying property significance (from National Park Service 1991:44-45):

1) Location "…where the historical property was constructed or the place where historic events occurred;"
2) Design "…the form, plan, space, structure, and style of a property;"
3) Setting "…the physical environment of a property;"

4) Materials "…the physical elements that were combined or deposited during a particular period of time…;"

5) Workmanship "…the physical evidence of the crafts of a particular culture or people during any given period…;"

6) Feeling "…a properties expression of the aesthetic or historic sense of a particular period…;" and

7) Association "the direct link between and important historic event or person and a historic property."

For the purposes of evaluating archaeological site integrity under Criterion D, the focus is primarily on the site's location, design, materials, association, and perhaps workmanship (National Park Service 1991:49). Information from the site pertaining to these elements should then be related to relevant and important research questions. An example of how specific site qualities may be associated with the elements of integrity is presented in Table 3.2. Therefore, to assess integrity, one must identify essential qualities that must be present to convey significance. This may entail comparing the property with other similar properties to determine what type of qualities are important, as well as determining if the site's data content is relatively intact and complete. Then, if the property has qualities that are discernable enough to convey their significance, specific aspects of integrity vital to the property's eligibility are determined. Typically, an archaeological site should contain more than one aspect of integrity to sufficiently meet eligibility requirements. For example, a site with good integrity of location (e.g., stratified deposits) might also have to demonstrate integrity of association (e.g., datable material from the deposits) and design (e.g., identifiable site structure). For the AOS project, specific aspects of a site's integrity were individually determined from the data content and discussed in each evaluation.

Summary of Impacts and Evaluation of National Register Status

The above model was designed to provide a baseline for assessment of the sites investigated during the conducting of the AOS project and used in determining whether or not the deposits encountered at a site represented "significant archaeological deposits." In short, the model allows for the determination of whether or not a site has the potential to yield information that is important to our understanding of the history or prehistory of the area, whether it retains integrity, and whether it is intact. Based on the above discussions, if it is determined that a site has significant deposits then they should have a combination of some, or all, of the following characteristics:

1) Direct or indirect evidence of features, or intact, subsurface archaeological deposits;

2) Evidence of post hole patterns or other indicators of structures;

3) Spatial patterning of fire cracked rock, indicating the use or location of thermal features;

4) Discernable patterns of features or artifacts;

5) A diverse range of artifact classes present (e.g., ceramic, lithic, economic remains) demonstrating a range of activities; and

6) A limited range of temporal diagnostics within a particular deposit.

It is recognized that between the time the archaeological record is created and the time of discovery, a number of natural and cultural processes can modify this record. Such processes occur to some extent on all sites. These processes include natural events such as soil erosion, bioturbation, and slope wash and cultural processes such as trampling and feature excavation. Within the AOS project, natural processes associated with fan (alluvial and colluvial) development represented a major source of processes that affected the sites, or specific deposits within sites. At some

sites, the effect of these natural and cultural processes was minimal and, therefore, played a minor role in our understanding of the site. In some cases, the colluvial or alluvial processes buried the archaeological deposit(s) within low energy sediments and preserved the remains. In other cases, the colluvial or alluvial processes were of high energy and completely, or nearly completely, modified the archaeological record to the extent that our understanding of the site was very limited. The extent to which such processes affected the arrangement of artifacts and/or facilities at a site, and therefore the information potential of the data contained within the site, was considered when assessing a site's potential. The above model takes these factors into consideration when determinations of significance are made. In addition, the research design for the project that was presented in Chapter 2 outlined specific and general research questions to be addressed by data derived from excavations at sites within the project area. Sites that were determined to have the potential to yield information important in history or prehistory were those that could address questions posed in the research design.

Table 3.2. Examples of Relevant Qualities and how they may Relate to the Elements of Integrity

Property Qualities	Elements of Integrity				
	Location	Design	Materials	Workmanship	Association
Datable Material from archaeological deposits					X
Floral or faunal remains found in association with cultural material			X		X
Spatially discrete cultural components	X				
Good feature preservation			X		
Preserved evidence of site organization (e.g., house patterns, meaningful feature distributions, etc.)		X		X	X

Chapter 4. Environmental Setting

Andrew V. Martin

This chapter provides a general description of the modern and prehistoric environment in Lewis and Clark Counties, Missouri. Specifically, this chapter considers aspects of the physical environment, such as topography, hydrology, bedrock geology, soils, vegetation, and climate, as well as the general prehistoric environmental conditions, to place the archaeological record of the region within a relative environmental context. The paleoenvironmental history and landform evolution within the project area and vicinity is the subject of more comprehensive discussion, based on recent analyses of environmental and archaeobotanical samples from the project area, in Volume II of this series.

Topography

Lewis and Clark Counties are within the Dissected Till Plain section of the Central Lowland Province of the Interior Plains (Fenneman and Johnson 1946) (Figure 4.1). Locally, this area is known as the Northeast Prairie region (Chapman 1975; 1980).

Two main physiographic features dominate the Northeast Prairie region in Lewis County. The first is the Mississippi River floodplain found along the eastern portion of the county. The floodplain is bordered by steep bluffs that rise to the uplands and extend across the remaining portions of the county. The uplands are commonly dissected by streams, and the broad ridgetops often have gently sloping prairies. Elevations in Lewis County range from 143 m (470 ft) AMSL along the Mississippi River floodplain in the southeastern corner of the county to a maximum of 232 m (760 ft) AMSL in the uplands of the west-central part of the county (Watson 1992:2).

The Northeast Prairie region of Clark County is also distinguished by the Mississippi floodplain in its eastern parts and the gently rolling, dissected, upland plains throughout the remainder of the county. High ridgetops and rounded knobs are also scattered throughout the central and western portions of the county. Elevations in Clark County range from 146 m (478 ft) AMSL on the Mississippi River floodplain in Clay Township to a maximum of 232 m (760 ft) AMSL in the uplands of Washington Township (Lilly and Neely 1997:2).

A majority of the project area is located along, or near, the base of the bluffs that divide the Mississippi River valley from the uplands. Other portions of the project area, mostly in Clark County, are further from the bluffs within the valley. Differences in the project area topography are a result of different depositional environments. For example, in areas where the valley margin is dissected by easterly flowing tributary streams, alluvial sediment derived from stream migration and flooding accumulates in broad, fan-like landforms across the valley floor. Between these tributary stream channels in the valley, sediment deposited by mass movement and/or dispersed water runoff has accumulated at the base of the valley bluffs, forming a series of narrow colluvial slopes. Ultimately, these alluvial fans and colluvial slopes represent the majority of the landforms on which the AOS project was located. Those portions of the project closer to the bluff line are mostly on the colluvial slopes, whereas those areas closer to tributary channels are more likely on alluvial fans. However, the topography in the areas of the project further from the bluffs has been influenced less by slopes or tributary streams and more by the Mississippi River. Early to middle Holocene Mississippi River paleochannels are commonly found within .8–1.6 km (.5–1 mi) from the bluff line in the vicinity of the project. Furthermore, remnants of old Mississippi River terraces are found throughout the valley and are typically 3–6 m (9.84–19.68 ft) higher than the surrounding floodplain.

Figure 4.1. Physiographic Regions of Missouri, showing the location of Lewis and Clark Counties.

Geology

Uplands in the area are covered almost entirely with Wisconsin loess, which is underlain by loamy, pre-Illinoian glacial till. Also, cherty clay residuum is commonly found at the base of the bluff slopes in the area. Wisconsin glacial outwash is also common along the base of the valley bluffs. This outwash is present on discontinuous terraces, which often contain bedded sand and pebbly sand that can exceed 15 m in thickness. Reddish brown silty clay is often interbedded in these terrace deposits and represents sediment that originated in the Lake Superior basin and was deposited during late glacial floods (Benn et al. 1994:18–19; Hajic et al. 1996:9-10).

Bedrock geology in the area is entirely within the Mississippian System, with exposures of limestone commonly occurring along the bluffs along the Mississippian River valley and at the base of slopes along tributary streams. The Mississippian-age Meramecian and Osagean series occur in the project vicinity (Middendorf 2003; Thompson 1995).

Late Mississippian, Meramecian series limestone occurs along the valley bluffs and terraces in Clark County. The St. Louis Limestone, Salem, and Warsaw formations are within this series (Middendorf 2003). The St. Louis formation is the youngest rock in the area and is commonly less than 15.24 m (50 ft) thick and often not well exposed (Thompson 1995). Exposures of this rock have been noted in northern Clark County, near St. Francisville, where reddish chalcedonic chert nodules up to 20 cm (8 in) in diameter were observed (T. Morrow 1997:4). Similarly, the underlying Salem Formation occurs in the northernmost portions of Clark County. This limestone also contains nodular chert but is less commonly found exposed in the region (T. Morrow 1997:4; Thompson 1995). The Warsaw Formation is locally exposed within, or near, the project area but is very friable.

Therefore, when found exposed, the bedrock of this formation is often a low surface exposure or heavily weathered vertical exposure. Geodes and chalcedonic chert are commonly found in the Warsaw exposures (T. Morrow 1997:4; Thompson 1995).

Early Mississippian, Osagean series limestone occurs along the valley bluffs within Lewis County and southern Clark County. It has also been noted that some streams in Clark County have down-cut into the bedrock of this series (T. Morrow 1997:3–4). The Keokuk, Burlington, Elsey, Reed Spring, Pierson, and Fern Glenn formations are within this series. Locally, only the Keokuk and Burlington formations have exposures. Limestone exposures of the Keokuk formation have been noted to increase further south within the county (T. Morrow 1997:3). Nodules and nodular beds of medium quality, beige to light gray chert between 20 and 40 cm (8 and 16 in) in diameter have been found in these exposures (T. Morrow 1997:3). In addition, the upper portions of the underlying Burlington limestone formation are exposed in the area. Residual fragments of moderate to high quality white and beige chert have been found associated with exposures of this formation in southern Clark County (T. Morrow 1997:3).

Chert samples were collected at 14 locations in the project area vicinity during the current archaeological investigations. These samples reflect a minimal range of raw materials locally available for tool stone in the project vicinity. These 14 samples, along with 8 other examples of Burlington or Keokuk chert from the region in CRAI's type collection, were utilized for comparison with chert artifacts recovered from the project area. A detailed description of the local and nonlocal samples in this collection is provided in Appendix A. A general summary of the locally obtained chert is provided below.

Twelve of the local chert samples were generally classified as Burlington/Keokuk chert. This represents medium light gray to white (Munsell notations N9 to N6) colored chert. Few of the specimens, such as Type K, were homogenous in color, with the majority often having various white to gray matrix and mottle coloring. Another specimen (Type D) exhibited irregular bluish gray (5B 5/1) and light gray (N6) mottling, while the majority of the others had a range of yellowish brown (10YR 5/4) to light brownish gray (10YR 6/2) and olive gray (5Y 6/2) mottling or streaking. A majority of the samples are fine to medium grained, although some, such as Type B, are coarse grained and fracture poorly. Inclusions are common, with oolites, crinoids, brachiopods, sponge spicules, and bryozoa noted. Other inclusions, such as calcite vugs, were less common.

Two specimens (Type N and U) were derived from glacial deposits, or possibly from Salem or Warsaw formation residuum. These are distinctive from the grayish white Burlington/Keokuk chert types. Particularly, these are commonly chalcedonic and have a water-worn cortex. These two types also exhibited a variable range of colors that are distinctive between each type. For example, Type N has various brown to gray hues, while Type U has various reddish hues prevalent. Furthermore, no fossils are noted in these two types, but quartz or calcite inclusions are commonly noted.

Ultimately, Mississippian-age bedrock is commonly exposed along the bluffs in the project area vicinity. Chert derived from this bedrock would have been readily available to native populations, both from primary geologic context or as gravels within local streams or residuum. These sources would have represented a local supply of tool stone. Several specimens of chert were classified from these sources for use during lithic analyses. Further discussion of the various types of raw material represented at specific sites is provided in the lithic analysis sections of each site volume (Volumes III–IX) in this series.

Hydrology

The project area is drained by the Fox River and several other streams that are tributaries of the Mississippi River (Figures 4.2 and 4.3). A majority of these waterways drain east and south from the uplands across the valley floor (Figure 4.2). Within Lewis County, Artesian Branch, Buck Run, and Doe Run are named streams in, or near, the project area. Artesian Branch is a perennial stream that flows approximately 1.6 km (1 mi) within the uplands before reaching the valley floor. Doe Run is an intermittent stream that flows approximately 2.4 km (1.5 mi) within the uplands of Clark County before reaching the valley floor and flowing south along the bluff line in Lewis County. Doe Run flows into Buck Run, which also originates within Clark County just south of a series of ponds (i.e., Baxter Ponds, Round Pond, and Long Pond), and continues flowing south through O'Farre Lake, paralleling the Mississippi River. Several other small ponds and 10 unnamed streams were also in the Lewis County project vicinity. Of the unnamed streams, only 1 of those is perennial, and it is located adjacent and to the north of Artesian Branch which flows for approximately 1.2 km (.75 mi) in the uplands. The remaining unnamed intermittent streams range in length from .4 to 2.8 km (.25 to 1.75 mi) in the uplands before reaching the valley floor.

The Fox River drains a majority of the streams within the Clark County portion of the project. Named tributary streams that flow across this portion of the project include Big Branch, Sugar Creek, and Honey Creek, all of which flow into the Fox River. Buck Run and Doe Run also originate in Clark County, but these streams flow east and south to the Mississippi River. Of these streams, Buck Run, Honey Creek, and Sugar Creek are perennial streams that exceed 6.4 km (4 mi) in length within the uplands. Seven unnamed intermittent streams also flow across the project area. These range in length from .8 km to 4 km (.5 to 2.5 mi) within the uplands before reaching the valley floor.

Soils and Geomorphology

Two soil associations are mapped within the Clark County portion of the project area. These include the Monitea-Plainfield and the Zook-Colo-Huntsville associations (Lilly and Neely 1997: General Soil Map). Two soil associations are also mapped within the Lewis County portion of the project, including the Winfield-Lindley-Vanmeter and the Westerville-Chequest-Darwin associations (Watson 1992: General Soil Map). Each soil association is comprised of one or more soil series.

The Monitea-Plainfield soil association is found at the base of the bluff line in the northeastern portions of the county (Lilly and Neely 1997:9). This soil association comprises the portions of the project area between Sugar Creek and the Fox River. The Weller and Neeper series are mapped on a majority of the landforms within this association in project area. The Weller series (Aquertic Chromic Hapludalf) consists of moderately well-drained soils found on high stream terraces. This series is classified as an Alfisol, which can be found on landforms that formed during the Pleistocene (Soil Survey Staff 1999:208). The Neeper series (Typic Hapludolls) consists of well-drained soils formed in colluvium and alluvium on footslopes. This series is classified as a Mollisol that is found on landforms that often formed during the Holocene (Soil Survey Staff 1999:593). Minor amounts of Klum and Wakeland (Entisols); Lawson, Bucklick, Marion, and Lindley (Alfisols); and Moniteau and Zook (Mollisols) series soils also occur within the portion of the association in the project area.

The Zook-Colo-Huntsville soil association is found on high stream terraces at the base of the uplands and on high floodplains along the Mississippi River in Clark County (Lilly and Neely 1997:9). This soil association comprises the portions of the project area along the bluff line between Sugar Creek and the Lewis/Clark county line. The Colo, Huntsville, and Zook series are mapped on a majority of the landforms within this association in project area. The Colo and Zook series (Cumlic Endoaquaolls) consist of poorly drained soils found on floodplains (Lilly and Neely 1997:73).

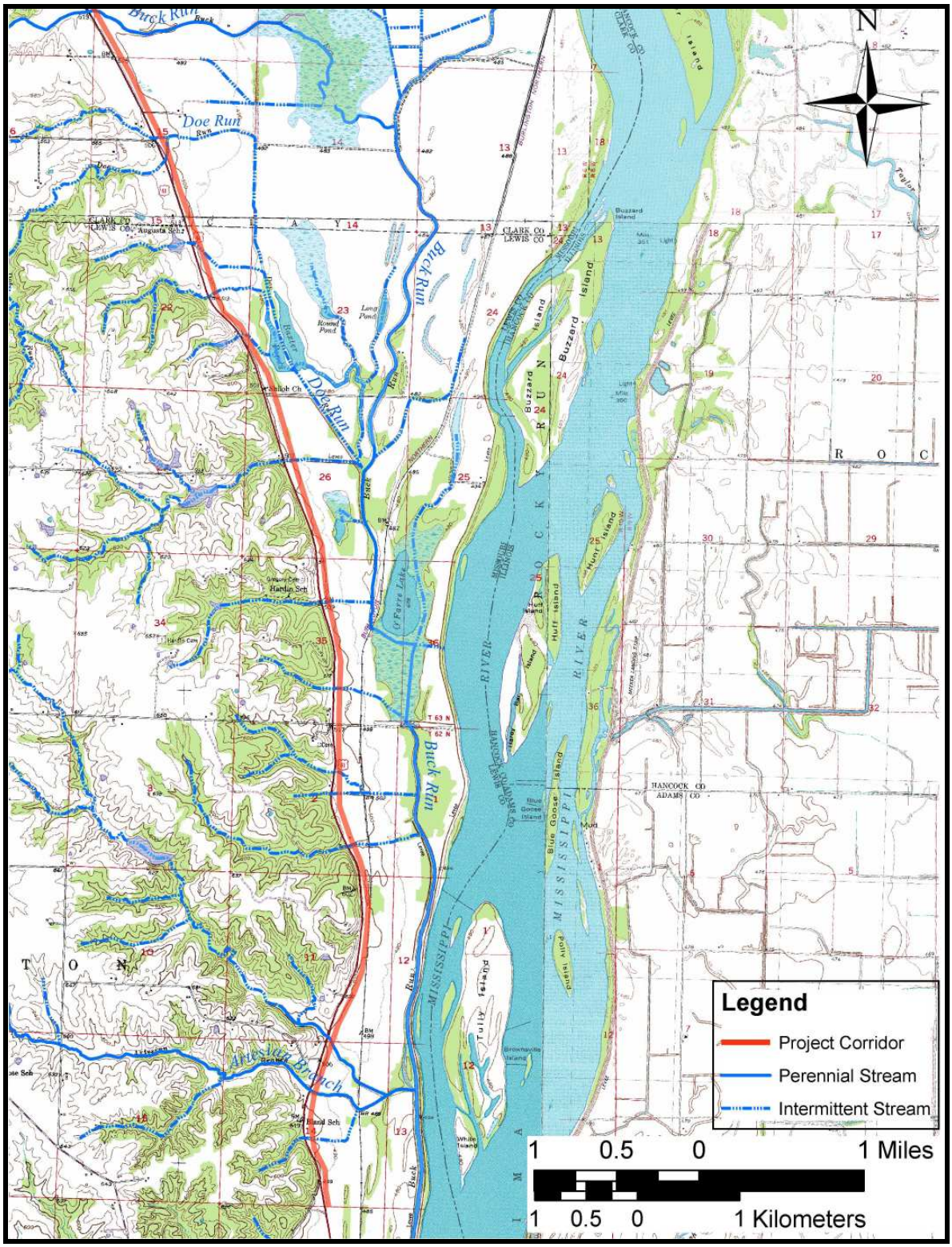

Figure 4.2. Hydrology in the project area vicinity of Lewis County.

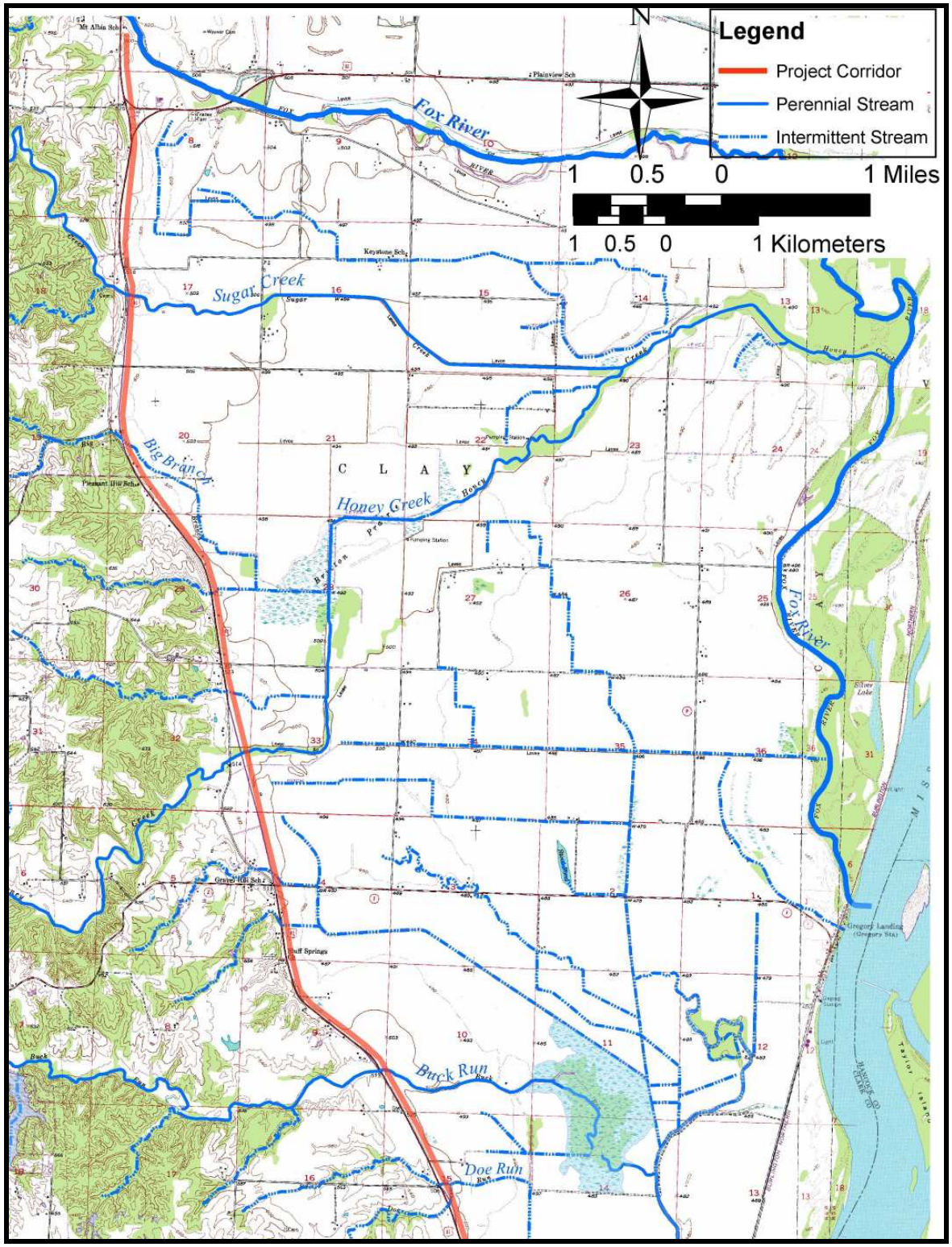

Figure 4.3. Hydrology in the project area vicinity of Clark County.

These series are classified as Mollisols, which are found on recent floodplain, typically in depressions (Soil Survey Staff 1999:208). The Huntsville series (Cumlic Hapludolls) is also a Mollisol, but it is typically comprised of well-drained soils that form in silty Holocene or late-Pleistocene alluvium on floodplains (Lilly and Neely 1997:76–77; Soil Survey Staff 1999:593, 597). Minor amounts of Klum and Wakeland (Entisols); Gorin, Keswick, Kilwining, Lawson, Bucklick, Lindley, Marion, Weller, and Winfield (Alfisols); and Beaucoup, Fatima, Gilford, Neeper, and Vesser (Mollisols) series soils also occur within the portion of the association in the project area.

The Winfield-Lindley-Vanmeter soil association is found on deeply dissected areas adjacent to the Mississippi River floodplain in Lewis County (Watson 1992:8). This soil association comprises the majority of the project area along the bluff line south of the Lewis/Clark county line to just north of Artesian Branch. The Vigar and Vanmeter series are mapped on a majority of the landforms within this association in project area. The Vigar series is a Mollisol (Aquic Pachic Argiudolls) that is well drained and found on footslopes of late-Wisconsinan age (Soil Survey Staff 1999:587; Watson 1992:15). The Vanmeter series is an Inceptisol (mesic Oxiaquic Eutrudepts) that is mapped along sideslopes in, or near, the project corridor (Watson 1992:28). These soils are often found on Holocene or late Pleistocene age landforms (USDA 1999:524). Minor amounts of Westerville (Entisols); Gorin, Lindley, and Winfield (Alfisols); and Chequest, Darwin, Fatima, Jasper, and Neeper (Mollisols) series soils also occur within the portion of the association in the project area. Sand dunes are also mapped within this portion of the project area as Udipsamments, a late Pleistocene or Holocene Entisol (Soil Survey Staff 1999:438).

The Westerville-Chequest-Darwin soil association is found on the floodplain along the Mississippi River floodplain in Lewis County (Watson 1992:9). This soil association comprises a small portion of the project area around Artesian Branch. The Jasper and Vigar series are mapped on a majority of the landforms within this association in project area. The Jasper and Vigar series are Mollisols (Argiudolls), which consist of moderately well-drained to well-drained soils found on footslopes or old alluvial landforms of late-Wisconsinan age (Soil Survey Staff 1999:587; Watson 1992:15;29). Minor amounts of Westerville (Entisols), Lindley (an Alfisol), and Chequest and Fatima (Mollisols) series soils also occur within the portion of this association in the project area.

Some general trends are noted with soil types, which are mapped for the locations of the 14 NRHP eligible sites within the project area (Table 4.1). Notably, within Clark County the sites have either Neeper or Weller soil series mapped for them. In Lewis County, the sites are mostly associated with the Vigar series. Also, the Fatima series in Lewis County and the Klum series in Clark County are noted to be associated with tributary alluvium. No other significant links between the mapped soil types and landform were noted. Previously mapped landscape-sediment assemblages (LSAs) identified for the area are provided for comparison. However, current analyses of hydraulic core samples and trench/block wall descriptions from the project area will provide a more refined landscape history for the sediments and associated landforms. This more detailed discussion is provided in Volume II of this series.

Flora and Fauna

Both Lewis and Clark Counties are part of the Mississippi Valley section of the Oak-Hickory forest region (Braun 2001). The Mississippi Valley section encompasses the Mississippi River valley from the Missouri River northward, but also includes much of the Des Moines River valley and other tributary valleys (Braun 2001). Oaks are dominant and hickories are moderately abundant in this region (Braun 2001:162). Within the Mississippi Valley section, the deciduous forest is predominately found along smaller stream valleys and sideslopes, while prairie communities occupy larger, more open, areas.

Table 4.1. Summary of Soil and Landform Data for each National Register Eligible site within the Project Area.

Site	LSAs (from Hajic et al. 1996)	Setting	Soil Series
23CK57	FANCO	Terrace/Tributary floodplain	Klum, Lawson, and Neeper
23CK59	FANCO/EMHOL 1	Terrace/Fan	Weller and Neeper
23CK243	FANCO	Colluvial Slope	Fatima and Neeper
23CK267	SAVAN/FANCO	Colluvial Slope	Neeper
23CK273	SAVAN (Bench)	Terrace edge/ Tributary floodplain	Weller and Neeper
23CK274	SAVAN (bench)/ FANCO	Terrace	Kilwinnina
23CK302	FANCO	Alluvial Fan	Huntsville
23CK299	FANCO	Alluvial Fan	Neeper
23CK308	FANCO	Tributary Floodplain	Klum and Neeper
23CK310	FANCO	Terrace	Weller
23LE41	FANCO	Terrace	Vigar
23LE174	FANCO	Colluvial Slope	Vigar
23LE178/357	FANCO	Terrace	Vigar
23LE348	FANCO	Colluvial slope/floodplain	Fatima, Chequest, and Vigar

Major wildlife species that are currently found in the area include white-tailed deer, coyote, gray fox, red fox, beaver, raccoon, skunk, muskrat, opossum, mink, cottontail, fox squirrel, gray squirrel, Canada goose, bald eagle, turkey, turkey vulture, ruffed grouse, woodcock, great horned owl, wood duck, ring-necked pheasant, and bobwhite quail (USDA 2006).

Modern Climate

Missouri's climate is continental in character and marked by strong seasonality. Cold, dry air masses from the northern plains and Canada periodically influence the climate during winter months, whereas moist, warm air masses from the Gulf of Mexico often influence weather patterns during the summer months. The spring and fall represent transitional periods when consecutive, and often contrasting, weather fronts move quickly through the region, often resulting in abrupt weather changes. Differences in climate generally grades from northwest to southeast across the state. In the northwest part of the state, mean January minimum temperature is -11.1 degrees C (12 degrees F), while mean annual precipitation is approximately 86.36 cm (34 in). In the southeast, mean January minimum temperature is approximately -4.44 degrees C (24 degrees F), while mean annual precipitation is approximately 127 cm (50 in). However, mean July maximum temperature across the state does not follow this gradient and typically only ranges .56–1.68 degrees C (3–4 degrees F) difference (Akyuz and Guinan 2008).

The climate in Lewis and Clark Counties reflects the varying weather patterns observed for the state. In the winter, the average temperature is -2 degrees C (28 degrees F), while in the summer temperatures average 23 degrees C (74 degree F). Annual precipitation averages 91 cm (36 in). Precipitation often occurs as high intensity, convective thunderstorms in the spring and early summer. In the winter, the average annual snowfall is 69 cm (27 in) (Akyuz and Guinan 2008; Lilly and Neely 1997; USDA 2006; Watson 1992).

Prehistoric Environment

Climatic conditions during the terminal Pleistocene and Holocene time periods represent a series of transitions in temperature, rainfall, and seasonal patterns (Anderson 2001; Shane et al. 2001). These transitions created a seemingly infinite range of ecological variation across time and space, and this variation both limited and expanded survival strategies of human populations. One can posit a link between certain climatic events and the development of prehistoric cultures across North America (Anderson 2001). It must be recognized that human responses to environmental factors are varied and that not all cultural change was "determined" by climatic events.

The Wisconsin glacial maximum occurred approximately 21,400 years B.P. (Anderson 2001; Delcourt and Delcourt 1987). This marks a gradual warming trend during the late Pleistocene period, which is marked by several glacial advances (stadials) and retreats (interstadials), with full retreat occurring by the beginning of the Holocene epoch (Anderson 2001; Shane 1994).

The landscape during the late Pleistocene was quite different from that of today. Much of the mid-continent consisted of periglacial tundra dominated by a boreal, largely coniferous (pine, spruce, and fir), forest (Delcourt and Delcourt 2004:139). Furthermore, sea levels were approximately 100 m (328 ft) below present levels because so much water was contained by the glaciers. As a result, the coastal plains were approximately twice the size they are today (Anderson 2001:152). The mid-continent during this time was populated by species-rich faunal communities that included megafauna, such as mastodon, mammoth, saber-toothed tiger, and Pleistocene horse, as well as modern taxa, such as white-tailed deer, raccoon, and rabbit (Delcourt and Delcourt 2004:140).

The late Pleistocene general warming trend and concomitant glacial retreat greatly affected the vegetation communities in the region. For example, during the interstadial after 14,000 B.P., a boreal forest gave way to a mixed conifer/northern hardwoods forest (Delcourt and Delcourt 1987, 2004; Holloway and Bryant 1985). Pollen records from central Missouri reveal that a mixed boreal and deciduous forest was established there by at least 13,600 B.P. (Baker and Waln 1985). Deciduous forests succeed in the region into the early Holocene. It is during this period that the Mississippi Valley was a channel for large volumes of glacial melt water and outwash. As a result of the increased glacial water flow, the sediments in the highest terraces (Savanna terrace) in the upper reaches of the Mississippi Valley were deposited (Hajic 1991).

Prior to approximately 13,450 B.P., conditions were harsh but capable of supporting human populations, and some evidence indicates that people inhabited North America by at least 14,700 B.P. (Adovasio et al. 1998; Dillehay 1997; McAvoy and McAvoy 1997). These populations were probably small, scattered, and not reproductively viable (Anderson 2001). However, abundant evidence indicates that Clovis populations spread across the continent during the late Pleistocene interstadial, circa 11,000–13,000 B.P. (Anderson 2001).

The late Pleistocene interstadial was followed by a rapid cooling event known as the Younger Dryas (circa 10,000–11,000 B.P.), during which harsher conditions prevailed and mega fauna species became extinct, vegetation changed dramatically, and temperature fluctuated. The Younger Dryas also corresponded with the end of the Clovis culture, which gave way to a variety of subregional cultures across the American continent. A rapid climate change, perhaps as short as 10–40 years, during the early Holocene is a likely factor in settlement shift during this period.

The beginning of the Holocene epoch (approximately 11,300–10,700 B.P.) is associated with rapidly warming temperatures, decreases in cloud cover, and generalized landscape instability (Delcourt 1979:270; Webb and Bryson 1972:107). Temperature increases during this period are estimated to have been three times greater than later Holocene fluctuations (Webb and Bryson 1972:107). Also by this time, although glacial melt waters had stopped directly flowing into the Mississippi Valley, glacial lakes had formed in the headwaters of the river and contributed large volumes of water during a series of discharge. It is at this time that the river began to entrench further, consequently forming the lower terraces (Kingston terraces) in the valley (Benn et al. 1994:19). By approximately 9300 B.P., glacial lake discharge had ceased, and the Mississippi River began shifting to the braided pattern it retains today. Throughout this time, the river moved across the valley, typically by avulsion, resulting in a series of paleochannels. It is also during this period that alluvial and colluvial

fans began to develop and prograde across the valley (Anderson and Bettis 1994:19–20).

Middle Holocene (approximately 8000–3500 B.P.) climate conditions are thought to have been consistently dryer and warmer than the present (Delcourt 1979:271; Klippel and Parmalee 1982; Wright 1968). This period is often referred to as the climatic optimum (i.e., Hypsithermal), where temperatures were appreciably warmer than preceding or late Holocene periods. An influx of westerly winds contributed to periods of severe moisture stress and to an eastward advance of prairie vegetation (Wright 1968). As seen in evidence from Illinois and Iowa, prairie communities had moved into the region and reached their maximum eastward extension between 6,000 and 7,000 B.P. (Holloway and Bryant 1985:235-237). However, more recent research suggests that the middle Holocene was marked by considerable local climatic variability (Anderson 2001; Shane et al. 2001:32–33). Paleoclimatic data indicate a period of more pronounced seasonality characterized by warmer summers and cooler winters. This evidence is supported by ice core data that show no appreciable decrease in continental ice volume, which would be expected with an increase in global temperature (Hu et al. 1999). However, Webb et al.'s (1983) hypothesis of increased aridity during this period is still valid for much of the region.

It has been argued that hydrologic and vegetation changes in the region during this time affected landform development (Bettis 2003). Evidence indicates that the Mississippi River valley became more stable between 7000 and 6000 B.P. (Benn et al 1988). The presence of strongly expressed buried soils dating to approximately 6500 B.P. found at alluvial fans in the valley further suggests landform stability at that time (Bettis 2003:786–787), although prior to 6500 B.P., and after 6000 B.P. until approximately 4000 B.P., periods of landform aggradation are evident. These periods of aggradation suggest dryer climate regimes when upslope erosion would redeposit sediment onto the surrounding landforms, whereas the periods of landform stability indicate increased vegetation ground cover during wetter periods (Bettis 2003).

The shifting vegetation communities during the Hypsithermal period also likely influenced adaptive hunter-gatherer strategies (e.g., Stafford 1994; Wolverton 2005). A change from generalized foraging to a logistical collector strategy is a likely result of the mixed availability of resources, as a result of a drier climate in the region (Stafford 1994). For example, data from two central Missouri sites, the Arnold Research Cave and Rodgers Shelter, indicate that inhabitants there became more focused on lowland resources as a result of prairie expansion during this time period (Wolverton 2005).

The earliest late Holocene climatic episode began circa 5000 B.P. This is associated with general increased precipitation across most of the mid-continental United States (Delcourt 1979:270; Maxwell and Davis 1972:517–519; Shane et al. 2001; Warren and O'Brien 1982:73). As a result, the prairie was shrinking westward in response to a generally cooling and moister climate, and by 2000 B.P., the prairie/forest ecotone had reached its present position. Late prehistoric aboriginal, and later European, agricultural practices and associated forest clearance have been major factors in the late Holocene vegetational history of the region (Holloway and Bryant 1985:238).

Beginning around 3000 B.P., generally warm conditions, probably similar to those of the twentieth century, prevailed until the onset of the Neo-Boreal episode, or Little Ice Age, around 700 B.P. During this period, warmer temperatures have been inferred for the Great Plains and dryer conditions for the upper Great Lakes (Baerreis et al. 1976; Warren and O'Brien 1982). In the upper Mississippi Valley, an expansion of mixed hardwood forest is indicated by this time along the margins of the Prairie Peninsula and in riparian corridors (Bettis 2003:780–782).

Some of these late Holocene climatic fluctuations have been associated with adaptive shifts in Midwestern prehistoric

subsistence and settlement systems. For example, the Middle Woodland Hopewellian florescence is temporally correlated with the relatively mild sub-Atlantic climatic episode (Griffin 1961). Likewise, the culture's decline corresponds roughly to the Vandal Minimum (approximately A.D. 400–800), a period of global temperature decline. Struever and Vickery (1973) suggest a possible correlation between the onset of a cooler, moister period (approximately 1600 B.P.) and increased use of Polygonum by Late Woodland groups in the Midwest (Struever and Vickery 1973:1215–1216).

Studies of historic weather patterns and tree-ring data by Fritts et al. (1979) have indicated that climatological averages are "unusually mild" when compared to seventeenth- to nineteenth-century trends (Fritts et al. 1979:18). The study suggests that winters were generally colder, weather anomalies were more common, and unusually severe winters were more frequent between A.D. 1602 and A.D. 1899 than after A.D. 1900. Cooler, moister conditions are associated with the Neo-Boreal episode, which began around 700 B.P. and coincided with minor glacial advances in the northwest and Europe (Denton and Karlen 1973; Warren and O'Brien 1982:73). This episode is viewed by Warren and O'Brien as a causal factor in vegetation pattern shifts in northeast Missouri, although fluctuations in the Neo-Boreal episode appear to have varied locally (Baerreis et al. 1976:50–52; Warren and O'Brien 1982:73–76).

Summary

The interaction of past geologic, biologic, and hydrologic controls on the environment during the late Pleistocene and Holocene has resulted in a complex landscape and environmental history in the upper Mississippi River valley. To summarize, after the late Pleistocene glacial retreat, two major climatic events affected this region. The first event was significant warming during the Hypsithermal (early–middle Holocene), which resulted in a generally dryer climate and a northward retreat of a mixed boreal forest as well as the expansion of prairies throughout the region. Secondly, fluctuating but generally cooler and wetter conditions during the late Holocene resulted in an expansion of the deciduous forest on the fringes of the prairie and in stream valleys. Also, since the middle Holocene, the Mississippi River channel has been relatively entrenched in its current position in the valley, while tributary stream development has varied through time with the fluctuating environmental controls. Landforms such as alluvial and colluvial fans have formed as a result of the Holocene tributary stream activity.

Ultimately, the changing environment has affected the landscape throughout the Holocene epoch. As a result, changing settlement and subsistence practices of the native populations is suggested during the fluctuating climatic events. Furthermore, landforms, such as alluvial and colluvial fans, have formed in these settings and can preserve important environmental and archaeological data within them.

Chapter 5. Culture History in the Tri-State Region (Northeastern Missouri, West-Central Illinois, and Southeast Iowa)

Studies in prehistoric occupations of the tri-state region have been the subject of considerable archaeological interest. Much of our current understanding of these cultures has been rooted in university sponsored research undertakings, as well as various cultural resource management projects that have been funded since the early 1970s. As a result, much of the archaeological information for the tri-state region has not been widely published and is, therefore, relatively inaccessible by most researchers. This summary reviews the information that was attainable.

A generalized cultural historic sequence for the tri-state region is presented here. Although focused on those time spans represented in the Avenue of the Saints archaeological datasets, a broad overview of the prehistory of the tri-state region will be presented in order to provide an overall context to the archaeological record. Specific information for various sites in northeast Missouri, southeast Iowa, west-central Illinois, the lower Illinois River valley, and the Missouri-Mississippi River confluence region will be provided by period.

To provide consistency within this summary, all age ranges based on radiocarbon dates were calibrated using the IntCal04 calibration curve at two sigma (95.4 percent). The calibration was conducted using the program CALIB 5.0.1. (Reimer et al. 2004; Stuiver and Reimer 1993). For more information concerning the specific dates, consult the original sources.

Paleoindian Period (circa cal 10,500–9200 B.C.)

Brian G. DelCastello and Andrew P. Bradbury

Since no evidence for Paleoindian occupation of the project area was identified during the current archaeological investigations, only summary information is presented for this period. The inclusion of a brief Paleoindian discussion allows for the placement of the remainder of the prehistoric cultural sequence in perspective. Regionally, most of the well known Paleoindian sites reported have been from the Missouri-Mississippi River confluence region of Illinois and Missouri. Sites such as Bostrom, Kimmswick, Martens, and the Ready/Lincoln Hills site have produced Paleoindian cultural materials in a variety of topographic settings.

Bostrom Site

Investigations at the Bostrom site in St. Clair County, Illinois, revealed the presence of an early Paleoindian Clovis component (Koldehoff 1983; J. Morrow 1997; Tankersley 1995; Tankersley and Morrow 1993). The site is situated along a narrow upland ridge spur. Investigations at the site included both a controlled surface collection and the excavation of approximately 400 sq m of test units. A total of 4 cultural features were identified at the site, including 2 shallow hearths, a circular concentration of sandstone, and a deep oval basin (Tankersley 1995). The latter feature was likely a large roasting pit. Although complete diagnostic modified implements were not recovered from the features, a single fluted point fragment was recovered from the large bathtub-shaped feature (Tankersley 1995:44). The controlled surface collection resulted in the recovery of 24 Paleoindian artifacts. The Paleoindian artifacts included 8 bifaces (including both fluted point preforms and finished fluted point specimens) and 16 unifacial scrapers. The excavations, in contrast, recovered a smaller number of modified implements, consisting of fluted biface fragments, scrapers, and a single channel flake (Tankersley 1995).

Lithic raw material identification of the Paleoindian artifacts indicated that a wide range of local to nonlocal and exotic raw materials was used in the manufacture of Clovis tools (Tankersley 1995:57). Nonlocal or exotic raw materials included Attica from western Indiana and Kaolin from southwestern Illinois.

Kimmswick Site

One of the more important Clovis sites in the region is the Kimmswick site, located in St. Louis County, Missouri (23JE354) (Chapman 1975; Graham et al. 1981). The site is situated on a terrace overlooking the confluence of two small tributary streams. Diagnostic Clovis artifacts, including two Clovis hafted bifaces, were recovered from two stratigraphic levels in one of several ponded basins along the terrace (Graham et al. 1981:1115). This basin also contained remains of a Mastodon (*Mammut americanum*). The presence of these Clovis-Age artifacts clearly indicates the processing of Mastodon by early Paleoindian hunters.

The small-sized Clovis assemblage recovered from the site was manufactured from a variety of lithic raw materials (Graham and Kay 1988). Raw materials identified, thus far, have included Ste. Genevieve, Fern Glen, Burlington, and an unidentified gray Oolitic chert (Graham and Kay 1988; J. Morrow 1996). Except the unidentified gray chert, all of the remaining raw materials are considered "local," with known source areas situated within 60 km (37 mi) of the site (J. Morrow 1996). The variety of Clovis cultural materials recovered from the site indicated that, as well as hunting and butchering of mastodon, additional activities were conducted there. These included the manufacture and maintenance of flaked stone tools (Graham et al. 1981:1116).

Martens Site

The Martens site (23SL222), one of the largest Clovis habitation sites in the American Midcontinent, is located in the uplands along a bluff overlooking the Missouri River (Martens et al. 2004; J. Morrow 1996, 1998, 2000). Both surface collection and intensive excavation were conducted at the site (J. Morrow 1998). A series of 139 hand dug test units were excavated in a .81-ha (2-acre) area of the site to identify sub-plow zone habitation debris (J. Morrow 1998). Although small amounts of post-Clovis artifacts were identified from the site, most of the identified cultural materials were associated with the Clovis occupation there.

The Clovis artifacts included a series of Clovis points, performs, and other manufacturing debris and byproducts. These latter items included Clovis blades and blade cores, end and side scrapers, as well as two limaces (Martens et al. 2004). Most of the artifacts were manufactured from Burlington chert, although minor amounts of Salem/St. Louis, Jefferson City, a greenish gray felsite, and an "unidentified lustrous, gray, blue, and brown streaked chert" were also identified (J. Morrow 1996:123).

Ready/Lincoln Hills Site

The Ready/Lincoln Hills site (11JY46) is located in Jersey County, Illinois, in the lower Illinois Valley (J. Morrow 1995, 1996, 1997; Morrow and Morrow 1993; Tankersley and Morrow 1993). The site is situated on an upland plateau that is intersected by the headwaters of several unnamed streams. While the site has not been the focus of intensive professional investigations, it has been surface collected by a series of advocational archaeologists during the latter half of the twentieth century.

A substantial number of Paleoindian lithic artifacts (n = 694) have been surface collected from the site. In addition to these earlier artifacts, a small minority of non-Paleoindian cultural materials, ranging from Early Archaic to Mississippian, have also been recovered from the site (J. Morrow 1995:169). Paleoindian artifacts from the site include at least 224 fluted bifaces. Twenty of the 28 finished or nearly finished fluted projectile points have been classified as Clovis; the remaining specimens are similar to Barnes and

possible Holcombe specimens (J. Morrow 1997:171). The vast majority of the Paleoindian artifacts appear to have been manufactured from locally available Burlington chert, accounting for approximately 86.5 percent of the fluted points and fluted point preforms (J. Morrow 1997:170).

Based on the analyzed artifact assemblage, it has been suggested that the primary focus of the Paleoindian occupation at the site was the procurement and processing of lithic raw materials (J. Morrow 1996, 1997). All aspects of Clovis manufacture were conducted on site, ranging from early stage reduction to final stage hafted biface manufacture. One of the principal observations made of the Clovis assemblage was the timing of the fluting process during Clovis manufacture. At most other sites throughout the American Midcontinent, Clovis specimens were typically fluted at the end of the manufacturing sequence. In sharp contrast, the analysis of the manufacturing debris from the Ready/Lincoln Hills site suggested that the fluting process was conducted during the intermediate stages of manufacture. Juliet Morrow (1997:177) suggested that this process reduced "the amount of time invested in a preform prior to potential breakage during fluting." Thus, this process would reduce time and energy expenditures in the manufacture of potentially broken preforms.

Summary

Based on current information, it appears that Paleoindian groups throughout the tri-state region were highly mobile hunter-gatherers. Nonlocal cherts, often obtained from great distances, are common on Paleoindian sites and have been used to infer long distance movement of people. In addition to the distinctive fluted bifaces, unifacial tools and blades are part of the chipped stone assemblage. Some evidence for the exploitation of mega-fauna has been documented in the region (e.g., Kimmswick site). While the presence of mega-fauna has been demonstrated, Paleoindian subsistence was likely more broad based and included the hunting of small game animals in addition to the gathering of plant species. Sites are generally small in size and contain few, if any, features. Features, when present, appear to represent hearths.

Dalton Transition (circa cal. 9500–9250 B.C.)

Brian G. DelCastello and Andrew P. Bradbury

As the Pleistocene came to a close and the Holocene began, a number of environmental changes were taking place. A number of cultural changes are also known for this transition. The most widely occurring cultural complex identified throughout the Midwest and Southeast portions of North America at this time was Dalton. Named after the type site along the Osage River in central Missouri, Dalton components are now known throughout the American Southeast and Midwest (Chapman 1975; Goodyear 1982; Koldehoff and Walthall 2004; O'Brien and Wood 1995, 1998; Walthall and Koldehoff 1998). Anderson (1989) notes that Dalton components have been identified as far south and east as along the coast of South Carolina, as far west as the Ozarks in Oklahoma and Arkansas, and as far north as extreme northwestern Illinois. Dalton sites appear to be concentrated along the major drainages, particularly along the central Mississippi River Valley (Koldehoff and Walthall 2004; Walthall and Koldehoff 1998).

As researchers have noted (i.e., O'Brien and Wood 1995:51), while Dalton appears to be contemporary with Folsom groups further to the west, Dalton weapon technology appears to have been closely associated with Clovis technology. The most distinctive diagnostic Dalton artifact is the Dalton hafted biface (i.e., Dalton point) (Justice 1987:35-44; T. Morrow 1992; O'Brien and Wood 1995:51). This biface form is a lanceolate style that commonly possesses a short flute along one or both surfaces. Basal thinning is usually fairly prominent on many specimens. The blade is triangular in shape and initially exhibits excurvate edges that were subsequently

reduced through use and resharpenings. The use of right-handed beveling or of serrations of the lateral blade edges are common forms of edge rejuvenation (Goodyear 1974; Justice 1987; Morse 1971a). Modern experimental research has demonstrated that the needle-like blade outlines and the serrated blade edges evident on many specimens were a result of multiple resharpenings of the lateral blade edges (Goodyear 1974).

In a recent review of Archaic cultural variation in west-central Illinois, Nolan and Fishel (2008) discuss three distinctive Dalton Cluster point styles that are common throughout the tri-state region: Pike County/Beaver Lake, Central Mississippi Valley (CMV), and Northern Mississippi Valley (NMV) variants. It is generally thought that the Pike County/Beaver Lake variant is Late Paleoindian in age and is technologically situated between the earlier fluted specimens and the later classic CMV Dalton variant (Nolan and Fishel 2008.; Perino 1985). Pike County/Beaver Lake variants have an expanding convex base that is typically basally thinned. Pike County specimens are typically larger than the Beaver Lake specimens (Perino 1985).

The CMV Dalton variant typically exhibits thinned bases that possess short multiple fluting scars (Walthall and Koldehoff 1998:261). They commonly exhibit serrated lateral edges and were frequently resharpened in the haft along the right edge by unifacial beveling. This alternating unifacial beveling serves as one of the primary characteristics that distinguishes CMV specimens from earlier Late Paleoindian complexes (Nolan and Fishel 2008).

The NMV variants generally can be distinguished from the CMV specimens by a wider haft element and a thinner transverse cross-section. NMV specimens generally lack the characteristic alternate unifacial beveling typical of the CMV variants (Goodyear 1974; Nolan and Fishel 2008). In this regard, the NMV specimens are more typical of the earlier Pike County/Beaver Lake variants.

In addition to the characteristic Dalton hafted biface, the second most distinctive artifact of this time period is the Dalton adze (Gaertner 1994; Morse and Goodyear 1973; Morse and Morse 1983:75; O'Brien and Wood 1998). The typical Dalton adze is a thick biface that has an ovoid to triangular outline and a convex, beveled working edge. When viewed from the side, Dalton adzes exhibit a skewed or beveled working edge (Goodyear 1974:41). Many specimens possess either cortex or evidence of heavy grinding and smoothing along the poll edges that may have facilitated hafting of the adze (Goodyear 1974). Morse (1969:18-19) has suggested that many adzes may have been manufactured from exhausted blade cores. Research has shown that at least some of the polish characteristic of this tool form was the result of wood working activities as a hafted implement (Gaertner 1994).

Dalton sites are common throughout the tri-state region, including much of Missouri as well as much of the Mississippi River Valley (i.e., Koldehoff and Walthall 2004; Price and Krakker 1975; O'Brien and Wood 1995, 1998; Walthall and Holley 1997). Sites within this region that contain Dalton components include Nochta (Higgins 1990), George (Walthall and Koldehoff 1999), and Olive Branch (Gramly 1995, 1999a, 1999b, Gramly and Funk 1991). Within the state of Missouri, diagnostic Dalton hafted bifaces have been recovered in each of the 114 counties (O'Brien and Wood 1998). A review of the better known sites in the region follows.

Northeastern and Eastern Missouri

Dalton occupations of northeastern and eastern Missouri are sparse and not very well known. Most of the Dalton occupations that have been identified are located at smaller open-air sites and as isolated finds throughout the uplands. Notable exceptions are several intensively investigated sites throughout the eastern part of Missouri.

Dalton Site

In the lower Missouri Valley, the Dalton site (23CO50) revealed the presence of an Early Archaic occupation of a short-term duration. The component was located approximately 2.4 m (8 ft) below the ground surface and consisted of an area of "no more than 60 feet in diameter, which may be an indication that it had been occupied for a short duration" (Chapman 1975:135). A single feature, a hearth, was identified during the excavations of the site. The feature does not appear to have contained any artifacts (Chapman 1975:135).

Pigeon Roost Creek Site

The Pigeon Roost Creek site (23MN732) was excavated as part of the Cannon Reservoir Human Ecology Project (O'Brien 1985a and 1985b; O'Brien et al. 1982). The project area is located to the south of the Avenue of the Saints project area. The site was located on a terrace overlooking the confluence of Pigeon Creek and the Salt River. This highly stratified site contained a deeply buried Dalton component situated in a colluvial-alluvial fill. The stratigraphy at the site was highly complex, particularly in the lowermost Dalton deposits, where mixing of the sediments was noted during the excavations (O'Brien and Warren 1982:111–113). The Dalton component consisted of a series of diagnostic artifacts, including Dalton and Dalton-like specimens, as well as what appeared to be other lanceolate and notched Archaic forms (including Hardin Barbed, Kirk, and Late Archaic stemmed forms) that post-date the Dalton component at the site (Curry et al. 1985; O'Brien and Warren 1982).

Unfortunately, the highly mixed nature of the lower-most deposits coupled with the small sample size of diagnostic artifacts hampers an accurate characterization of the Dalton component at the site. Alternatively, O'Brien and Warren (1982:113) suggest another interpretation of the Dalton component. They point out that the excavations of the lowermost levels were conducted in a controlled manner that prevented cross-contamination of the natural strata and that no evidence of cross-strata contamination was identified. This would suggest that the "apparent mixing of Dalton points (including preforms) and other Early Archaic types is the result of tradition lag" (O'Brien and Warren 1982:113). A recent study of Late Paleoindian and Early Archaic hafted bifaces from Pigeon Roost Creek indicated that Dalton specimens predated the other Early Archaic forms, such as Stillwell, Hardin Barbed, and St. Charles types (Darwent 2005:72).

Graham Cave

At Graham Cave (23MT2), a Dalton component was identified in the lowest levels of the rockshelter (Chapman 1975; Klippel 1971a). The Dalton component was represented by a rather narrow spectrum of flaked and groundstone tools. Several hafted bifaces, including both Daltons (complete and heavily reworked drills) and several lanceolates (including Graham Cave lanceolates and Graham Cave fluted examples) were recovered from the site. Other stone tools recovered included snubbed nose scrapers, "rubbed hematite," pestles, and a flat mealing stone. In addition, several bone and antler items were recovered. including bone awls and needles (Chapman 1975:109). Chapman indicates that a "ceremonial fire area outlined by a ring of stones and a secondary burial" (1975:107, 113) was also identified as belonging to the Dalton occupation.

Arnold Research Cave

The Dalton component at the Arnold Research Cave (23CY64) is "not well defined" (Chapman 1975:107; Shippee 1966). In fact, the site is notorious for its mixed sediments (Goodyear 1982; Shippee 1966; Wolverton 2005). The mixed nature of the sediments from the site precluded detailed stratigraphic analyses of the deposits.

Several lanceolate hafted bifaces were recovered from the Dalton occupation, including Dalton, Dalton serrated, and Graham Cave Fluted (Chapman 1975:107). Crane and Griffin (1968) report two radiocarbon dates

from the Dalton component at the site: 8190±400 B.P. and 9130±300 B.P. (8220–6360 B.C.; p = .995 [2σ] and 9450–7310 B.C.; p = 1.0 [2σ]). Goodyear, however, contends that the radiocarbon assays can be challenged, as these dates were obtained from arbitrarily excavated levels: levels with uncertain cultural association. In these levels, Dalton specimens were found in association with non-contemporary stemmed and notched forms. Shippee (1966:35) suggests that the stemmed and notched were not contemporary with the Paleoindian lanceolate forms.

Rodgers Shelter

One of the more well-defined Dalton occupations in eastern Missouri was identified at the Rodgers Shelter (23BE125) (O'Brien and Wood 1998; Wood and McMillan 1976). The site is located in west-central Missouri along the northern edge of the Pomme de Terre River valley. Excavations at the site were focused on the terrace deposits immediately in front of the overhang, with additional excavations conducted in the terrace, west terrace, and within the shelter proper (McMillan 1976a).

Dalton occupations were identified in the lowermost cultural deposits at the site, primarily along the terrace deposits. Highly mixed deposits were also identified within the shelter proper (McMillan 1976b). In the terrace deposits, several well preserved open hearths were present in the Dalton occupation. Abundant cultural debris was identified in association with hearths at distances usually not exceeding approximately 10 m (33 ft) (McMillan 1976b). This debris included several modified tools and cores along with associated fauna and ethnobotanical debris. Dalton hafted bifaces, distal/lateral scrapers, and Dalton adzes were recovered from the Dalton occupation. Animal remains included both deer and raccoon, whereas plant remains were dominated by hickory nuts and black walnuts (McMillan 1976b; Parmalee et al. 1976). In sharp contrast to the terrace deposits, the Dalton occupation within the rockshelter was not clear, as a substantial amount of sediment mixing was apparent.

Southeast Iowa

Dalton components have been identified at various multicomponent sites throughout this portion of the state, including both open-air and rockshelter sites. No securely dated pure Dalton components have been identified in Iowa (Alex 2000).

In Iowa, a regional Dalton variant, the Holland hafted biface, is commonly recognized in Early Holocene occupations (Holland 1971; Justice 1987; Perino 1971). This point type has a thinned stem, exhibiting faint shoulders. It typically exhibits basal thinning, similar to the CMV and NMV variants. This point type is named after the person who identified a cache of 14 specimens (Holland 1971; Perino 1971).

West-central Illinois

Dalton occupations throughout west-central Illinois have also been typically viewed as either Late Paleoindian or as Early Archaic. The Dalton occupations appear to belong to a transitional horizon that combines aspects of both Paleoindian and Early Archaic lifeways. Several of the widely recognized Dalton forms, including the NMV, CMV, and the Pike County/Beaver Lake variants, are commonly recognized throughout west-central Illinois (Nolan and Fishel 2008).

Unfortunately, no securely dated Dalton components have been identified in the region. Therefore, dating of Dalton sites in west-central Illinois is based on sites in neighboring regions, such as in the mid-South (Driskell 1996; Goodyear 1982), southwestern Missouri (Lopinot et al. 1998), and southwestern Illinois (Gramly and Funk 1991). The bulk of the information concerning Dalton occupations of west-central Illinois is derived from surface collected materials, since few sites have been intensively excavated.

Only a small number of sites containing Dalton (or Dalton-like) components throughout the greater region have been investigated. One such site is the Christianson site (Evans and Womac 1998). This site, located to the northeast of the project area, is

situated on a north terrace and ridge of the lower Rock River valley. The vast majority of the Dalton age cultural materials were recovered during surface collections of the site—most from amateur collections. Over 50 Dalton hafted bifaces have been collected from the site, including what Evans and Womac (1998:336–342) refer to as "Chesrow" and "Chesrow-like" specimens. Nolan and Fishel (2008) have suggested that these specimens are likely a NMV variant, although some appear to be more closely similar to CMV specimens.

Lower Illinois Valley

Diagnostic Dalton hafted bifaces have been recovered at various sites throughout the lower Illinois River valley, occurring primarily in open-air sites. Luchterhand (1970) reports that most of the Dalton/Meserve specimens recovered during a study of private collections of the lower Illinois Valley were collected from localities throughout the uplands. Of a sample of 38 specimens, 73.68 percent (n = 28) were collected from upland settings, compared to the 7 (18.42 percent) collected from the major valley bottomlands and the 3 (7.9 percent) collected from secondary stream valleys (Luchterhand 1970:33).

Missouri-Mississippi River Confluence

In the confluence region, Dalton components are only known from sites containing isolated or minimal Dalton diagnostic artifacts. Again, no securely dated Dalton components are known from this region.

The sole site in the American Bottom floodplain that contained a sizeable Dalton component was the Nochta site (11MS128) (Higgins 1990). This site is located in Madison County, Illinois, and is situated along a sand ridge between two meander scars of the Mississippi River. Over 180,000 sq m (44.48 acres) of the site were examined during the archaeological investigations.

The Dalton component at the site was represented by the presence of typical Dalton lithic tools. These included at least 15 Dalton hafted bifaces of varying production/reduction stages, 12 Dalton adzes, and a variety of flake tools, including end scrapers and flake knives (i.e., blades) (Higgins 1990:31–47). The site also yielded 4 Dalton adze blanks in an apparent cache (Higgins 1990). Only 3 of the features contained Dalton cultural materials; these features consisted of 2 pits and 1 hearth.

While not in the American Bottom region proper, several additional sites and/or archaeological projects have identified Dalton components. The recent Scott Joint-Use Archaeological Project (i.e., Holley 2006; Walthall and Holley 1997) identified ephemeral Dalton components throughout the uplands of Silver Creek. Most of these components consisted of scattered or isolated diagnostic Dalton tools, primarily hafted bifaces. One exception was the Dalton component at the Jens site (11S784), where a single Dalton feature was indentified (Walthall and Holley 1997). Feature 30 contained one Dalton hafted biface, an adze, six end scrapers, two unifaces, and traces of ochre. This feature was interpreted as a hide processing facility (Walthall and Holley 1997).

Dalton components have also been identified in the vicinity of the Modoc Rockshelter locality (11R5) (Ahler 1998). This site is located in the southern portion of the American Bottom in the Mississippi River valley along a bluff base setting (Ahler 1984, 1998; Ahler et al. 1992). At the Modoc Rockshelter (11RA501), both Dalton hafted bifaces and adzes were recovered, although based on stratigraphic positioning, Ahler (1993, 1998:12) suggests that these materials were likely scavenged and reused during the Middle Archaic occupation of the site.

Summary

By the end of the Pleistocene, the post-glacial climate became warmer, and as a result, major shifts in the biotic communities of the American Midcontinent took place

(Wright 1983). Some of these shifts included the demise of the mega-fauna and a host of other smaller mammals. During this time span, native peoples continued to adapt to their surroundings, and to modify their technologies to meet the demands of an ever-changing environment.

Research indicates that Dalton groups were highly mobile hunter-gatherers occupying an expanse throughout the mid-South and Midwest. It appears that these Early Holocene groups practiced a seasonal migration of sorts, with groups aggregating during the fall followed by population dispersal into the uplands for the winter (Walthall 1998a). Walthall suggests that these fall aggregations likely served as part of the overwintering strategies. As Early Holocene groups gathered for feasting, exchange, marriage, and the formation of non-kin relationships, a sense of communal ties and membership in the larger hunter-gatherer band developed (Walthall 1998a:15). It is also during this time span that formal cemeteries appear in the archaeological record (Morse 1997; Walthall 1999).

The Dalton Transition spans a time period ranging from approximately 10,500 to 10,000 B.P. (8500 to 8000 B.C.) (Goodyear 1974, 1982). One of the factors that had confounded the chronological placement of Dalton throughout the American Midcontinent is the association with various hafted biface forms. As O'Brien and Wood point out (1995:51), numerous sites have yielded both Dalton and Clovis bifaces in association with one another. Other sites and components have yielded Dalton artifacts in association with later side-notched hafted bifaces characteristic of the Early Archaic (Koldehoff and Walthall 2004). In contrast, other sites, such as Rodgers Shelter (i.e., Wood and McMillan 1976) and the Brand site (Goodyear 1974), have yielded Dalton components without the presence of earlier Clovis materials.

The first widespread use of rockshelters appears to have origins during Dalton times (Walthall 1998b). There appears to have been a fundamental shift in the residential mobility patterns of native populations. A shift to more regional movements (rather than long distance movements) likely occurred in tandem with the marked increase of the deciduous forests of the American Midcontinent. The increase in the extent of these forests would have led to a corresponding increase in the numbers of non-migratory animals that would have been the focus of predation by the Early Holocene populations. As Walthall notes (1998b:234), the rise of encounter hunting of these non-migratory animals would have allowed Dalton groups to mentally map the landscape in terms of hunting locations as well as camping localities, such as rockshelters.

One of the most well documented Late Paleoindian/Early Archaic settlement models in the eastern United States is Morse and Goodyear's Dalton Settlement model (Goodyear 1974, Morse 1971b, 1973, 1976, Morse and Morse 1983). This model, based on data from southeastern Missouri and northeastern Arkansas, suggests that Late Paleoindian (i.e., Dalton) groups occupying the central Mississippi River Valley likely occupied semi-permanent to permanent base camps, such as at the Lace Place site (3PO17) (Redfield and Moselage 1970). These groups would have exploited territories situated along major watersheds. These base camps would, in turn, have been supported by a series of logistical camps throughout the territory (Goodyear 1974). Within these territories, formal cemeteries were present and may have symbolically delineated these territories (Anderson and Sassaman 1996:25–26; Morse 1997). Morse's settlement model is based on ethnographic analogy of groups considered to be "collectors" in Binford's (1980) hunter-gatherer mobility strategies.

In sharp contrast to the linear-based territories of Goodyear and Morse, Schiffer (1975a, b) and Price and Krakker (1975) have suggested an alternative view of Dalton settlement patterns. They suggested that Dalton groups likely occupied regions that crosscut drainages, rather than lying along linear networks. This model suggests that Dalton groups had a high degree of residential mobility throughout much of the year, with

only short-term aggregations occurring at larger base camps during the late fall and early winter times. This model suggests a more "forager" aspect to Dalton settlement systems (sensu Binford 1980).

In a recent study regarding mobility (or land-use) patterns, Koldehoff and Walthall (2004) suggest that Dalton groups occupied territories that were smaller than the preceding Clovis groups. This reduction in territory size was manifest as a reduction in the distance of lithic raw material procurement (Koldehoff 1999; Koldehoff and Walthall 2004; Walthall and Koldehoff 1999). Clovis assemblages are characterized by a higher percentage of nonlocal cherts originating from sources further than 50 km (31 mi) from their place of use. In contrast, Dalton assemblages tend to be dominated by local or near-local cherts (Koldehoff and Walthall 2004:60). In addition, the directionality of the chert sources also differentiates Clovis and Dalton occupations throughout the region (Koldehoff and Walthall 2004: 60). During the earlier Clovis times, source areas outside of the central Mississippi Valley were routinely exploited, including sources to the north and northeast, such as the Wabash River valley, northern Illinois, and central Illinois River valley. Dalton components, on the other hand, contained raw materials that rarely originated from source areas outside the central Mississippi Valley and adjacent drainages. These source areas appear to be concentrated throughout southwestern Illinois and east-central Missouri (Koldehoff and Walthall 2004:61).

During Dalton times, there is growing evidence of interregional exchange systems throughout the Midwest. In the central Mississippi River Valley, Walthall and Koldehoff (1998) have defined an elaborate alliance network that appears to have been established during circa 10,500–10,000 B.P. The primary archaeological manifestation of this exchange network is the large, well made hafted biface typically referred to as the Sloan Point, named after the property owner of the Sloan site in Arkansas (Morse 1997; Perino 1985). These hafted bifaces are large, well made lanceolates, exhibiting rather thin transverse cross-sections. These bifaces possess concave bases that are typically ground and are often basally thinned by a series of short, multiple flutes (Walthall and Koldehoff 1998:263). It appears that most, if not all, of the large Sloan bifaces were manufactured from Burlington chert deriving from the Crescent Hills source area west of St. Louis, Missouri (Koldehoff 1983, 1985; Walthall and Koldehoff 1998). As Walthall and Koldehoff indicate, this quarry area was widely utilized throughout much of prehistory, since chert from this source area is of high-quality, is plentiful, and occurs in large tabular blocks. In addition, this source area is situated near the confluence of major river systems that would have provided easy access (Walthall and Koldehoff 1998:263). When combined, these factors permit the production of large bifaces manufactured from high-quality lithic raw material.

Walthall and Koldehoff (1998) propose that the large Sloan bifaces were exchanged as a form of "primitive valuables." That is, these bifaces were manufactured from high quality, often colorful chert, originating from a single source area; they were exceptionally well made, and were highly portable (Walthall and Koldehoff 1998:266). They are often found in caches throughout the CMV (Morse 1971a; Gramly 1995). Walthall and Koldehoff suggest that, based on ethnographic analogs, these bifaces were likely exchanged "by interband aggregations which may have taken place seasonally, perhaps at strategically placed and favored localities" (1998:266).

Given the above data, some general patterns that would be expected in the northeastern Missouri data can be presented. It is expected that sites will be represented by either larger base camps or smaller logistical camps. Large, unifacial tools are expected along with the typical Dalton hafted biface and adze. While local materials would be expected for the majority of these tools, the presence of nonlocal sources should also be represented. Subsistence remains, if preserved, should show a high percentage of white-tailed deer and nutshell. Features, other than surface hearths, would not be expected.

Archaic Period (circa cal 9200–1000 B.C.)

Brian G. DelCastello and Andrew P. Bradbury

The Archaic period includes a long span of time during which important environmental changes took place (e.g., Anderson 2001). By the Early Archaic subperiod, the last glaciers had retreated and the arctic-like boreal forest was developing into the eastern deciduous forest. During Middle Archaic times, however, the environment was warmer and drier than that of modern times (McMillan and Klippel 1981). By the beginning of the Late Archaic subperiod, the modern deciduous climax forest covered the entire eastern United States. In response to the changing environments, the various Late Archaic groups began to develop a more diversified subsistence strategy based on local choices from a variety of subsistence options that included hunting, plant food gathering, fishing, and in some areas, the beginnings of plant domestication in a planned seasonal round exploitation strategy. Caldwell (1958:6–18) has called this Archaic subsistence approach "primary forest efficiency," while Cleland (1976) developed a focal-diffuse model to explain this type of subsistence. This strategy appears to have continued well into the Woodland period.

Because of the growing evidence for the existence of transitional cultural manifestations, it is believed that the Archaic groups of the American Midcontinent evolved from the various Late Paleoindian expressions throughout the region (Funk 1978:19).

Existing models view the Archaic period as a time span characterized by increasing sedentism through time. The development of more efficient subsistence practices resulted in a shift from high residential mobility during the Early Archaic to more logistically organized foraging strategies during Middle and Late Archaic times (Stafford 1991a and 1991b). Most models suggest that the impetus for this trend was environmental change. In particular, the dry-warm Hypsithermal or Atlantic climatic episode, which dates from approximately 5000 to 3000 B.C., and concomitant changes in vegetation are frequently cited as the factors that "forced" Midwest hunter-gatherers out of the uplands and into major river valleys (Brown 1985:323–324; Carmichael 1977). Recent studies in southwestern Indiana have suggested that simple cause and effect models cannot adequately explain the settlement-subsistence changes that occurred during the Middle Archaic (Stafford 1991a; Stafford et al. 2000). Although a considerable wealth of information has been accumulated over the years, many important questions regarding changes and developments in Archaic adaptive strategies, technological systems, and social organizations remain to be more fully addressed.

The Archaic period is commonly divided into three subperiods: Early (cal 9200–6400 B.C.), Middle (6400–3000 B.C.), and Late (3000–600 B.C.). Regional differences account for slight temporal differences in these general ranges.

Early Archaic: The Early Holocene (circa cal 9200–6400 B.C.)

The beginning of the Early Archaic is marked by the final retreat of the glaciers and the transformation of the boreal forests into modern deciduous forests. Except for the adoption of new projectile forms, (e.g., notched varieties), Early Archaic tool kits are nearly identical to those associated with the Paleoindian period. The fact that these projectile point varieties have been recovered from a multitude of sites throughout North America suggests that little regional subsistence diversity occurred during the Early Archaic (Anderson and Hanson 1988; Luchterhand 1970). Rather, subsistence strategies are believed to have been similar to those employed by Paleoindian peoples, although a greater variety of game was hunted (Meltzer and Smith 1986; Neusius 1982, 1986; Styles et al. 1983). Certain classes of flaked stone tool artifacts, such as scrapers, unifaces, drills, and gouges, indicate a continuation of

their importance from the Paleoindian period (T. Morrow 1996). Diagnostic hafted biface types associated with the Early Archaic in the region consist of corner-notched, side-notched, and stemmed forms. The former includes named types such as Thebes and Kirk Corner-Notched. Side-notched forms include Graham Cave and Early Side Notched (Big Sandy I). Hardin Barbed types represent stemmed forms.

The scarcity of tools associated with the preparation of plant foods and fishing in the early part of the Archaic period indicated that hunting was probably still the major subsistence activity (Dragoo 1976). Alternatively, Early Archaic peoples may have been processing plant foods with tools other than stone implements, or there are preservation issues with these remains.

Modern archaeological investigations at deeply stratified sites throughout the greater eastern Woodlands have served to outline cultural developments that occurred during the Archaic period, as well as the Early Archaic subperiod. In eastern North America these sites included St. Albans site in West Virginia (Broyles 1971); the Longworth-Glick site in Louisville, Kentucky (Collins 1979); and in the Illinois River valley at the Koster site (Asch et al. 1972; Brown and Vierra 1983; Hajic 1990; Neusius 1982, 1986), the Little Muddy Rockshelter (Moffat et al. 1992), and the Modoc Rockshelter (Ahler 1998; Fowler 1959a and 1959b). In Missouri, closer to the current project area, deeply stratified sites containing Early Archaic components include Arnold Research Cave (Shippee 1966), Graham Cave (Klippel 1971a; Logan 1952), Pigeon Roost Creek (O'Brien and Warren 1985), and a minor component at Rodgers Shelter (McMillan 1976a, 1976b).

Important sites with Early Archaic components in the region are summarized below. The final part of this section summarizes basic data from these sites and other Early Archaic sites to provide general impressions of Early Archaic lifeways.

Northeastern Missouri

Throughout the northeastern Missouri region, Early Archaic components have been identified in a variety of topographic settings. Only a few of the sites, however, have been the focus of intensive archaeological investigations. These sites include Pigeon Roost Creek site, Graham Cave, and Arnold Research Cave.

Pigeon Roost Creek Site

The Pigeon Roost Creek site (23MN732) is located along a small tributary stream valley of Pigeon Roost Creek in Monroe County, Missouri (Teter and Warren 1979). The site was deeply stratified with cultural materials extending in depth up to 330 cm below ground surface. At the site, the Dalton/Early Archaic component was identified in the lower 60 cm of the cultural deposits in the middle portion of Zone III (230–330 cmbgs). This component contained numerous features and activity areas, including up to 10 hearths and a large biface reduction area (O'Brien and Warren 1985:208). Hafted bifaces recovered from this component included Dalton, Kirk, Hardin Barbed, Graham Cave, and Calf Creek (O'Brien and Warren 1983, 1985:218; Teter and Warren 1979). Dispersed charcoal recovered from non-feature contexts within this component produced a single uncorrected radiocarbon date of 8500±220 B.P. (cal. 8220–7060 B.C.; $p = 1.0$ [2σ]) (O'Brien and Warren 1985:211; Teter and Warren 1979:234).

Graham Cave

The Early Archaic component at Graham Cave (23MT2) is represented by the presence of Graham Cave Side-Notched hafted bifaces (Justice 1987; Perino 1968). The Graham Cave hafted biface is a side-notched specimen that is typically long and fairly narrow. This form commonly exhibits a deeply concave base that lacks grinding. Blade edges are typically serrated. Chapman (1975:136) also indicated that the Early Archaic component at Graham Cave contained Dalton, Hardin Barbed, St. Charles, and several other lanceolate forms. Various additional tool classes were also identified in the assemblage,

including cores, adzes, groundstone tools, as well as antler-tip flakers and bone awls (Chapman 1975:145).

Studies of the environmental record from Graham Cave have suggested that during Early Archaic times, the surrounding environment was becoming drier (Klippel 1971a). There was also a corresponding shift in the hunting strategies of the Early Archaic occupants from forest adapted species, such as squirrel, to forest-edge resources, including white-tailed deer and rabbit, by the end of the Early Archaic (McMillan and Klippel 1981:238).

Arnold Research Cave

The Early Archaic component at Arnold Research Cave (23CY64) is represented by a similar suite of cultural materials as other Early Archaic sites throughout the region (Chapman 1975; Shippee 1966). Diagnostic hafted bifaces from the Early Archaic component at Graham Cave included Graham Cave Side-Notched, St. Charles, and a variety of lanceolate hafted bifaces.

Southeast Iowa

The Early Archaic in southeast Iowa is poorly known. Most of the evidence for Early Archaic occupations is known from surface collected artifacts in private collections (Louis Berger Group, Inc., 2001). Several medium- to large-scale phase I surveys throughout the region have identified sporadic use of the landscape during early Holocene times. This evidence is limited to the presence of isolated Early Archaic hafted bifaces. Several sites with Early Archaic components have been identified in the Montrose Bottoms (Artz 1991). In Lee and Henry Counties, Toby Morrow (1995) identified several sites within the project area for U.S. 61 that contained Early Archaic hafted bifaces, including Hardin Barbed, Kirk, Neuberger, and St. Charles.

West-central Illinois

Throughout west-central Illinois, few sites dating to this time span have been the focus of intensive professional archaeological investigations. The limited investigations in the region have identified Early Archaic sites in a variety of topographic settings, including floodplains, terraces, and undissected upland settings. Few sites have been the focus of professional investigations. Several of these are summarized below.

Cochran 10 Site

The Cochran 10 site (11-Wa-140) is a multicomponent stratified, buried upland site located on the summit and shoulder of an upland interfluve overlooking Swan Creek in Warren County, Illinois (Hansen and Nolan 1998). The site was excavated by the Center for American Archeology in the early 1990s as part of the FAP 10 project. The investigations identified both Early Archaic and Late Archaic cultural components at the site. Investigations there consisted primarily of excavation blocks and focused on the Early Archaic component (early Holocene). Over 15,000 piece plotted artifacts were recovered from these excavations. No Early Archaic features were identified during the excavations. No radiocarbon dates were determined for the Early Archaic component present at the site.

The lithic assemblage was composed of both Burlington chert (available from sources located approximately 15–20 km [9.3–12.4 mi] from the site) and locally available lithic raw materials (Hansen and Nolan 1998:301). The nonlocal focus of the composition of the lithic assemblage is rather unusual for Early Archaic components, since many assemblages tend to be comprised of nonlocal raw materials. The lithic assemblage includes early and middle stage bifaces, Thebes Cluster hafted bifaces (including both St. Charles and Thebes types), small flake tools, and end scrapers. Analysis of the recovered cultural materials suggested that the primary activities being conducted on the site were focused on the reduction of locally available lithic raw materials. The analysis also indicated that the site was repeatedly occupied by small groups of people who used Thebes Cluster hafted bifaces (Hansen and Nolan 1998).

Tuttle Site

The Tuttle site (11A1059) is situated along a prominent divide (Nolan 1995; Nolan and Fishel 2008). The site was investigated by a series of surface collections that identified a dense scatter of Early Archaic lithic modified implements, cores, and flake debris. Diagnostic artifacts included two Kirk-like hafted bifaces. The lithic assemblage is dominated by locally available lithic raw materials. The curated tools were typically manufactured from higher quality raw materials. In contrast, the expedient tools, such as flake tools, were made from locally available, poorer-quality cherts.

Serpentine Ridge Site

The Serpentine Ridge site (11A1165) was situated along a narrow terrace (Nolan 1995; Nolan and Fishel 2008). Although most of the site has been disturbed by modern agricultural practices, a small portion (approximately 112 sq m) appeared to be relatively intact (Nolan 1995). The phase II investigations at the site revealed the presence of a small, relatively spatially restricted Kirk component. The investigations recovered a sparse, but diverse Early Archaic lithic assemblage dominated by finer-grained Burlington/Keokuk cherts. A minor amount of nonlocal raw materials were also identified in the assemblage, including a Kirk Corner-Notched hafted biface made from Cobden chert. The lithic assemblage also contained an end scraper, several unhafted bifaces (or preforms), flaked chert adze, several flake tools, and a pitted anvil.

Hardin Horizon

Aside from Kirk, another Early Archaic cultural horizon identified in west-central Illinois is the Hardin Horizon (Nolan and Fishel 2008). This cultural horizon is marked by the presence of the Hardin Barbed hafted biface (Behm 1985; Justice 1987; Luchterhand 1970). Hardin Barbed points have been typically characterized as a style common to the Prairie Peninsula and to the central Mississippi Valley (Behm 1985:52–60; Luchterhand 1970). Hardin Barbed is a distinctive lanceolate hafted biface form possessing an expanding stem that is commonly heavily ground. The later blade edges are typically outward flaring and form a barbed shoulder. Hardin Barbed points are typically resharpened by a combination of left-hand beveling and serration (Munson 1967).

In west-central Illinois, no Hardin Barbed sites have been excavated (Nolan and Fishel 2008). Several sites in the region, however, are known to have Hardin Barbed components, although no professional testing was conducted on those sites. One such site is the Dittmer Site (11A1252) (Nolan and Fishel 2008). This site consisted of a series of three subsurface lithic concentrations that might be related to a series of short-term occupations. As Nolan and Fishel (2008) note, each of the clusters displayed evidence of the production, or use, of expedient tools made from locally-available lithic raw materials. Evidence of curated tools made from higher-quality raw materials was also identified.

One particular characteristic noted is the use of nonlocal, or otherwise exotic, cherts for the production of Hardin Barbed hafted bifaces (Behm 1985: Nolan and Fishel 2008). The use of Payson chert during this time span is well documented and is considered diagnostic of this time span (Fishel 1992; Nolan and Fishel 2008). It had been suggested that during Early Archaic times, this high-quality lithic raw material was readily available as residuum in certain stream beds. During this time, overall climatic conditions were generally cool and moist; however, with the onset of the Hypsithermal (during Middle Archaic times), overall climatic conditions would have caused “the commencement of rapid, large-scale upland erosion and sedimentation downslope about 8450 B.P.” (Hajic 1990:60). This downslope sedimentation would have likely buried the Payson chert sources throughout the region, thus preventing the utilization of these source areas during later prehistory (Fishel 1992).

Lower Illinois Valley

Archaeological investigations throughout the lower Illinois River valley have identified a series of Early Archaic sites in a variety of

topographic settings. Only a few of these early Holocene occupations have been the focus of intensive investigations. Among the more widely known are Campbell Hollow, Koster, Napoleon Hollow, and the Twin Ditch sites.

Campbell Hollow Site

A minor Early Archaic component was indentified at the Campbell Hollow site (11ST144) (Odell 1996; C. Stafford 1985). The site is situated along the toe of a colluvial slope of a small tributary stream as it entered the eastern edge of the lower Illinois River. The site was investigated as part of the Central Illinois Expressway (FAP 408). Intensive investigations at the site identified several cultural components, including a minor sub-plow zone Late Woodland, a Middle Archaic Campbell Hollow phase component (i.e., the upper Archaic component), and an ephemeral Early Archaic component (i.e., lower Archaic component). A single pit was the only identified cultural feature in the Early Archaic component. A single radiocarbon date of 8350±100 B.P. (cal. 7580–7140 B.C.; p = .999 [2±]) from the Lower Horizon places it between Brown and Vierra's (1983) Early Archaic 2 (8700–8450 B.P.) and Middle Archaic 1 (C. Stafford 1985:23). The date was obtained from non-feature context.

The lithic artifact assemblage from Campbell Hollow contained a low number of tools and some flake debris. Although no diagnostic hafted bifaces were recovered from this component, the assemblage contained a moderately diverse lithic assemblage, including unhafted bifaces, blades, burins, retouched flakes, scrapers, a wedge, cores, and a single Dalton-style adze (Odell 1985, 1996). The analysis of the flake debris indicated that many of the lithic reducing activities being conducted were focused on the later stages of biface production. The assemblage was dominated by locally-available Burlington chert.

Subsistence remains belonging to the Lower Horizon are sparse. The faunal assemblage is meager and was dominated by the presence of small to medium sized mammal remains, including squirrel, shrew, marmot, muskrat, rabbit, and others. Only a single piece of white-tailed deer bone was recovered (Colburn 1985). In contrast, the ethnobotanical assemblage was larger and was dominated by hickory nuts along with minor amounts of other mast resources, including black walnut, pecan, and acorn (Asch and Asch 1985a). No seeds were recovered from this component.

The Lower Horizon has been interpreted as a short-term occupation of the site location. Use wear analysis of a sample of the lithic artifacts indicated that activities conducted on-site included woodworking, butchering, and digging activities (Odell 1996:66). In addition, several non-chert tools were also examined and displayed evidence of the grinding and battering of plant remains.

Koster

The Koster site is located on a colluvial fan overlooking Koster Creek along the eastern side of the Illinois River (Brown and Vierra 1983; Butzer 1977; Hajic 1990; Neusius 1982, 1986; Walthall 1999). The intensive investigations at the site revealed the presence of deeply-buried early Holocene cultural deposits dating to the Early Archaic subperiod (Horizons 11–14).

Within these deposits, two Early Archaic components were delineated: Early Archaic 2 (Horizons 11 and 12) and Early Archaic 1 (Horizon 13) (Brown and Vierra 1983:175). The Early Archaic 1 component had been estimated to date to approximately 9000 B.P., although there were no radiocarbon dates (Brown and Vierra 1983). Only a diagnostic artifact, a Kirk Corner Notched hafted biface, was recovered from this deposit.

The Early Archaic 2 "cultural phase" was divided into two separate cultural components (Brown and Vierra 1983). The earlier of the two components, Horizon 12, has not been thoroughly studied at this time. The older of the components, Horizon 11, had been the focus of intensive analyses. This horizon was approximately 50 cm (20 in) thick and contained an artifact assemblage that was considered rather large and diverse by Brown

and Vierra (1983:183). A single radiocarbon date (8500–8350 B.P.) was obtained from the sediments of Horizon 11 (Butzer 1977:29). These deposits were approximately 12–13 m (39–42 ft) below the modern ground surface. Over 30 features were identified at the site, including shallow pits and hearths, and some of the latter were ringed with limestone.

The western portion of the site contained nine human burials, some of which were covered by limestone slabs (Struever and Holton 1979; Walthall 1999). The burials consisted of five adults, including two males and three females, and four infants. The adults were buried in a flexed position. Three of the infants were buried in an extended position, while the fourth was buried in a flexed position (Walthall 1999). Located near the graves were five dog burials; each was located in a separate pit (Morey and Wiant 1992). As Morey and Wiant (1992) note, the dog burials represent one of the earliest dated instances of Canis familiaris from North America.

The artifact assemblage consisted of several diagnostic hafted bifaces, including Dalton, Graham Cave Side Notched, Kirk Corner Notched, LeCroy, and Rice Stemmed, among other unidentified types. Non-diagnostic lithic tools recovered from the component included snub-nosed scrapers, gravers and burins, drills, and hammerstones (Brown and Vierra 1983:181). In addition, Horizon 11 also possessed the earliest evidence of groundstone tools in North America, including both metates and adzes (Struever and Holton 1979:208).

Subsistence remains recovered and analyzed from the Early Archaic 2 component (Horizons 11 and 12) have indicated that a broad range of resources were utilized. Neusius (1986:122) indicated that the faunal assemblage exhibited a “surprisingly broad niche breath.” Terrestrial resources were highly represented in the assemblage and were dominated by the presence of both tree squirrel and white-tailed deer. In addition, freshwater mussels also represent a significant portion of the utilized resources. The paleoethnobotanical resources indicate a reliance on mast resources, including hickory, pecan, black walnut, and acorn (Asch and Asch 1979).

Napoleon Hollow Site

The Napoleon Hollow site (11PK500) is situated along the western edge of the lower portion of the Illinois River. The extent of the Early Archaic deposits is unknown, since this cultural horizon was not excavated due to its depth below plow zone (Wiant et al. 1983:151). The temporal assignment of the Early Archaic deposits was based on their stratigraphic position directly overlying early Holocene sediments (Wiant et al. 1983:152)

Twin Ditch Site

The Twin Ditch site is located on the floodplain of the Illinois River valley in Greene County, Illinois (T. Morrow 1996). Excavations in the southern portions of the site revealed the presence of an intact mid-Early Archaic component (Horizon 2). Features identified during the block excavations included "numerous hearths and adjacent ash and charcoal concentrations" (T. Morrow 1996:348). A possible house floor measuring 2.0 to 2.5 m in diameter was also identified at the site in the northwestern portion of the block. Detailed analyses suggested the presence of two or more occupational episodes in Horizon 2. Modified implements identified at the site included Thebes and St. Charles hafted bifaces, as well as several adzes. Most of the lithic assemblage is comprised of Burlington chert, although small amounts of Keokuk, St. Louis, and Ste. Genevieve cherts were also indentified (T. Morrow 1996:349).

The faunal assemblage is dominated by white-tailed deer and various species of fish (T. Morrow 1996:349). Only wood charcoal was recovered from the horizon; however, there was some indication that the waterlogged conditions of the soil may have hampered recovery techniques. A series of eight radiocarbon dates were derived from the Horizon 2 occupation at the site. The eight dates range from 9510±100 B.P. (cal. 9220–8610 B.C.; $p = 1.0$ [2σ]) to 8740±70 B.P. (cal. 7990–7590 B.C.; $p = .947$ [2σ]), and five of

those dates cluster between 9400 and 9100 B.P. (T. Morrow 1996:347). The Early Archaic component at the site was interpreted as a seasonally-occupied base camp.

Missouri-Mississippi River Confluence

The Early Archaic in the Missouri-Mississippi River confluence region is known primarily by the presence of surface collected, or otherwise isolated diagnostic modified implements, such as hafted bifaces. Only a handful of archaeological sites dating to the Early Archaic have been investigated to date.

Nochta site

The Nochta site (11MS128) is the only known archaeological site in the American Bottom that contained a sizeable Early Archaic component (Higgins 1990). This site, albeit unstratified, contained an expansive buried component containing numerous features, including hearths, pits, and rock concentrations (Higgins 1990). In addition to the previously discussed Dalton component, the Nochta site also had a series of significant Early Archaic components.

Numerous features—including pits, hearths, and rock clusters—situated along the east-central portion of the site were assigned to the Early Archaic on the basis of their proximity to a predominance of diagnostic artifacts outside of feature contexts (Higgins 1990:73–74). Unfortunately, no diagnostic Early Archaic artifacts were recovered from these features.

Early Archaic hafted bifaces recovered from the site included Kirk Cluster, Hardin Barbed, and Bifurcate-Based (MacCorkle-like) specimens, along with additional hafted biface types, such as Rice Lanceolate, Hidden Valley Stemmed, Thebes, Graham Cave, and Rice Lobed (Higgins 1990:59–73). Given the lack of feature context for the hafted bifaces, a "determination of the nature of the settlement type for each of the Early Archaic components at the Nochta site is impossible" (Higgins 1990:75).

The paleoethnobotanical assemblage from the Early Archaic component at the Nochta site consisted of samples analyzed from a 25 percent sample (n = 39) of 156 features, including hearths, pits, and rock clusters (Parker 1990). The assemblage is dominated by mast resources, including hickory/walnut family, hickory, and black walnut. Only 4 seeds were identified from the sample and included sumac, grape, possible black haw, and possible Greenbrier (Parker 1990:235).

Modoc Rockshelter

The previously mentioned Modoc Rockshelter (11RA501) is located in the southern portion of the American Bottom (Ahler 1984, 1998; Ahler et al. 1992; Fowler 1959a and1959b; Styles et al. 1983). A sparse Early Archaic component was identified in the lower and middle strata at the site. Hafted bifaces recovered from this component include a variety of corner- and side-notched specimens that denote an overall shift from earlier lanceolate to those notched forms (Ahler 1998:14–15). Subsistence remains recovered from the Early Archaic component indicate an emphasis on small mammals, particularly squirrel (see Ahler and Styles 1998:137, Figure 11), birds, and fish, along with a variety of nutshells (Ahler and Styles 1998).

Research by Ahler (1984, 1998) examined the settlement systems employed by the Archaic period groups inhabiting the rockshelter and suggested a variety of strategies. He suggested that the Early Archaic occupants at the site were likely either residentially mobile hunter-gatherers or had possessed a settlement system that combined various aspects of residential and logistical mobility in a “hybrid system” (Ahler 1998:96). Evidence suggests that these Early Archaic groups occupied the rockshelter on a short-term, and probably seasonal, basis. These patterns have been interpreted as “indicating episodic use of the site as a residential camp in a residentially organized system” (Ahler and Styles 1998:147).

Other Sites

Big Eddy Site

Located in southwest Missouri, the Big Eddy site (23CE426) is situated along the northern bank of the Sac River (Lopinot et al. 2005a). Extensive excavations at the site have documented the presence of a thick sequence of early Holocene cultural components situated within an alluvial setting (Ray and Lopinot 2005).

Several Early Archaic components were identified within the "Middle Sub member" of the Holocene deposits. In terms of chronological age, the various components consisted of Breckenridge, Scottsbluff, Indeterminate Early Archaic, Cache River, Graham Cave, Rice Lobed, and Hidden Valley. Most of the Early Archaic lithic assemblages were dominated by lithic raw materials procured in the local cherty alluvium. Radiocarbon dates for the various components range from 7030±60 B.P. (cal. 6020–5770 B.C.; p = 1.0 [2σ]) for wood charcoal associated with an unidentified corner-notched hafted biface to 9525±65 B.P. (cal. 9160–8700 B.C.; p = .979 [2σ]) for wood charcoal associated with the Scottsbluff component (Hajic 2005:127).

A total of 15 cultural features were identified in these Early Archaic sediments. These included such feature types as knapping piles, hearths, and rock associations (Ray and Lopinot 2005:227). In addition, several indeterminate features were also identified in these deposits.

The paleoethnobotanical record for the Early Archaic components is sparse, due to what was considered poor preservation combined with post-depositional processes (Powell and Lopinot 2005). Mast resources dominated the meager assemblage, consisting of thick-shelled hickory, walnut, hickory family, and acorn. Unspecified wood charcoal was also present in most samples.

During the Early Archaic, the Big Eddy site was likely to have been occupied on an intermittent basis by small groups conducting specialized extractive activities (Lopinot et al. 2005b). It is also possible that Early Archaic groups may have occupied the site location for extended, or even multi-seasonal, stays, particularly during the Graham Cave and Hidden Valley components (Lopinot et al. 2005b).

Rodgers Shelter

At Rodgers Shelter (23BE125), the post-Dalton Early Archaic component was not well represented. Very sparse Early Archaic cultural materials were indentified in the lower deposits at the site (Stratum 1c). Radiocarbon dates of this stratum range from 10,200±330 B.P. (cal. 10,890–9120 B.C.; p = .984419 [2σ]) to 8100±300 B.P. (cal. 7740–6380 B.C.; p = 1.0 [2σ]) (Ahler and McMillan 1976:124). Within this stratum, most of the Early Archaic deposits were identified in what was considered the stratigraphic unit 10 (Ahler and McMillan 1976:212–213).

The Early Archaic artifact assemblage was sparse, consisting of a small number of lithic artifacts along with a few pieces of faunal remains. Diagnostic lithic artifacts recovered in Stratum 1 included Graham Cave, Hidden Valley, Rice Lobed, and Rice Lanceolate hafted bifaces (Ahler and McMillan 1976). In addition, several Dalton specimens were also recovered from this stratum, suggesting the degree of post depositional disturbances. The meager Early Archaic faunal assemblage included such animals as rabbit, squirrel, and white-tailed deer (McMillan 1976b:215).

Summary

On the basis of information gleaned from the sites described above and from the surrounding regions, various general patterns can be discerned for the Early Archaic subperiod. Early Archaic groups inhabited a range of topographic settings throughout the landscape. Rockshelters were inhabited and may have functioned as short-term, temporary camps. Open-air sites may have functioned in a wider range of settlement types, including base camps.

As is evident by the presence of nonlocal lithic raw materials in numerous artifact assemblages, it appears that Early Archaic

groups were highly mobile, though probably less so than Paleoindian groups. Archaeological data collected from surveys and excavations throughout the American Midcontinent confirm this hypothesis. The formation of most Early Archaic sites likely resulted from short-term occupations by small, highly mobile groups. Sites dating to this subperiod are characteristically small in size and produce limited numbers of functionally restricted artifacts. Chert tools associated with the procurement and processing of fauna are most common, though collection of wild plant resources was undoubtedly important to the subsistence base.

In terms of subsistence, Early Archaic faunal procurement strategies, with little exception, appear as a continuation from those strategies of the Late Paleoindian times. For example, at Koster the "Early Archaic faunal record indicates a generalized approach to animal procurement" (Neusius 1986:136). Early Archaic subsistence appears to have been broadly based and had become more focused on white-tailed deer, freshwater mussels, and hickory nuts sometime after approximately 7500 B.P. (Neusius 1986). Hunting remained important; however, there is increasing evidence for the use and exploitation of wild plant foods as a dietary supplement. The lack of evidence for plant use may be, in part, due to problems with preservation and partly due to how the plants were processed. For example, in Mississippi, the Early Archaic horizons at the Hester site (22MO569) (including components dominated by Dalton, Big Sandy, Decatur, and Pine Tree hafted bifaces), contained the remains of acorn, hackberry, hickory nut, walnut, and wild plum (Lentz 1986). "Most of the foods [recovered in these early horizons] can be consumed fresh without any required grinding, soaking, or cooking" (Lentz 1986:272).

In general, there is a lack of evidence for midden development, pit features, human and dog interments (Koster is an exception), groundstone tools/implements used to process plant foods, and other evidence of long-term and/or intensive occupation. However, thermal features (burned surfaces), charcoal filled pits, and some rock concentrations have been identified at various sites in the tri-state region (Brown and Vierra 1983; T. Morrow 1996).

Based on the available information for the Early Archaic, several expectations for Early Archaic sites in northeast Missouri were made. In general, it was expected that such sites would be of small size, have indications of short-term or non-intensive use, and represent small numbers of people. Subsistence remains, when preserved, should indicate a dominance of hunting with lesser amounts of botanical remains. Deer and squirrel remains should dominate the faunal assemblages, whereas nuts will be the main botanical remains recovered. Chipped stone assemblages will be dominated by few tool types and exhibit evidence of nonlocal chert resources. Few, if any, features would be expected. When present, these features are expected to represent surface hearths and other thermal features.

The close of the Early Archaic is marked by the onset of the Hypsithermal. This climatic episode brought on environmental changes in addition to shifts in cultural patterns reflected in the material culture.

Middle Archaic: The Hypsithermal (circa cal. 6400–3000 B.C.)

Evidence of new lithic technologies used to process a wider variety of resources first appeared in the archaeological record during the Middle Archaic (Chapman 1980; O'Brien and Wood 1998). The increased occurrence of grinding stones and other groundstone tools commonly associated with the processing of vegetal material may actually reflect intensification in the use of plant resources during this time span (sensu Ford 1977). Diagnostic hafted bifaces common to this time include a series of side- and corner-notched forms such as, for example, Godar, Jakie Stemmed, Rice Lobed, and Radatz (Justice 1987).

Beginning in the late Middle Archaic (i.e., Helton phase, see below), the archaeological

record indicates the emergence and development of long distance exchange systems. In the Mississippi River Valley, there is limited evidence that interregional exchange systems began to appear during this time (Jefferies 1996). Based on the extant archaeological literature, two primary lines of evidence have been noted for the exchange systems. First are artifacts manufactured from exotic raw materials, such as copper or galena. The second line of evidence has been linked to the presence of regional "styles," particularly those styles of decorated bone pins (Jefferies 1995, 1996; McNichol 2005; White 2003). It has been suggested that exchange systems such as these were formulated as part of a series of "risk averting mechanisms that compensated for the loss of information and materials formerly obtained though more direct intergroup contact" (Jefferies 1996:233). Thus, these exchange systems would have functioned to ensure the needs of individual groups, be it food, resources, or information.

During the Middle Archaic subperiod, mortuary practices shifted towards more formal cemeteries (Charles and Buikstra 1983). It was argued that the development of formal cemeteries (particularly in the lower Illinois valley) is evidence for increasing sedentism in the region. As competition for limited resources increased, native groups began to bury their dead in formal cemeteries to ritually claim "ownership" or access to a specific parcel of land. In this regard, formal cemeteries can be viewed as ritual locations that serve as corporate group territorial markers for a particular parcel of land.

The Middle Archaic is also distinguished as a time when differences seen in the burial treatment of individuals suggested the marking of status of certain people, particularly with the inclusion of grave goods and burial placement (Charles and Buikstra 1983; Hassen and Farnsworth 1987). For example, in the lower Illinois Valley, the Bullseye site (11GE127) was a Middle Archaic mortuary site that might have contained between 25 and 50 burials (Hassen and Farnsworth 1987:18). The site was situated on the floodplain of the lower Illinois River and was the focus of both amateur and professional investigations. The combined investigations resulted in the recovery of 29 bannerstones—including crescent, "clipped wing," geniculate, tube, reel, and shuttle forms—43 groundstone axes, 45 drills, and 4 copper awls, along with single examples of a drilled plummet and a tubular pipe (Farnsworth 1987). In addition, 296 hafted bifaces, including Godar, Matanzas, and Osceola types, were recovered from the site.

In recent years, several archaeological projects have been conducted investigating aspects of Middle Archaic lifeways. Within the eastern portion of Missouri, such projects included the investigations of sites including Arnold Research Cave (Chapman 1975; Shippee 1966), Graham Cave (23MT2) (Chapman 1975, Klippel 1971a, Logan 1952), Feeler site (23MS12) (Reeder 1982), and Site 23BO971 (Reeder et al. 1983). A summary of sites in the region is provided below.

Northeast Missouri

Middle Archaic sites in northeastern Missouri are sparse, primarily limited to several rockshelter sites, such as Arnold Research Cave and Graham Cave, in the southwestern portion of the region. Additional sites were also identified during the fieldwork for the Cannon Reservoir Archaeological Project (O'Brien et al. 1982) and during various archaeological projects for the Missouri State Highway Commission (Reeder 1982; Reeder et al. 1983). In addition, several sites were excavated in the Long Branch reservoir project in Macon County, just to the southwest of the current project area.

Arnold Research Cave

At Arnold Research Cave (23CY64), the Middle Archaic occupations were represented by relatively mixed sediments within the rockshelter (Chapman 1975; Shippee 1966; Wolverton 2005). As previously mentioned, these mixed deposits precluded a detailed analysis of the stratigraphic record and resulting cultural materials. However, a few generalizations can be made.

Artifacts recovered from the Middle Archaic deposits included a variety of items typical of other Middle Archaic sites throughout the tri-state region. Diagnostic hafted bifaces recovered from these deposits consisted of a series of heavy side-notched forms that were similar to Big Sandy and Jakie Stemmed (Chapman 1975). Additional artifacts included full-grooved axes along with a variety of organic items, such as decorated bone pins (Jefferies 1997), bone awls, and an atlatl hook (Chapman 1975).

The faunal record from Arnold Research Cave suggested that the environmental conditions of the Hypsithermal were witnessed in this region of the state by an expansion of prairie (or grasslands) to the east. The limited evidence of prairie fauna at the site is meager, consisting of several remains including bison (*Bos bison*) and spotted skunk (*Spilogale putoriius*). Accelerator mass spectrometry (AMS) dating of the individual remains resulted in early to middle Holocene dates. A bison femur produced a date of 7016±71 B.P. (cal. 6010–5750 B.C.; p = 1.0 [2σ]), while the AMS dating of a spotted skunk cranium produced a date of 7937±78 (cal. 7050–6650 B.C.; p = 1.0 [2σ]) (Wolverton 2002).

Graham Cave

The Middle Archaic component at Graham Cave (23MT2) consisted of a series of likely short-term occupations. Diagnostic artifacts recovered from these deposits consisted of a series of side-notched specimens, including Big Sandy (some of which were reworked into hafted end scrapers), Raddatz, and Jakie Stemmed examples (Chapman 1975; O'Brien and Wood 1998). Groundstone items included axes (full grooved and three-quarter grooved), manos, metates, and pestles. Additional artifacts recovered from this component were retouched flake tools, prepared cores, antler flakers, and bone awls, among others (Chapman 1975; Klippel 1971a; Logan 1952).

Pigeon Roost Creek Site

At the Pigeon Roost Creek site (23MN732) within the Cannon Reservoir Archaeological Project, the Middle Archaic was represented by cultural materials recovered from the upper portion of Zone III and the middle portion of Zone II (O'Brien and Warren 1982). Little information was available for the Zone III occupation, so the remainder of the discussion will focus on the Zone II occupations (referred to as Middle Archaic I). A series of seven radiocarbon dates were obtained from the Middle Archaic Zone II occupations. These dates range from 6370±100 to 4840±440 (cal 5520–5200 B.C. to 4600–2470 B.C. 2σ) (O'Brien and Warren 1982:103–107).

Diagnostic hafted bifaces recovered from these occupations consisted of a series of side-notched and lanceolate specimens (Curry et al. 1986; O'Brien and Warren 1982). Although specimens were not specifically assigned to existing types, arbitrary classes were employed. The classes identified in the Middle Archaic assemblage included specimens that are similar to Big Sandy, Brewerton-like, Hemphill, Osceola, and Raddatz (Curry et al. 1985; O'Brien and Warren 1986). Curry et al. noted that the side-notched specimens are the best temporal/cultural indicators, since this form does not occur in non-Middle Archaic contexts at the site.

Most of the paleoethnobotanical remains recovered from the Pigeon Roost Creek site were recovered from the Middle Archaic I occupations. Mast resources, consisting of shagbark hickory, black walnut, and hazelnut, comprised the most commonly identified cultural materials (King 1982). In addition to the unidentified wood charcoal recovered, seeds were only represented by a few giant ragweed seeds.

Feeler Site

At the Feeler site (23MS12), Reeder (1982:410–415) identified a small Middle Archaic component in the southwestern portion of the site, approximately 1.2 m (3.9 ft) below the modern ground surface. Only two features could be placed within the component. These were identified as small rock pits that were likely small surface hearths. No radiocarbon dates were obtained

for this occupation. Hafted bifaces related to the Middle Archaic component consisted of both Jakie Stemmed and Big Sandy specimens. Due to the high percentage of decortication flakes recovered during the investigations, it appears that initial trimming and processing of cores likely took place at the site. Based on the recovered archaeological remains, the Middle Archaic component was interpreted as a "small, single use campsite of limited duration" (Reeder 1982:474). The artifact types recovered suggest that the primary Middle Archaic activities being conducted at the Feeler site location included game procurement along with stone tool manufacturing and maintenance activities.

Site 23BO971

At Site 23BO971 (Reeder et al. 1983:96–129), archaeological investigations consisted of a controlled surface collection, two backhoe trenches, and the mechanized removal of the plow zone within a proposed 35 m wide right-of-way. In the investigated portion of the site, 10 features were encountered, consisting of 6 pits and 4 artifact caches. The primary cultural component identified was found at depths ranging from 50–100 cm (19.7–39.4 in) bgs. While the spatial patterning of the artifacts indicates the presence of multiple occupations, it appeared that most of the occupation occurred during the transitional Middle to Late Archaic subperiods (Reeder et al. 1983:124). The presence of numerous side-notched hafted bifaces, including Jakie Stemmed, Matanzas, Rice Lobed, and Raddatz types, indicated the presence of Middle Archaic occupations, whereas the presence of Afton and Etley hafted biface types point to the presence of Late Archaic component(s).

Three radiocarbon dates were obtained from charcoal samples in feature contexts at Site 23BO971. These dates indicated a Late Archaic component at the site; and the dates included 4510±70 B.P. (cal. 3373–3009 B.C.; $p = .956$ [2σ]), 4200±110 B.P. (cal. 3030–2480 B.C.; $p = .989$ [2σ]), and 3790±60 B.P. (cal. 2370–2120 B.C.; $p = .798$ [2σ]) (Reeder et al. 1983:115–122). Based on the available radiocarbon assays for the site, it appeared that the Archaic period component present there was assigned to the Late Archaic, although recovered diagnostic hafted bifaces also indicated a minor Middle Archaic component. The researchers suggested that the occupations at the site location were by peoples that shared a similar material culture: one that was "transitional between the Middle and Late Archaic periods" (Reeder et al. 1983:129).

Site 23MC55

At Site 23MC55, Larry Grantham (1986) documented an Early/Middle Archaic component below the base of the plow zone. The Early/Middle Archaic component appears to represent the most intensive occupation at the site. Investigations there consisted of the excavation of 1-x-1-m units in a block area and the excavation of features. The site was excavated as a part of the Long Branch Reservoir investigations in Macon County, Missouri.

Four cultural features were excavated and thought to be associated with this component. One was a large pit, possibly an earth oven. The other features were small, conical pits. While charcoal samples were collected, no radiocarbon dates were obtained for the site. Hafted bifaces from the Early/Middle Archaic component were generally side-notched forms (Godar and Graham Cave like). A relatively large number of ground stone implements were recovered from the site, and it was determined that they had been used mostly for plant processing. The site was suggested to represent a fall seasonal site.

Site 23MC56

At Site 23MC56, Grantham (1986) documented an Early/Middle Archaic component below the base of the plow zone. The Early/Middle Archaic component appears to represent the most intensive occupation at the site. Investigations there consisted of the excavation of 1-x-1-m units in a block area and the excavation of features (Late Archaic). The site was excavated as a part of the Long Branch Reservoir investigations in Macon County, Missouri.

Nineteen features were excavated at the site. One was determined to be related to the Woodland occupation of the site. The other 18 features were related to the Late Archaic occupation. Hafted bifaces associated with the Early/Middle Archaic component were side-notched forms (Big Sandy like). A number of ground and pecked tools were recovered from the site. The site was suggested to represent a fall seasonal site.

Southeast Iowa

The Middle Archaic in southeastern Iowa is poorly known, since few intensive investigations have been conducted at sites dating to this time span (Hollinger and Benn 2001). Much of the evidence of the Middle Archaic is known primarily from surface collected sites and limited archaeological testing throughout the region. A notable exception is the Gast Springs site (13LA152).

Within southeastern Iowa there have been several phase I surveys that have examined regionwide settlement data and have suggested diachronic shifts in land-use patterns. For example, in the Lake Odessa region, several surveys have shown that the initial heavy occupation of the Mississippi River floodplain occurred during late Middle Archaic times (Benn 1998). Other research has also shown that within the Mississippi River floodplain, Middle Archaic sites tend to be situated along sand ridges near backwater sloughs and lakes (Benn 1992).

Gast Springs Site

The Gast Springs site (13LA152) is situated on a small alluvial fan near the Muscatine Slough in Louisa County, Iowa (Alex 2000; Bettis et al. 1992; Dunne and Green 1998). Deep testing at the site identified a substantial Middle Archaic midden underlying Terminal Archaic–Early Woodland deposits at a depth of approximately 4.5–5 m (14.7–16.4 ft) below ground surface. The deep testing identified a feature that was interpreted as a floor of a pit house (Alex 2000; Bettis et al. 1992). This structure had a pronounced basin and associated subfloor pit. Radiometric dating of charcoal recovered from the subfloor yielded two assays of 5730±90 B.P. (cal 4780–4440 B.C.; p = .941 [2σ]) and 5680±90 B.P. (cal. 4710–4350 B.C.; p = 1.0 [2σ]) (Bettis et al. 1992:39). These dates are consistent with an earlier radiocarbon date of 6215±70 B.P. (cal. 5320–4990 B.C.; p = 1.0 [2σ]) that was obtained from the paleosol in which the house was associated (Bettis et al. 1992:39). Associated cultural materials included flake tools, a biface, a microblade core, along with abundant charcoal, FCR, and burned soil (Alex 2000; Majewski 1992). Subsistence remains recovered consisted of mammal bones—including fish, birds, turtle, and gastropods—and plant charcoal.

Site 13MC134

Site 13MC134 was situated along a bench on the western edge of the bluff overlooking the Mississippi River valley (Benn 2002). Middle to early Late Archaic occupations were indentified in the lower portion of the cultural deposits. Due to extensive mixing of these sediments, only generalizations of the Archaic component(s) were presented. Site function was not assigned for the Middle Archaic component due to the mixing. A single cultural feature (a large roasting pit) was identified in the Archaic component. An unidentified hafted biface was recovered from the feature and may be considered an intrusive artifact.

A minor Middle Archaic Helton phase component was identified at the site on the basis of a Matanzas and a Tama hafted biface. A minor early Late Archaic component may also be present at the site (based on a single Table Rock hafted biface); however, due to the extensive mixing of the sediments, the relation between these cultural deposits was unclear.

West-Central Illinois

The beginning of the Middle Archaic in west-central Illinois is poorly understood and is generally marked by the introduction of a series of expanding stem and corner-notched hafted bifaces (Nolan and Fishel 2008). These hafted biface forms appear to derive from earlier late Early Archaic forms, in such

attributes as haft grinding and overall flaking patterns. These hafted bifaces have been recovered from such sites as Koster (west-central Illinois) and Campbell Hollow (in the lower Illinois valley), as well as sites further south in the American Bottom at the Strong site (Adams et al. 1997; Walz et al. 1998). Hafted biface types include such types as Campbell Hollow and Valmeyer Corner Notched. Later Middle Archaic components, such as those described below, contain a wider assortment of forms, although side-notched specimens tend to be most commonly identified diagnostic hafted bifaces.

Helton phase (circa cal 4650–3800 B.C.)

Throughout the American Midcontinent, Helton phase sites are commonly characterized by the presence of side-notched or stemmed hafted bifaces, such as those of the Matanzas and Karnak Clusters (Brown and Vierra 1983; Cook 1976; Munson and Harn 1966; Nolan and Fishel 2008). As Nolan and Fishel (2008) pointed out, of the several varieties of the Matanzas type discussed by Cook (1976), only the Modal and Fain Side-Notched varieties are comparable to the Matanzas type, as defined by Munson and Harn (1966). There are two primary varieties of the Karnak type (based on the presence of a well-defined shoulder), consisting of either a narrow unstemmed lanceolate or a weakly shoulder type. Nolan and Fishel (2008) also suggest that Godar hafted bifaces should not be unequivocally assigned to the Helton phase, due to their slightly earlier temporal span. Rather, they suggest that there are some generic, side-notched specimens that were being manufactured during this time span.

Archaeological surveys in the Lima Lake region of west-central Illinois have shown that Helton phase occupations appear to be centered on larger residential sites that were located along the bluff and valley margins (Nolan 2004 as cited in Nolan and Fishel 2008). These sites appear to be situated in a way to provide access to various floodplain resources. Smaller extractive camps tend to be located within several kilometers of the larger sites. Larger sites are not limited in distribution to the major valleys, as additional larger sites containing both Karnak and Matanzas hafted bifaces have been identified in the uplands (Nolan and Fishel 2008).

Although much is known concerning the Helton phase throughout the Mississippi River Valley, few sites in western Illinois that contain Helton phase components have been adequately investigated outside the lower Illinois River valley proper (Nolan and Fishel 2008). The vast majority of those sites are either published in CRM reports of limited circulation or are currently unpublished (analyses ongoing).

Lower Illinois Valley

The Middle Archaic in the lower Illinois Valley is fairly well known, based on intensive archaeological investigations during the last 40 years. Intensive excavations at sites such as Koster, Napoleon Hollow, and Campbell Hollow have defined and expanded our knowledge of Middle Archaic lifeways.

Koster

The Middle Archaic components at the Koster are likely some of the most well known cultural sequences in the American Midcontinent. The Koster Middle Archaic is divided into four “cultural phases”—Middle Archaic 1, 2, 3 and Helton—each encompassing several horizons and cultural components (Brown and Vierra 1983). Several of these cultural phases were the center of detailed research—particularly, Middle Archaic 1 and Middle Archaic 2 phases—and became the focus of much research and numerous dissertations and theses (Carlson 1979; Doershuk 1989; Hewitt 1983; Hill 1975; Lurie 1982; Neusius 1982; Wolynec 1977).

The Middle Archaic 1 consisted of a series of eight horizons (Horizons 10B, 10A, 9D, 9C, 9B, 9A, 8F, and 8E). This cultural phase was situated approximately 4.5–7.0 m (15–23 ft) below the modern ground surface (Brown and Vierra 1983:180). The various components identified in the Middle Archaic 1 phase consist of relatively diffuse occupations. Radiocarbon dates from the Middle Archaic 1 component range from 8130±75 (cal. 7350–

6900 B.C.; p = .956 [2σ]) to 7630±210 B.P. (7040–6080 B.C.; p = 1.0 [2σ]) (Brown and Vierra 1983:187).

Hearths or other thermal features were the most commonly identified feature type in the Middle Archaic 1 component, although some roasting pits and other processing pits were also identified in the upper portion of the component. Human burials were only identified in three of the components (Horizons 10A, 9A, and 8F) (Brown and Vierra 1983:183).

Recovered Middle Archaic 1 artifacts included a series of corner-notched hafted bifaces, including what might be considered Campbell Hollow specimens. Numerous groundstone items, such as manos, metates, cylindrical pestles, milling and grinding slabs, and numerous hammerstones, were also recovered from this occupational phase.

The Middle Archaic 2 consisted of a series of occupational zones that possessed higher artifact densities than the underlying Middle Archaic 1 phase (Brown and Vierra 1983; Doershuk 1989; Neusius 1982). This cultural phase included a total of four Horizons (8D, 8C, 8B, and 8A). Radiocarbon dates from this phase range from 7320±70 B.P. (cal 6370–6050 B.C.; p = 1.0 [2σ]) to 6860±80 (cal 5910–5630 B.C.; p = .988 [2σ]), placing it near the older portion of the Middle Archaic (Brown and Vierra 1983:187).

Various features were identified in the cultural deposits of this phase. Surface hearths and other processing pits were commonly identified. Horizon 8C contained the most abundant cultural materials, including a wide range of features. Additional features identified include circular pits and basins, mussel steaming pits, and a mussel shell dump (Brown and Vierra 1983:184). As Brown and Vierra (1983) indicated, the house platforms are the most important of the feature types in Horizon 8C. The best preserved of these platform areas measure approximately 4.5-x-5.0 m (15-x-16 ft) and are rectangular in shape. Rectangular structures are indicated by a series of large post molds that suggest larger, more substantial structures. Hearths and shallow basins were identified within these structures.

Artifactual debris associated with this phase (MA2) is denser than the preceding Middle Archaic 1. Diagnostic lithic artifacts recovered from this phase consist of a series of stemmed and side-notched specimens, including Jakie Stemmed, Table Rock Stemmed, Stone Square Stemmed, and Godar and Matanzas types (Brown and Vierra 1983). It is now known that some of these hafted biface types also continue into the Late Archaic. A fairly diverse antler and bone assemblage was also recovered and included such tools as, antler flakers, bone awls, socketed bone and antler hafts, bone needles, turtle carapace cup, and mussel shell spoon, among other items (Brown and Vierra 1983:183).

The Middle Archaic 3 cultural phase at Koster is represented by Horizons 7B, 7A, 6B, 6A2, and 6A1, although the latter three horizons have been classified as Helton phase (Doershuk 1989:115). For the purposes of the current study, only Horizons 7B and 7A are included in the Middle Archaic 3 phase. Horizons 6B, 6A2, and 6A will be discussed below in the Helton phase section. Horizon 7A was dated to the latter half of the Middle Archaic by a single radiocarbon date of 5825±80 B.P. (cal. 4850–4490 B.C.; p = .988 [2σ]) (Brown and Vierra 1983:187). Diagnostic artifacts consisted of a series of corner-notched hafted bifaces.

Napoleon Component (circa cal 5848–5604 B.C.)

The Middle Archaic Napolean component was identified at the Napoleon Hollow site.

Napoleon Hollow

At Napoleon Hollow (11PK500), a lower Middle Archaic component was identified and underlies the Helton phase occupations (Wiant et al. 1983). In subsequent publications (i.e., Odell 1996) this component was termed the "Napoleon Component," since sufficient information concerning the cultural assignment was not known. Three radiocarbon dates were obtained from this component

ranging from 6630±100 B.P. (cal. 5720–5460 B.C.; p = .944 [2σ]) to 6800±80 B.P. (cal. 5850–5600 B.C.; p = .943 [2σ]) (Wiant et al. 1983:154). Hafted bifaces consisted of a series of unnamed side-notched specimens. No information concerning the faunal or paleoethnobotanical remains have been published.

Campbell Hollow phase (circa cal 6700–6250 B.C.)

The Middle Archaic Campbell Hollow phase was identified at the Campbell Hollow site.

Campbell Hollow Site

In the lower Illinois River valley, the Campbell Hollow phase is represented best by the Campbell Hollow site (11ST144) (C. Stafford 1985). During the analysis, this component was referred to as the upper Archaic component and was separated from the underlying Early Archaic component by approximately 30 cm of sterile sediment.

A total of 17 cultural features were identified in this component and were classified as either hearths (n = 6), pits (n = 5), or refuse accumulations (n = 6). Three radiocarbon dates were obtained from both feature and non-feature contexts. These dates range from 7670±90 B.P. (cal. 6690–6370 B.C.; p = 1.0 [2σ]) to 7560±80 B.P. (cal. 6530–6240 B.C.: p = .952 [2σ]) (C. Stafford 1985:22).

The lithic assemblage was considerably larger and more diverse than the underlying Early Archaic component (Odell 1985). Flaked stone artifacts include hafted bifaces, unhafted bifaces, blades, burins, gravers, various chopping tools, drills, scrapers, edges, sandstone abraders, cores, and an adze. Odell noted (1985:29) that only a few of the hafted bifaces fall within established type descriptions, consisting of a series of expanding stemmed and side-notched specimens. Odell also noted (1985:31) that many of the recovered hafted bifaces show closer affinities to regional Early Archaic assemblages than with other Middle Archaic assemblages. As with the Early Archaic, the Middle Archaic component was dominated by Burlington chert.

The intensive investigations recovered a sizeable subsistence assemblage, including both faunal and paleoethnobotanical materials. The faunal assemblage was diverse, especially when compared to the Early Archaic component, and appeared to have been focused on terrestrial mammal resources (Colburn 1985). Faunal remains recovered consisted of a variety of small- to medium-sized animals, including raccoon, squirrel, beaver, muskrat, rabbit, and white-tailed deer. Additional resources, such as fish, reptile, and avian, were minimally represented in the assemblage. Other than the presence of fish, these combined faunal resources lack seasonality indicators (Colburn 1985:116). The presence of fish suggested spring through early fall.

The paleoethnobotanical assemblage was more substantial and diverse than that recovered from the Early Archaic component (Asch and Asch 1985a). In terms of overall count and weight, the assemblage was dominated by the presence of various mast resources. In fact, thick-shelled hickory accounted for approximately 90 percent of the identified nutshell. Additional mast resources included bitternut hickory, pecan, black walnut, butternut, hazelnut, and acorn. Wood charcoal consisted of elm, oak, and ash, along with minor amounts of black walnut, mulberry, hickory, and honey locust. Seeds were present in extremely small amounts and included single examples of sumac, grape, giant ragweed, wild bean, and maygrass (a probable contaminant).

The Middle Archaic component at the site was interpreted as short-term residential occupation (C. Stafford 1985:250). Spatial analysis of the cultural features suggested that the site was occupied by a small number of individuals. C. Stafford (1985) noted that this component was similar, in terms of spatial arrangement and lithic data, to the Middle Archaic 1 component at Koster (particularly Horizons 10B and 10A). Those horizons were

interpreted as the result of short-term occupations.

Helton phase (circa cal. 4500–3600 B.C.)

In the lower Illinois Valley the Helton phase is well known, due to the intensive archaeological investigations conducted in the region—particularly by those excavations conducted by the Center for American Archeology (CAA) and Northwestern University (Brown and Vierra 1983; Doershuk 1989; Odell 1996;C. Stafford 1985).

Koster

At Koster, the Helton phase is represented by Horizons 6B and 6A1 (Brown and Vierra 1983; Doershuk 1989). Brown and Vierra (1983:185–186) also included Horizon 7A in the Helton phase, although as previously discussed, Doershuk (1989:115) placed this horizon in the Middle Archaic 3 cultural phase. Several radiocarbon dates were obtained from feature contexts in the Helton phase component (Brown and Vierra 1983). The dates range from 5305±75 B.P. (cal. 4270–3980 B.C.; p = .932 [2σ]) to 4880±250 B.P. (cal. 4240–3010 B.C.; p = .999 [2σ]) (Brown and Vierra 1983:187).

Horizon 6A (Brown and Vierra 1983:185) is a thick and dense midden accumulation containing abundant limestone. Cultural features are abundant in this cultural phase and included many diverse feature types associated with food preparation, including shallow basins, pits, and possibly deeper storage pits (Brown and Vierra 1983). Shallow pit ovens were also identified, consisting of long shallow linear trenches. Several house platforms of the same type described in the Middle Archaic 3 were identified in these deposits. As with the Middle Archaic 3 structures, these Helton phase examples also contain internal hearth and other features.

Within the Horizon 6A deposits, 25 human burials were identified. The graves were arranged in a series of two “distinct burial plots” (Brown and Vierra 1983:185). The first group consisted of children and adolescents buried in the northwestern portion of the site, while the second group, comprised of individuals possessing various physical aliments, was located within the primary occupational area.

The Helton phase component contained abundant cultural materials comprising both nonorganic and organic artifacts. Diagnostic hafted bifaces recovered included Karnak, Matanzas, Godar, Helton, and Brannon Side Notched (Cook 1976). The flaked stone tools included drills, scrapers, gravers, and burins, among others. Among the groundstone tools present were axes (both three-quarter and full grooved), manos, metates, milling slabs, sandstone abraders, plummets, pendants, and hematite beads.

Organic artifacts identified included awls, turtle carapace cups, bone beamers, beaver tooth chisels, socketed antler projectile points, shell spoons, shaft straighteners, and a fishhook (Brown and Vierra 1983:185). A series of decorated bone pins were also identified from the site (Cook 1976; Jefferies 1995, 1997; White 2003). In addition, items of nonlocal origin, such as galena and copper, were also recovered in the Helton phase deposits.

Campbell Hollow Site

The Campbell Hollow site (11ST144) contained a series of deeply stratified components (C. Stafford 1985; Odell 1996). Two buried Archaic components were identified at the site, including the previously discussed Early Archaic component and the Middle Archaic component (i.e. Upper Horizon).

The first Archaic component, the Upper Horizon, dates to the Middle Archaic subperiod. Three radiocarbon dates, ranging from 7670±90 B.P. (cal. 6690–6370 B.C.; p = 1.0 [2σ]) to 7560±80 B.P. (cal. 6530–6240 B.C.; p = .957 [2σ]), firmly place this component during the early portion of the Middle Archaic (C. Stafford 1985:22). Seventeen features were indentified from the Upper Horizon, including pits, refuse accumulations, and hearths. Diagnostic lithic artifacts recovered from the Upper Horizon

include Matanzas, Godar, and other Helton phase hafted bifaces.

Subsistence remains in the Upper Horizon were more plentiful than in the Lower Horizon and consisted of a wider variety and diversity of taxa and species. The paleoethnobotanical assemblage was dominated by mast resources, particularly hickory nuts (with 90 percent by count) (Asch and Asch 1985a). The faunal assemblage, comprising both terrestrial and aquatic species, from the Middle Archaic component is more diverse than that of the Lower Horizon (Colburn 1985). The assemblage was dominated by a wide variety of small to medium mammals, including squirrel, rabbit, beaver, muskrat, and white-tailed deer. The aquatic resources recovered included geese and duck, along with a series of fish species: bowfin, catfish, and bullhead, among others (Colburn 1985).

The Helton phase component at Napoleon Hollow has not been extensively published, although summary information has been provided by a series of researchers, including Odell (1996) and Wiant et al. (1983). This component, also known as the upper Middle Archaic, is represented by a series of at least three distinct occupational surfaces with five associated radiocarbon dates ranging from 5140±70 (cal. 4070–3760 B.C.; p = .963 [2σ]) to 6080±90 B.P. (cal. 5230–4780 B.C.; p = 0.993 [2σ]) (Wiant et al. 1983:154). Several features were identified, including surface hearths and pits.

Diagnostic lithic artifacts from this component include several side-notched Middle Archaic forms, including Matanzas and Godar types, along with a series of unidentified side-notched and lanceolate forms. Use-wear analysis of the lithic assemblage identified activities involving cutting and scraping of wood, bone, and small amounts of softer materials (Odell 1996:97–98.). Lithic reduction activities were also being conducted on-site.

Quasar Site

Intensive multiyear investigations by the CAA at the Quasar site (11GE136) identified stratified Middle and Late Archaic deposits (Goatley 1998). The site is situated along the east bank of the Illinois River. The CAA investigations resulted in the excavation of 41 test units (105 sq m) totaling approximately .7 percent of the site area.

A late Middle Archaic Helton phase component was identified in Stratum 2, the most intensively occupied horizon at the site. The age of this component was determined by two radiocarbon assays that appear to tightly date this occupation (Goatley 1998:273). The first date, 5360±100 B.P. (cal. 4360–3970 B.C.; p = 1.0 [2σ]), was obtained from a mix of nutshell and wood charcoal from non-feature contexts. The second date, also from non-feature context, was 5220±80 B.P. (cal. 4260–3910 B.C.; p = .929 [2σ]). A total of 30 features were identified in this stratum (Goatley 1998:274–277). Twenty-two of the features were pits and have been interpreted as having been associated with food processing. Four of these pits contained abundant mussel shell. Six features were identified as dense piles of mussel shells. Also identified were 2 flexed human burials, each having been placed within shallow basins. Neither contained diagnostic grave goods.

Diagnostic lithic artifacts recovered from this stratum included hafted bifaces that are similar to other Helton phase assemblages in the lower Illinois Valley, such as at Koster and Napoleon Hollow. Diagnostic Middle Archaic hafted bifaces included Godar, Helton, and Matanzas. Additional specimens, such as Etley, Snyders, and a Triangular, were also recovered from this stratum. Numerous metates, manos, and other groundstone tools were also recovered, leading the author to suggest the high degree of plant processing during this time span (Goatley 1998:275).

Based on the available data, Goatley (1998:278) had suggested that the late Middle Archaic Helton phase occupants likely used the site location as combined residential and extractive camps—perhaps as a multi-seasonal logistical camp. He pointed to a short-term occupation of the site, based on the lack of deeper storage features and residential

structures. Occupations may have focused on the collection of aquatic resources, particularly freshwater mussels.

Missouri-Mississippi River Confluence

In the confluence region, the Middle Archaic is not exceptionally well known and, like other regions under discussion, is marked by the introduction of expanding stem and corner-notched hafted bifaces. Although much of the evidence for occupation of the region derived from isolated diagnostics, surface collected materials, and private collections, several sites have been the focus of intensive investigations. Many of the archaeological excavations have been conducted under the guise of transportation related projects, particularly those within the American Bottom proper and those in east-central Missouri.

Middle Archaic artifacts typically consisted of a series of side and corner-notched hafted bifaces along with a variety of stemmed specimens. Side-notched forms include Brannon Side Notched, Matanzas, and Robinson types. Stemmed and corner-notched examples, such as Jakie Stemmed and Table Rock, are also routinely recovered at Middle Archaic sites in the region, including Nochta (Higgins 1990) and Strong (Adams et al. 1997).

Dennis Hollow phase (circa 5700–5450 B.C.)

South of the confluence region in the southern American Bottom, the Dennis Hollow phase has been recently identified as a local, previously unrecognized early Middle Archaic manifestation (Adams et al. 1997; Walz et al. 1998). Currently, this phase is only known by a single site: the Strong site (11MO841) (Adams et al. 1997; Walz et al. 1998).

Strong Site

The Strong site (11MO841) is located on a narrow upland ridge along the eastern bluffline of the Mississippi River Valley in Monroe County, Illinois. Investigations were undertaken at the site in advance of construction activities associated with the relocation of the modern community of Valmeyer, Illinois. Phase III investigations conducted at the site revealed the presence of 66 cultural features that were arranged in a series of 4 feature clusters along the ridge (Adams et al. 1997:35–37). A series of 6 radiocarbon assays were determined from charred nutshell and wood charcoal samples deriving from 6 individual cultural features at the site. These dates range from 6870±80 B.P. (cal. 5910–5630 B.C.; p = .983 [2σ]) to 6560±90 B.P. (cal. 5640–5340 B.C.; p = 1.0 [2σ]) (Adams et al. 1997:39–40; Walz et al. 1998:170).

Subsistence remains recovered from the site were dominated by a rather substantial paleoethnobotanical assemblage along with a small faunal assemblage. The vast majority of the botanical remains (analyzed from a sample of 23 features) were charred nutshell, including thick- and thin-shelled hickory, black walnut, and walnut. A small amount of charred seeds were recovered, including American lotus, rush, grape, and goosefoot. The botanical remains indicated a heavy reliance on the collection and utilization of hickory nuts, including both upland and floodplain species. The highly fragmented faunal assemblage included pieces that were not identifiable below the level of class due to the fragmentary nature of the assemblage. The 65 pieces were identifiable as amphibian, mammal, large mammal, and vertebrate (Adams et al. 1997:77).

Investigations at the site have identified a distinctive hafted biface form that appears to be diagnostic of the Dennis Hollow phase. This hafted biface type, Valmeyer Corner Notched, is corner-notched/expanding stem. Bases appear to be heavily ground, and this grinding extends along the lateral stem edge. The authors suggest that this form “represents a link between earlier corner-notched point styles such as Kirk or Stillwell, and Late Archaic types such as Falling Springs” (Walz et al. 1998:183).

At the time of the site’s publication, the authors acknowledge that the spatial extent of the Dennis Hollow phase beyond the southern

American Bottom is unknown, and that the Strong site represents the only known Dennis Hollow phase in southwestern Illinois (Adams et al. 1997). The Dennis Hollow phase has been tentatively dated between 6900 B.P. and 6500 B.P. and is the initial Middle Archaic phase immediately preceding the slightly later Nochta phase (Walz et al. 1998:183).

Nochta phase (circa cal. 4550–4150 B.C.)

The Nochta phase is known primarily from the Middle Archaic component at the Nochta site.

Nochta Site

The Nochta phase has been recently defined by the analysis of cultural materials recovered from the Nochta type site (11MS128) (Higgins 1990). Based on currently available literature, additional sites have not been assigned to this phase.

As previously discussed, the Nochta site is situated along a sandy ridge in the Mississippi River floodplain. Excavations at the site revealed the presence of substantial Middle Archaic occupations. Approximately 220 cultural features in 5 feature clusters were identified in the Middle Archaic portion of the site. Features included various pits, rock clusters, burials, a post mold, and a large rectangular feature.

Four radiocarbon dates were obtained from the Middle Archaic component, and all were collected from feature contexts (Higgins 1990:108). One of the dates, 6890±170 B.P. (cal. 6070–5490 B.C.; p = 1.0 [2σ]), was considered too early to accurately date the Middle Archaic component. The remaining three dates range from 6490±90 B.P. (cal. 6520–5310 B.C.; p = 1.0 [2σ]) to 6180±120 B.P. (cal. 5380–4830 B.C.; p = .989 [2σ]) (Higgins 1990:108).

Diagnostic lithic artifacts recovered from the site primarily consisted of a narrow spectrum of side-notched hafted bifaces, including Brannon Side Notched, Matanzas, and Robison (Higgins 1990:81–84). The Robison specimens are small side-notched forms that are relatively thick and exhibit shallow side notches (Perino 1985). Additional corner-notched and stemmed specimens were also recovered, including the Jakie Stemmed and Table Rock types. The hafted bifaces, as an assemblage, were similar in composition to those recovered from the Middle Archaic 2 component at Koster and to possibly the Helton phase in the lower Illinois valley (Higgins 1990:83). In particular, the artifact assemblage recovered from the site bears a strong resemblance to early Helton phase materials from the lower Illinois valley (Higgins 1990:114).

A modest-sized subsistence assemblage (dominated by plant remains) was recovered from the site. The faunal remains were calcined and highly fragmented. No remains were identified beyond class level, and these remains consisted of primarily fish and small mammal. A more substantial paleoethnobotanical assemblage was recovered and analyzed (Simon 1990). Charred nutshell comprised the majority of the assemblage, accounting for approximately two-thirds by weight (Simon 1990:241). Charred nutshell included a variety of mast resources, including walnut family (thick shelled hickory, pecan, bitternut, black walnut) and acorn. A small percentage of the charred wood was identified and consisted of hickory, oak, ash, coffeetree/honey locust, and sycamore. Only six seeds and seed fragments were identified from the Middle Archaic deposits, consisting of four eroded fragments, a single grass seed, and a single marshelder seed. Overall, the assemblage compared favorably to other late Middle Archaic to Late Archaic sites in the Midwest.

Summary

By Middle Archaic times, environmental conditions in the American Midcontinent were essentially modern, as remnants of the Pleistocene vegetation had disappeared throughout the landscape (O'Brien and Wood 1998). The overall climate became warmer and drier and created, on a local level, drastically new vegetation communities that shifted from deciduous forests to prairies (Chapman 1975; Delcourt and Delcourt 1985;

Klippel 1971b; McMillan and Klippel 1981). Upland regions became drier, with a concomitant decrease in the local water table, creating drought-like conditions. There also appears to have been a concomitant shift in the faunal resources in many areas of the American Midcontinent. It was a time of "maximum warmth and dryness" (Morse and Morse 1983:99) that witnessed an increase in grasslands at the expense of bottomland forests and swamps. Summer droughts became a common feature of the yearly cycle.

The environmental conditions caused by the onset of the Hypsithermal were not generalized over much of the American Midcontinent and eastern Woodlands. Rather, the Hypsithermal created a series of localized environments that brought about localized patterns of resource utilization. Because of the local nature of the environments, the Hypsithermal likely influenced the adaptive strategies of the native groups during this time.

The Hypsithermal had a major effect on the foraging efficiency of mid-Holocene hunter-gatherers throughout Missouri (Wolverton 2005). For example, efficiency increased from the middle to late Holocene (Middle to Late Archaic) near Rodgers Shelter and Arnold Research Cave, as humans relied more heavily on high-rank prey (i.e., white-tailed deer) during the late Holocene. In fact, white-tailed deer became the focus during the Late Holocene. At Rodgers Shelter, the apparent focus on cottontail rabbits during the early and middle Holocene likely reflected the substantial expansion of grasslands in the western portion of Missouri. During the preceding early Holocene, Archaic peoples likely foraged across multiple landscapes and topographic zones (particularly the uplands). By the Middle Archaic, however, the human use of the landscape shifted towards the bottomlands, near rivers and streams (Brown and Vierra 1983; Phillips and Brown 1983). Population shifts to more riverine environments have been suggested as facilitating the general trend of increasing sedentism of these native groups (i.e., Brown 1985).

In areas further east, such as in southern Indiana, Stafford (1994) has suggested that changing vegetation resulted in heterogeneous upland resource availability in the region. According to this model, the patchy resource base was exploited through a logistical collector strategy, which represented a change from the generalized foraging of the preceding time span. These groups appear to have practiced a generalized foraging strategy, occupying a variety of base camps and procurement/processing locations. Rockshelters and caves were frequently utilized (Chapman 1980; McMillan 1965; Roberts 1965).

Styles and Klippel (1996) examined the faunal assemblages of several Archaic sites throughout the Southeast and Midwest regions of the United States. They suggested that on a local scale, the "environment is important in configuring the focus and mix of subsistence pursuits" (Styles and Klippel 1996:115). They suggest that the faunal record at many sites throughout the region displays generalized regional trends towards more use of aquatic resources throughout the Holocene and an increased emphasis on white-tailed deer from the early to middle Holocene. However, they suggest that much of the variation seen in the faunal record at various sites could be explained as changes and differences in local resource availability (Styles and Klippel 1996).

For example, at Modoc Rockshelter, the early to middle Holocene trends seen in the Archaic period faunal record are best interpreted within longer-term trends recorded for the resource-rich areas of the lower Illinois and central Mississippi River valleys (Styles 1993). The declining exploitation of squirrel during this time span was linked to an overall shift into more open forested areas in the region (Styles and Klippel 1996:131–132). Similarly, the overall increase of white-tailed deer remains in Holocene faunal assemblages further support this shift into forest-edge environments.

Based on these data, Middle Archaic occupations in northeast Missouri can be

characterized as follows. Relative to Early Archaic sites, there should be an indication of increased sedentism and evidence of the exploitation of bottomland and riverine resources. While the hunting of deer is still important, there is an increase in the use of aquatic animal sources. Mast resources are also important plant resources. Diagnostic hafted bifaces are expected to be side-notched. Chipped stone industries are expected to be dominated by local raw material sources. In addition to the chipped stone assemblage, ground stone tools are expected. These may include axes (full grooved and three-quarter grooved), bannerstones, and plant processing tools (manos, metates, and pestles). Pit features, in addition to surface hearths, would also be expected at sites representing longer-termed occupations.

Late Archaic: The Late Holocene (circa cal. 3000–600 B.C.)

During the Late Archaic, there was a shift in hafted biface morphology, reflecting the increasingly local and regional nature of the various native groups. Many of the earlier side- and corner-notched forms gave way to a variety of lanceolate, stemmed, and corner-notched varieties, including those of the Merom, Late Archaic Stemmed, Nebo Hill, Wadlow, Etley, Ledbetter, and Saratoga Clusters (i.e., Justice 1987; Parks 2006).

Despite a variety of new projectile point forms identified, the majority of the lithic tools present in Late Archaic lithic assemblages do not differ significantly from the Middle Archaic. A slight shift in the variety of Late Archaic artifact types is apparent. Core and flake scrapers appear to replace formalized end and side scrapers that are typical of earlier periods. Also, expedient flake tools tend to dominate various assemblages. In addition, groundstone tools, such as grooved axes and bannerstones, appear to play a more important role in the organization of technology during this time span (Chapman 1975; Jefferies 1990).

Throughout the American Midcontinent, ceramics are not well known during the Late Archaic. For instance, excavations at only a few Nebo Hill phase sites (in northwestern Missouri and eastern Kansas) have yielded evidence of fiber-tempered ceramics (Reid 1984b). Fiber-tempered ceramics were recovered from Site 23CL11, a Nebo Hill site situated in northwestern Missouri (Reid 1984a). Radiocarbon dating of nutshell charcoal recovered from a sealed hearth yielded a date of 3555±65 B.P. (cal. 2040–1740 B.C.; .965 [2σ]). Three additional dates were also obtained from the component, although these dates were considered to be in error and did not date the Nebo Hill component (Reid 1984a:58).

During the Late Archaic, cultures became more varied, as each group tailored its own brand of subsistence strategy for maximum exploitation of locally available resources. Hunting, fishing, and plant processing activities carried out in a seasonal round pattern of exploitation appears to characterize Late Archaic subsistence strategies (i.e., Cook 1986; Winters 1967, 1968, 1969). This strategy continued into the Woodland period. In some cases, a focal-oriented adaptive strategy is associated with the Late Archaic to the Early Woodland period (Cleland 1976). The following attributes indicate this trend (Stevens 1991:208–209): 1) base camps are located in riverine or estuarine settings; 2) increased reliance on riverine and estuarine resources (including shellfish and fish) as well as the increased use of plant resources; 3) increase in the amount of woodworking and land clearing tools; 4) increase in the number of tools associated with plant resources; 5) storage technology (e.g., storage pits, stone and ceramic vessels) appears; 6) increase in the number, size, and type of features present at base camps as well as the presence of house patterns; 7) evidence of increased sedentism through time (more features and thicker middens); 8) increased population; and 9) change in production where larger, more cooperative labor groups were required to clear fields, construct fish weirs and dams, conduct fish drives, gather shellfish, or cultivate seed crops. Catlin et al. (1982) developed a model that suggested that

settlement-subsistence focus on riverine and estuarine settings was the result of pronounced warm and dry periods during the early Sub-Boreal Episode (circa 2350 B.P.). These environmental conditions led to the shift in the distribution of resources within these settings, enhancing their diversity and density. Native peoples had to alter their subsistence-settlement strategies by involving exchange and more intensive exploitation of certain resources to reduce the increased risks due to reduction of group mobility.

Late Archaic mortuary practices, particularly cemeteries, are more well known than those of the preceding time spans. Cemeteries dating to the Late Archaic have been identified throughout much of the American Midcontinent, at sites such as the Burial site (Bacon and Miller 1957), the Airport site (Roper 1978), and the Hartford Church Cemetery (Farnsworth 1993; Montet-White 1968). It is during this time span that burial mounds first appear in the archaeological record of the eastern Woodlands (Russo 1996; Sassaman 2005). In Missouri, however, burial mounds appear to be slightly later phenomena, post-dating many of the early Late Archaic mounds of the lower Mississippi River Valley. For example, the Hatten Mound I, located in the central Salt River valley in Monroe County, Missouri, is the oldest documented burial mound in the state (Klepinger and Henning 1976; O'Brien 1985b). The three radiometric dates from the site range from 2210±65 B.C. to 500±55 B.C. (O'Brien and Warren 1982:286). Although there is a Late Woodland component to the site, the lower portions of the mound, below a rock layer, were assigned to the Late Archaic.

The presence of grave goods associated with Late Archaic burials suggests a degree of social status differentiation (Warren and O'Brien 1982). While it is still unclear based on the current archaeological record, the differences in social status, as seen through funerary items, could have been the force in the establishment of the long distance exchange networks (Ford 1977; Reeder et al. 1983:54–55).

Throughout the tri-state region, the most extensive research on the Late Archaic has been conducted in the Missouri-Mississippi River confluence region, particularly in the American Bottom region of Illinois. Much of the work was conducted by University of Illinois at Urbana-Champaign under the auspices of either Resource Investigation Program (RIP) or Illinois Transportation Archaeological Research Program (ITARP) as part of various Illinois Department of Transportation (IDOT) projects, including FAI-270 (Bareis and Porter 1984) and FAP-310 (Jackson et al. 1998). Relatively large numbers of sites were examined as a result of those IDOT projects, including Go-Kart North (Fortier 1984), Labras Lake (Yerkes 1987), Dryoff (Emerson 1984), Nochta (Higgins 1990), McLean (McElrath 1986), and Missouri Pacific #2 (McElrath and Fortier 1983). The major sites and phases in the region dating to this time span are discussed below.

Northeast Missouri

The Late Archaic in northeastern Missouri is not exceptionally well known, due to the lack of intensive professional archaeological investigations in the region. The limited investigations that have been conducted at several sites provide much of the information known of this time period. Sites tend to be clustered along many of the upland streams throughout the region, especially in the Missouri River valley, the Cuivre River, and Salt River valley.

Sedalia phase (circa cal. 2800–600 B.C.)

The Sedalia phase has been previously discussed as the Sedalia Complex (i.e., Chapman 1975). This complex has been described as a Late Archaic manifestation characterized by the presence of a series of lanceolate and stemmed hafted bifaces, including Etley, Sedalia, and Wadlow specimens. Additional flake stone artifacts, including Clear Fork Gouges and Sedalia Diggers, have also been assigned to the Sedalia phase.

Booth Site

The Booth site (23MN242) was located on a ridge overlooking the south fork of the Salt River (Cook 1976; Klippel 1969; O'Brien 1985a). Excavations at the site were conducted as part of the Cannon Reservoir Human Ecology Project. The excavations revealed the presence of a Titterington phase occupation. Faunal and paleoethnobotanical remains and analysis were not reported in the report.

No cultural features were identified; however, abundant cultural materials were recovered. A series of diagnostic hafted bifaces were recovered, including Etley, Sedalia, and Wadlow specimens. Groundstone tools included numerous grinding stones, manos, hammerstones, and a three-quarter grooved axe.

The site was interpreted as a single component Sedalia phase occupation, although a small number of Middle Archaic and Woodland artifacts were present. The analysis of the artifacts identified the presence of high gloss polish on various flakes that was interpreted as the result of plant processing activities. The presence of the groundstone items also suggested plant processing activities.

Pigeon Roost Creek Site

The Late Archaic component at the Pigeon Roost Creek site (23MN732) was represented in the lower portion of Zone I (O'Brien and Warren 1985). It was situated below a compact layer of limestone slabs, which were deposited during the Late Woodland subperiod. Two radiocarbon dates were obtained from Late Archaic contexts at the site: 2900±250 B.P. (cal. 1690–500 B.C.; p = .989 [2σ]) and 2910±160 B.P. (cal. 1460–800 B.C.; p = .992 [2σ]) (O'Brien and Warren 1986:81).

Most of the diagnostic hafted bifaces recovered from the Late Archaic component were identified as Etley/Stone Square Stem and Sedalia. Additional corner-notched hafted bifaces were also recovered from the component.

Subsistence remains from the Late Archaic component were sparse. Charred nutshell identified in the assemblage included hickory, black walnut, hazelnut, and acorn (King 1982). Identified seeds included sumpweed, possible giant ragweed, and possible persimmon seeds. Wood charcoal was also identified, although species composition was not reported. A small amount of faunal remains were recovered, consisting of white-tailed deer, soft-shelled turtle, turkey, and eastern cottontail (Bozell and Warren 1982).

Site23MC56

A Late Archaic component was documented at Site 23MC56 during the Long Branch Reservoir project in Macon County, Missouri (Grantham 1986). Unit and feature excavation was conducted at this site. Portions of a Late Archaic component were situated below the base of the plow zone. These portions included 18 features.

Hafted bifaces from the site were generally square stemmed types similar to Etley. A number of ground and pecked stone tools were also recovered from the Late Archaic component.

A structure was also documented that was suggested to be part of the Late Archaic component. A late summer though fall, and possibly winter, occupation is suggested for the site (Grantham 1986:174).

Southeast Iowa

The Late Archaic subperiod in southeastern Iowa is better known than the preceding time span. When compared to the preceding time span, the Late Archaic is marked by an increase in site density throughout the region (Alex 2000). The increase in site density, along with the variety of diagnostic hafted bifaces, has been interpreted as a population increase throughout the region (T. Morrow 1995).

Excavations throughout southeastern Iowa have identified four Late Archaic cultural complexes. As intensive investigations have

not been conducted in the region, three of these complexes are only briefly described.

Hemphill-like complex (circa 3800–2800 B.C.)

The Hemphill complex is the earliest Late Archaic cultural manifestation in southeastern Iowa. This complex is similar to the Hemphill phase (circa 3800–2800 B.C.) of west-central Illinois (Alex 2000). Sites dating to this time span include the lowest levels at the Sand Run Slough West site. Diagnostic hafted bifaces associated with this complex consist of a series of small to medium-sized side-notched specimens (similar to Godar and Matanzas), as well as larger side-notched Osceola specimens (Alex 2000:73). Additional artifacts included T-shaped drills and three-quarter grooved axes.

Titterington-Sedalia-Nebo Hill Culture (circa 2900–700 B.C.)

The second Late Archaic complex in the region is referred to as the Titterington-Sedalia-Nebo Hill Culture (TSN Culture) (Alex 2000; McElrath 1993). Sites dating to this time span are known throughout the tri-state region. Of these individual phases, the Nebo Hill phase is centered further west outside the AOS project area in western Missouri along the lower Missouri River (Chapman 1975; Reid 1983, 1984a). The similarity in the TSN material cultural has led researchers to group these phases together under a single rubric: TSN Culture. As McElrath (1993:150) observed, it is likely that the various Titterington, Sedalia, and Nebo Hill groups "interacted to a significant degree and can be viewed as representing a culture (TSN)."

Diagnostic artifacts from this time span consist of a variety of stemmed and lanceolate hafted bifaces, including Etley, Karnak, Nebo Hill, Sedalia, and Wadlow. To a lesser degree, Smith Basal Notched and Stone Squared Stem specimens have also been identified from TSN sites (Alex 2000:73). Additional artifacts that have been identified include flaked stone gouges and "Sedalia diggers" (Chapman 1975) along with drills, grinding stones, and three-quarter grooved axes. Ceramics have not been identified in TSN sites in southeastern Iowa.

Unnamed Terminal Archaic (circa 1100–700 B.C.)

Alex (2000:74) discussed an unnamed Terminal Archaic complex that is present in southeastern Iowa. This complex has been identified by the presence of particular stemmed hafted bifaces, including the Dryoff, Springly, and Mo-Pac types. Additional artifacts recovered from these sites related to this complex include scrapers and drills, along with groundstone items, such as manos, metates, celts, and plummets. Objects made from galena and hematite are also common. Artifact assemblages from this complex are similar to Terminal Archaic Prairie Lake sites further south in the American Bottom.

Terminal Archaic (circa 1150–650 B.C.)

The Terminal Archaic in southeastern Iowa is not well known. Most of the information of this time span is known from surface collected artifacts. Only a few Terminal Archaic sites have been investigated. Only the Gast Springs site will be described in detail.

Gast Spring Site

The best known of the Terminal Archaic sites in the region is the Gast Spring site (13LA152) (Bettis et al. 1992; Dunne and Green 1998). The site is situated on an alluvial fan sitting along the western edge of the Mississippi River. Intensive investigations at the site identified that the cultural deposits ranged from Middle Archaic through Late Woodland subperiods. A small Terminal Late Archaic/Early Woodland component was identified (Dunne and Green 1998). During the excavations of the early 1990s, only a single feature (Feature 3) was assigned to the Terminal Archaic. Unfortunately, no diagnostic artifacts were recovered from this feature. Two radiocarbon dates of 3060±70 B.P. (cal. 1460–1120 B.C.; $p = 0.98$ [2σ]) and 2800±45 B.P (cal. 1060 B.C.–830 B.C.; $p = .98$ [2σ]) were obtained from charred plant material (Dunne and Green 1998:50).

The paleoethnobotanical remains from the Terminal Archaic feature were dominated by unidentified wood charcoal. No nutshell was identified in the samples. Seeds comprised a minor amount of the analyzed samples and consisted of little barley, amaranth, goosefoot, purslane, and carpetweed. Of particular interest, direct dating of three of the little barley seeds resulted in the earliest known date for little barley in the eastern United States (circa 2800±45 B.P.; cal. 1060–830 B.C.; p = .986 [2σ]) (see above).

West-central Illinois

In their recent summary of the Archaic period, Nolan and Fishel (2008) discussed several Late Archaic phases in terms of a single Titterington Horizon. This horizon encompasses several related phases throughout the west-central Illinois region, including Titterington, Sedalia, and Nebo Hill phases, as well as the recently defined Mule Road phase. When combined, these phases are characterized by the presence of large stemmed and lanceolate hafted bifaces, including such types as Etley, Sedalia, Nebo Hill, and Stone Squared Stemmed, along with Mule Road and Ledbetter. Additional diagnostic tools also include both Clear Fork Gouges and Sedalia Diggers (Chapman 1975; McElrath 1993; Nolan and Fishel 2008). The similarity in these phases led McElrath (1993:150) to discuss them in terms of a single culture, the Titterington–Sedalia–Nebo Hill cultural entity (TSN culture). McElrath noted that the similarities seen in each of these phases are likely the result of interaction between the various groups.

Titterington phase (circa cal. 2500–1900 B.C.)

The Titterington phase was identified as the Titterington Focus by Griffin (1952b). It was originally defined on the basis of several Archaic mortuary sites in the greater St. Louis area. Later archaeological investigations coined the term Titterington phase for those Late Archaic sites in west-central Illinois, northeastern Missouri, and in the Missouri-Mississippi River confluence regions.

Nolan and Fishel (2008) argue that many sites have been routinely assigned to the Titterington phase on the basis of scant data. As they note, the Titterington phase actually comprises multiple phases and complexes throughout the region (the TSN culture as described by McElrath 1993). Nolan and Fishel (2008) suggested that if the Titterington phase is to be used as a local cultural entity, it should be limited by a number of factors. This phase should be relegated to those sites that contain a high proportion of Etley and Wadlow hafted bifaces. In addition, the use of this phase should be limited to the Missouri–Mississippi River confluence region, the American Bottom, and a small portion of east-central Missouri—the geographic location where the Titterington phase was first defined.

For the purposes of this brief cultural history, only those sites situated close to the confluence region of Illinois and Missouri will be discussed.

Koster

One of the most widely known Titterington phase occupations in west-central Illinois was identified in Horizon 4B at the Koster site (Brown and Vierra 1983; Cook 1976; Doershuk 1989). Identified cultural features consisted of only hearths and limestone-rich roasting pits (Brown and Vierra 1983). No radiocarbon dates were available for this component; however, two dates for overlying deposits were obtained that provide terminus post quem dates for the Titterington phase component. These dates were 3950±75 B.P. (cal. 2640–2200 B.C.; p = .985 [2σ]) and 2980±70 B.P. (cal. 1400–1010 B.C.; p = 1.0 [2σ]) for Horizon 4 (Brown and Vierra 1983:187).

Cultural materials identified in the Titterington component included items such as scrapers, gouges, drills, gravers, and other flaked stone implements. Numerous groundstone artifacts were also recovered. These consisted of manos, metates, hammerstones, three-quarter grooved axes, sandstone abraders, and hematite beads. Among the diagnostic hafted bifaces were a variety of stemmed and lanceolate forms,

including Etley, Sedalia, and Wadlow specimens (Cook 1976).

Brush College School Site

Another Titterington phase site is the Brush College School site (11PK488) located in Pike County, Illinois (Felix 2005; B. Stafford 1994). The site was originally excavated as part of the Central Illinois Expressway, U.S. Route 36 (FAP–408) (B. Stafford 1994). The site is situated on an upland terrace overlooking several unnamed intermittent streams. Investigations at the site identified the presence of a modest-sized Titterington phase occupation. These investigations revealed the presence of three pit features and nine lithic concentrations. A modest-sized artifact assemblage was recovered from the site. Flake debris comprised the vast majority of the assemblage. Diagnostic Late Archaic hafted bifaces, recovered from both the ground surface and from feature contexts, consisted of Sedalia specimens (B. Stafford 1994:45). Two Middle Archaic specimens were also identified in the assemblage.

Raw material procurement and utilization strategies were focused exclusively on locally-available Burlington chert. Of a subsample of the flake debris, non-Burlington chert comprised less than .25 percent of the assemblage (Felix 2005).

Recovered subsistence remains were sparse. Unlike nearby Late Archaic sites, the paleoethnobotanical assemblage was not dominated by the presence of charred nutshell (Schroeder 1994). In fact, nutshell comprised a minor portion of the overall paleoethnobotanical sample and consisted of thick-shelled hickory, black walnut, and unspecified walnut family. Only five seeds were recovered from feature contexts, of which only one was identified as erect knotweed (Schroeder 1994:110).

Based on the results of the analyses, the Brush College School site appears to be a short-term occupation (Felix 2005:46). The lack of midden deposits, coupled with few pit features, was also viewed as evidence of a short-term occupation. Due to the sparse paleoethnobotanical remains, the site does not appear to be related to a special purpose extractive site.

Miscellaneous Terminal Archaic Sites

In addition to the previously mentioned Late Archaic sites, several other sites have been investigated that do not fall into the established cultural historic sequence for the region. These sites have not been assigned to a specific phase. Only the Seiwell site will be discussed.

Seiwell Site

The Seiwell site (11P344) is located in Peoria County, Illinois, and is situated along a bluff top location overlooking Kickapoo Creek (Alvey 1993). The site was investigated by Resource Investigation Program (RIP) in 1987 for a borrow area as part of a bridge replacement project. The investigations identified nine cultural features, consisting of pits, basins, and rock concentrations. A single radiocarbon date of 2940±70 B.P. (cal. 1320–970 B.C.; $p = .940$ [2σ]) was obtained from Feature 1 and indicated a Terminal Archaic occupation for the site (Alvey 1993:162).

Two hafted bifaces were recovered from the investigations, including an indeterminate corner-notched specimen that is similar to other Late Archaic types in the American Bottom (such as the Mo-Pac type) (Alvey 1993:163). Other cores and modified implements recovered included two multidirectional cores, scrapers, wedges, a gouge, a drill base, several manos, hammerstones, and pitted stones. The flaked stone lithic assemblage was dominated by Burlington chert, a resource that appeared to have been collected in the local till deposits. Fire-cracked rock and rough rock were recovered in significant quantities, accounting for the vast majority of the cultural materials recovered from the site.

The author suggests that the site likely functioned as an upland plant-processing location, although the recovered paleoethnobotanical remains do not entirely support the authors interpretation (Alvey

1993:164). The analysis of the features and feature contents indicate that all of the features functioned, in part, as either hearths or some other type of thermal features. Tool maintenance activities, and not tool manufacture, were the primary lithic reduction activities being conducted on site.

Lower Illinois Valley

Only two Late Archaic phases from this region of Illinois have been delineated. These are the Titterington and Kampsville phases (Nolan and Fishel 2008). Each will be briefly discussed.

Titterington phase (circa cal. 2300–1900 B.C.)

The Titterington phase is the most widely known cultural manifestation from the lower Illinois valley. Two of the main sites in the region with Titterington components are Napoleon Hollow and Koster. Each will be briefly described.

Napoleon Hollow Site

The Titterington phase component at Napoleon Hollow (11PK500) has been summarized by a variety of researchers, including Odell (1996). This component is represented by three radiocarbon dates, 4060±75 B.P. (cal. 2880–2460 B.C.; p = 1.0 [2σ]) and 3920±90 B.P. (cal. 2640–2140 B.C. p = .985 [2σ]) (Wiant et al. 1983:154) (see below for discussion of third date). The radiocarbon samples were collected from two pit features (Features 23 and 20, respectfully). Temporally diagnostic hafted bifaces recovered from the Titterington component included Kampsville Barbed, Nebo Hill, Etley, and Sedalia types (Odell 1996; Wiant et al. 1983). The latter two types were considered important in the formulation of the Titterington phase at Koster in Horizon 4 (Cook 1976; Odell 1996). Additional lithic artifacts included adzes, axes, ground celts, and "hoe chips" (i.e., resharpening flakes detached from a digging implement) (Odell 1996:81). Although the standard thought suggests that their presence on the site indicates that agricultural activities were being conducted on-site, Odell (1996:86) suggested that the digging implements may have been used in the excavation of storage pits, earth ovens, or postholes. Additional tools recovered from the site included drills, scrapers, hammerstones, and manos (Odell 1996; Wiant et al. 1983).

Subsistence remains from the Titterington component indicate a reliance on local resources (Asch and Sidell 1988). Analysis of the paleoethnobotanical remains have identified the earliest evidence of domesticated marshelder in the eastern United States (Smith 2006). The seeds were recovered from a Titterington phase pit, were indentified as a domesticated variety, and were dated to cal. 2640–2140 B.C. (see above). An additional AMS date obtained from 20 marshelder seeds from the same feature produced a date of 3920±40 B.P. (2490–2290 B.C.; p = .963 [2σ]). This date provided a "confirmation that I. annua had been brought under domestication in the eastern United States by circa 4400 B.P." (Smith 2006:1223).

Koster

Little is known of the Titterington phase occupation at Koster (Brown and Vierra 1983; Cook 1976). Horizons 4 and 4A have been assigned to the Late Archaic subperiod, and the Titterington phase had been assigned to Horizon 4 (Cook 1976). According to Cook (1976:43), only .01 ha of the site was excavated during the 1969 and 1970 investigations. These investigations resulted in the identification of six Titterington cultural features. The features consisted of hearths and limestone-rich roasting pits. One burial was identified along the northern portion of the site (Brown and Vierra 1983:186). Two radiocarbon dates were obtained from the Late Archaic deposits at the site, including 2980±70 B.P. (cal. 140–1010 B.C.; p = 1.0 [2σ]) and 3950±75 B.P. (cal. 2640–2200 B.C.; p = .985 [2σ]) (Brown and Vierra 1983:187).

Diagnostic artifacts consisted of Etley, Sedalia, and Wadlow hafted bifaces (Cook 1976). Additional artifacts recovered from this component included scrapers, heavy duty scrapers/gouges, drills, gravers, unifaces, and

retouched flakes. Groundstone tools consisted of manos and metates, worked hematite, sandstone abraders, three-quarter grooved axes, hammerstones, and a drilled plummet. Several pieces of worked bone were also recovered from the site.

Kampsville phase (circa 1300–600 B.C.)

In recent years, archaeological investigations throughout the uplands of the lower Illinois River valley have identified a series of Terminal Archaic Kampsville phase occupations. These components appear to be similar to contemporary Prairie Lake phase sites further south in the northern American Bottom. These Kampsville phase sites appear to be similar to what Farnsworth and Asch (1986:340) refer to as the "Prairie Lake Culture" of the Missouri-Mississippi River confluence region of Illinois and Missouri. In terms of diagnostic artifacts, these phases share a variety of artifacts, including corner-notched and expanding stemmed hafted bifaces (e.g., Kampsville Barbed), as well as grooved plummets (Farnsworth and Asch 1986).

Axedental Site

The Axedental site (11PK751) is situated along a bluff crest overlooking Blue Creek. Both Late Archaic and Late Woodland artifacts and features were identified during the investigations. The Late Archaic Kampsville phase component was represented by scattered artifacts along the landform along with four pit features and a lithic artifact concentration (Nolan and Fishell 2008; B. Stafford 1994). A single radiocarbon date of 2600±70 B.P. (cal. 910–510 B.C.; p = 1.0 [2σ]) was obtained from one of the features at the site (B. Stafford 1994:70).

Excavations at the site recovered a sizeable artifact assemblage that was dominated by unmodified flake debris (B. Stafford 1994). A variety of modified tools and cores were also identified at the site, including bifaces, adzes, drills, retouched flakes, hammerstones, manos, and pitted stones. Most of the diagnostic hafted bifaces recovered from the site were Late to Terminal Archaic, most of which were Kampsville Barbed specimens. Additional Late Archaic examples included Etley and Sedalia.

The paleoethnobotanical analysis indicated a strong reliance on upland resources, particularly various mast resources (Schroeder 1994). Thick-shelled hickory was the most commonly identified nutshell, followed by black walnut and pecan. Wood charcoal is dominated by oak and hickory, and a minor amount of black walnut/butternut was also identified.

Although the investigations were limited, the site was interpreted as a small upland residential site that likely provided access to upland resources, including both mast resources and white-tailed deer (B. Stafford 1994:149). Stafford had suggested that the site did not fit into existing Archaic period settlement models. She pointed out that "this lack of congruence with known data sets is due to the lack of investigation in upland settings" (B. Stafford 1994:149). In contrast, Nolan and Fishel (2008) indicate that the site boundaries were never established and that given the diversity of the artifacts present, they suggest that the site represents a base locale.

Miscellaneous Late Archaic Sites

In addition to the previously mentioned lower Illinois River valley Late Archaic sites, several additional sites have been investigated that do not fall into the established cultural historic sequence for the region. These sites contain components that differ slightly from other lower Illinois valley sites and show affinities to sites outside the region. Only the Quasar site will be discussed in detail.

Quasar Site

The Quasar site (11GE136) is situated along the east bank of the Illinois River. Investigations at the site revealed the presence of a Late Archaic component situated directly below the plow zone and above of the earlier Helton phase component. This component was only identified in a small area of the site where modern agricultural activities had not disturbed the deposits. Three surface hearths

and associated cultural debris were identified as belonging to this component. The three hearths were closely spaced and were associated with numerous artifacts, including several expanding stemmed hafted bifaces and a mano and metate. A single radiocarbon date of 4200±45 B.P. (cal. 2820–2660 B.C.; p = .689 and 2900–2830 B.C.; p = .284 [2σ]) was obtained from non-feature derived charcoal (Goatley 1998:273).

The recovered artifact assemblage further indicated a Late Archaic temporal/cultural assignment to this component. Diagnostic hafted bifaces recovered from the component included Etley, Godar, Godar/Osceola, Helton, Matanzas, and a Merkle. At the time of the publication, no faunal or paleoethnobotanical analyses have been conducted.

Little can be interpreted of the Late Archaic component, due to the limited spatial distribution of the deposits. Prior to the excavation of the site, few diagnostic artifacts, such as expanding stemmed hafted bifaces, characteristic of the Falling Springs phase had been identified in the lower Illinois valley. Goatley noted (1998:290) that the Late Archaic component at the site likely represented "the first Falling Springs phase occupation in the lower Illinois valley."

Missouri-Mississippi River Confluence

A total of five phases have been identified for Late Archaic occupations throughout the Missouri-Mississippi River confluence region, particularly for the American Bottom region of Illinois and regions further west in east-central Missouri. These phases include Falling Springs, Titterington, Mule Road, Labras Lake, and Prairie Lake. Much of the following discussion has been summarized from several volumes of the FAI-270 project.

Falling Springs phase (circa cal. 3400–2900 B.C.)

The Falling Springs phase was initially defined in the American Bottom as a complex in the late 1970s (Kelly et al. 1979). This phase is the first post-Helton cultural manifestation in the region. Helton style hafted bifaces are common on Falling Springs phase sites, although a variety of expanding-stem specimens were being manufactured at this time. These forms are sometimes confused with late Middle Woodland/early Late Woodland corner-notched specimens, such as Manker (Nolan and Fishel 2008).

McLean Site

The McLean site (11S640) is located in a dissected upland setting approximately 1 km (.6 mi) east of the Mississippi River Valley bluffline (McElrath 1986). The site was investigated as part of the FA1-270 highway project. The investigations at the site consisted of both mechanized removal of the plow zone and subsequent feature excavation. A Late Archaic Falling Springs phase component was represented by the presence of approximately 164 cultural features, including both straight-sided, flat-bottomed pits as well as shallow basin pit features. Two radiometric dates were obtained from charred plant materials from feature contexts (McElrath 1986:106). These dates were 4360±120 B.P. (cal. 3360–2840 B.C.; p = .903 [2σ]) and 4600±75 B.P. (cal. 3530–3090 B.C.; p = .961 [2σ]). No faunal remains were recovered from feature contexts.

Cultural materials recovered from the site were typical of other nearby Falling Springs phase occupations throughout the American Bottom region. A series of untyped expanding-stem and side-notched hafted bifaces were recovered from both feature and non-feature contexts. Additional Late Archaic artifacts included drills, scrapers (including both hafted and unhafted specimens), and a series of groundstone tools, including manos and grinding stones, hammerstones, slot abraders, and a full-grooved axe.

The paleoethnobotanical remains recovered from the site are characteristic of other American Bottom Late Archaic assemblages. Charred nutshell comprised the largest proportion of the paleoethnobotanical remains (Johannessen 1986). This mast resource included hickory, black walnut, walnut/hickory, pecan/bitternut, hazelnut, and butternut. Wood charcoal was most commonly

identified as red oak group and hickory, followed by white oak group, unspecified oak, elm family, mulberry, and persimmon. Identified charred seeds consisted a variety of resources that included marsh elder, ragweed, knotweed, goosefoot, along with single specimens of American lotus, erect knotweed, blackberry, grape, and wild bean. Analysis of the marsh elder (*Iva cf. annua*) seeds indicated that these were not domesticated and were likely wild varieties.

The site was interpreted as functioning as a specialized camp. The site was likely occupied on a seasonal basis. Based on the recovered paleoethnobotanical remains, it was likely occupied from the summer to fall. Site activities likely included nut processing. On the basis of the scrapers, both hide processing and wood working were also suggested.

Truman Road Site

The Truman Road site (23SC924) was situated on an alluvial fan along the western edge of the Mississippi River floodplain proper in St. Charles County, Missouri (Harl 1999). The site was investigated as part of a Federal Highway Administration funded, City of St. Charles project for the construction of an access ramp for Route 370. Investigations at the site consisted of hand excavated test units, mechanized plow zone removal, and the excavation of cultural features. The excavations at the site revealed the presence of 255 Late Archaic features, consisting of basins, inslanted pits, deep pits, and bell shaped pits (Harl 1999:24). Five of the Late Archaic features contained 8 human burials (Feature 182 contained 4 individuals) (Spence 1999). In addition, a minor Middle Woodland occupation was also identified at the site.

A total of seven radiocarbon dates were obtained from Late Archaic feature contexts (six from features and one from a burial) (Harl 1999:135). These dates range from 4890±70 B.P. (cal. 3800–3620 B.C.; p = .813 [2σ]) to 4000±70 B.P. (cal. 2700–2300 B.C.; p = .930 [2σ]) (Harl 1999:135). These dates place the Late Archaic occupations during the initial portion of the Falling Springs phase. In fact, several of these dates appear to actually predate the Falling Springs occupation.

Cultural materials recovered from the site are consistent with other Falling Springs sites throughout the confluence region. Diagnostic hafted bifaces recovered from feature contexts included a series of stemmed and notched specimens, representing both late Middle Archaic and Late Archaic forms (Harl 1999). Hafted biface types included Etley/Stone Squared Stemmed, Helton, and Smith Basal notched specimens. A series of untyped medium-sized expanding stemmed specimens were also recovered and were assumed to specifically belong to the Falling Springs phase occupation. Additional cultural materials recovered from the site consisted of drills, hafted end scrapers, and flaked adzes. Groundstone tools included manos, metates, pestle, a bannerstone, net weight, hematite plummets, as well as both full-grooved and three-quarter grooved axes.

Most of the flaked lithic assemblage was composed of Burlington chert, a resource that was not readily available at the site location. This resource was available to the west in the neighboring drainage.

Subsistence resources identified at the site included both paleoethnobotanical and faunal remains. Paleoethnobotanical remains were analyzed from a small subsample of the Late Archaic features (Wright 1999a). Charred plant remains were dominated by the presence of charred nutshell, including hickory, walnut, acorn, black walnut, and hazelnut. Recovered charred seeds consisted of a narrow spectrum of non-domesticated species, including Chenopodium, grass, persimmon, and grape. Wood charcoal was not identified.

A robust faunal assemblage was recovered from a small sample of Late Archaic features (Styles and White 1999a). Only those faunal remains that were recovered from the dry screened sediments (larger than .25 in) were subjected to analysis. Both terrestrial and aquatic resources are well represented in the assemblage. Of the aquatic resources, fish was most commonly represented, with buffalo sucker accounting for a high percentage of the

identified fish. Both freshwater mussel and frog were also identified. Of the terrestrial animals, white tailed deer was the most commonly identified mammal, followed by raccoon and squirrel. Birds were also commonly represented, including duck, dabbling duck, American coot, mallard duck, Canada goose, and turkey (Styles and White 1999a:120–121).

The site had been interpreted as a residential camp on the basis of the recovered artifact assemblage. A wide range of artifacts were recovered from the site, suggesting that generalized activities were typically being conducted on-site (Harl 1999:140–141). The site was likely occupied on a seasonal basis—from summer to spring—as was evident by the occurrence of fish and mast resources.

The presence and condition of several burials at the site further suggests its nonritual or nonspecialized nature. Several of the burials were subsequently disturbed during the Late Archaic by the excavation of pit features (Harl 1999:141). It appears that there was no concerted effort to re-inter those disturbed remains.

Titterington phase (circa cal. 2800–2500 B.C.)

The Titterington phase was originally defined as a focus by Dr. Paul F. Titterington, a local collector from the region (Titterington 1950). Research at the Koster site (i.e., Cook 1976) reformulated the archaeological entity and redefined Titterington as a phase (McElrath 1993). This assignment has been made primarily on the basis of diagnostic hafted bifaces, including Etley, Sedalia, and Wadlow, along with the Clear Fork Gouge. Titterington phase occupations have been identified on either side of the Mississippi River, in both Missouri and in Illinois.

Go-Kart North Site

The Go-Kart North site (11MO552N) is situated in the Mississippi River floodplain along the eastern bank of the Hill Lake Meander Scar in Monroe County, Illinois (Fortier 1984). Archaeological investigations at the site were conducted as part of the FAI-270 project. The investigations at the site identified the presence of intensive Late Archaic Titterington phase component(s). The investigations consisted of mechanized plow zone stripping followed by the hand excavation of cultural features.

Investigations revealed the presence of a linear array of features concentrated in four spatially discrete concentrations along the northeastern–southwestern trending landform. A total of 209 Late Archaic features were identified at the site, consisting of basins, pits (including flat bottomed, irregular bottomed, and bell-shaped examples), artifact concentrations, lithic activity areas, tool caches, and "special artifacts" (Fortier 1984:27).

A total of seven radiocarbon dates were obtained from Late Archaic Titterington feature contexts (Fortier 1984:182). These dates range from 4020±100 B.P. (cal. 2880–2290 B.C.; $p = 1.0$ [2σ]) to 4130±75 B.P. (cal. 2890–2560 B.C.; $p = .946$ [2σ]). When calibrated at the 2-sigma level, these dates span the entire Titterington phase (circa cal. 2800–2500 B.C.). At the time of the Go-Kart North investigations, these dates were the first radiometric assays for the Titterington phase in the Midwest.

Cultural materials were recovered from both feature and non-feature contexts throughout the site. Diagnostic artifacts consisted of a series of straight-stemmed and expanding stemmed hafted bifaces, including specimens of the Etley, Stone Square Stemmed, Wadlow/Sedalia, and Benton specimens (Fortier 1986:78–110; McElrath 1993:150). Additional lithic artifacts included drills, gouges, wedges, scrapers, retouched flakes, and chert hammerstones. A diverse groundstone tool assemblage was also recovered from the site, consisting of metates/grinding stone, manos, pitted stones, mauls/pestles, ground celts, and a three-quarter grooved axe.

A modest sample of paleoethnobotanical remains were recovered from feature contexts at the site (Johannessen 1984). Charred nutshell was the most commonly identified

charcoal identified at the site. Most of the nutshell consisted of thick-shelled hickories; however, other mast resources, such as pecan and bitternut, black walnut, butternut, chestnut, and acorn were also recovered in appreciable quantities. Wood charcoal was scarce in the analyzed sample and included minor amounts of honey locust, Kentucky coffee-tree, mulberry, and red oak group, among others. The scarcity of wood charcoal was noted by Johannessen (1984:169). Seeds were very scarce at the site; only 59 individual seeds were identified in the flotation samples (Johannessen 1984:176). Identified seeds included grass, American lotus, bedstraw, maygrass, and knotweed. In addition, single examples of erect knotweed, dock, mint (?), watershield (?), and black haw (?) were also indentified in the assemblage.

The results of the paleoethnobotanical analysis suggested that the nearby environment was utilized in the procurement of plant resources. The wood charcoal indicated that the inhabitants of the site had collected firewood from the vicinity of the site—from both floodplain and upland settings. As Johannessen noted (1984:177), many of the seeds are characteristic of wet habitats.

Identifiable faunal remains were scarce; most of the remains were highly fragmented and heavily calcined (Fortier 1984). White-tailed deer remains were most commonly identified at the site. Fish remains were present and included catfish and buffalo fish. The preservation issues (i.e., biases towards deer or large mammal remains) were likely an indirect result of Late Archaic cooking practices that consisted of the use of shallow roasting pits and hearths, rather than due to acidic soil conditions (Fortier 1984:179).

The site was interpreted as a single component Titterington phase occupation (Fortier 1984:183). The linear patterning of the features, coupled with the lack of feature super-positioning and lack of multiple-zone features, were interpreted, by Fortier, as representing a single component occupation, possibly by a series of multifamily units (Fortier 1984:183). In fact, Fortier had suggested that the linear nature of the site layout may be interpreted as a planned community (1984:192).

Hayden Site

Another east-central Missouri Titterington phase site is the Hayden site (23SL36) (Harl 1998). The site is situated on a bluff top overlooking the Missouri River in western St. Louis County, Missouri. In 1993, after several months of extensive unauthorized digging, the site was professionally excavated prior to the construction of a proposed housing development project (Harl 1998:235).

A total of 109 cultural features containing diagnostic Titterington artifacts were excavated during the phase III excavations (Harl 1998:237). These features were exposed along the topographically high portion of the landform in a roughly oval shaped area approximately 70 m (230 ft) north–south and 60 m (197 ft) east–west.

Radiocarbon assays were determined for four features at the site. The four dates range from 4080±70 B.P. (cal. 2780–2480 B.C.; p = .804 [2σ]) to 3930±60 B.P. (cal. 2580–2280 B.C.; p = .961 [2σ]) (Harl 1998:254). In conjunction with the Etley Cluster hafted bifaces, the dates support the Titterington phase assignment for most of the Late Archaic occupations at the site.

Flotation samples were collected from each of the 109 features at the site. These samples produced a rather modest paleoethnobotanical sample. Flotation samples derived from 63 features were analyzed. These analyzed samples indicated a dominance of nut resources, including hickory, walnut, black walnut, acorn, and hazelnut. Other plant resources were also identified as feature contexts, such as goosefoot, knotweed, grass, marsh elder, and giant ragweed seeds. Additional plant resources included pawpaw, persimmon, grape, and sumac. Faunal remains were sparse and consisted of small calcined pieces of unidentifiable bone fragments.

The lithic assemblage contains a large number of diagnostic Titterington phase hafted

bifaces, including 172 Etley specimens (from either sub-plow zone deposits or from feature contexts) and 75 Stone Square Stemmed specimens (sub-plow zone deposits). In addition, hafted bifaces assigned to other Middle and Late Archaic phases were also identified at the site, including Helton-like, Afton Corner Notched, Osceola-like, Godar, and Burkett-like. Other tools identified from the Titterington component included early and middle stage bifaces, cores, scrapers, drills, adzes, hammerstones, abraders, along with single examples of a drilled river pebble and a bannerstone. In addition, 48 pieces of hematite were recovered from feature contexts. Although an analysis detailing the lithic raw material composition was not provided in the published article (i.e., Harl 1998), it appears that the majority of the flaked stone tools were manufactured from Burlington chert: a resource that is exposed at the base of the bluff below the site.

Lithic reduction activities and the production of long-bladed hafted bifaces and preforms appear to have played a substantial role in the organization of activities being conducted on-site during Titterington phase times. The author even goes as far as to suggest that the site inhabitants may have been producing Etley Cluster hafted bifaces, and associated performs, for exchange with other native groups (Harl 1998:254).

The analysis of the site structure and cultural materials recovered from the site indicated that the site served as a residential settlement, rather than a locus of repeated short-term occupations (Harl 1998:254). The spatial arrangement of the features appears to suggest that the location of previous features were known to the site inhabitants. Few features were overlapping with one another. The wide variety of tools recovered indicated that an equally wide range of activities were being conducted on-site.

Mule Road phase (circa cal. 1900–1550 B.C.)

In the American Bottom, the Titterington phase is followed by the recently defined Mule Road phase (McElrath 1993). Evidence for the Mule Road phase appears to be limited to a reanalysis of the Late Archaic component at the George Reeves site (McElrath 1993; McElrath and Finney 1987).

George Reeves Site

At the George Reeves site (11S650), the Mule Road phase is represented by a single uncorrected radiocarbon date of 1760±120 B.C. (McElrath 1987:47). This date was determined for a feature that produced a hafted biface similar to the Ledbetter type of the mid-South (McElrath 1987:62–71).

The material culture for the Mule Road phase is marked by a suite of lithic artifacts similar to those assigned to the Titterington phase of the Prairie Peninsula. These items include Ledbetter-like hafted bifaces referred to as the Mule Road Class I (i.e., Burkett or Mulberry Creek types) and Mule Road Class II (i.e., Ledbetter/Pickwick types) (McElrath 1987: 62–71; McElrath 1993:152). Bell-shaped pestles also appear to be highly diagnostic during this time span, although a single specimen has been recovered from the George Reeves site (McElrath 1993:153).

It has been suggested that the Mule Road phase represents the local manifestation of mid-South Late Archaic culture (McElrath 1993:150–154). In particular, the Mule Road phase represents the intrusion of group(s) into the American Bottom that were associated with the Ledbetter culture. McElrath (1993:154) had suggested that this intrusion(s) may have taken place by one of two primary routes. The first may have been north through the Tennessee River Valley into Kentucky, along the Ohio River, and finally entering into the American Bottom from the Mississippi River Valley. The second possible route extends from the lower reaches of the Tennessee River Valley westward into northern Mississippi, and then north along the Mississippi River Valley into the American Bottom.

Labras Lake phase (circa cal. 1750–1400 B.C.)

In the American Bottom, numerous sites assigned to the Labras Lake phase have been excavated, although these sites have been

somewhat difficult to differentiate from the Prairie Lake and Mule Road phases that temporally bracket the Labras Lake phase (Fortier 1996). Although there appears to be a technological overlap of their respective artifact assemblages, particularly when examining hafted bifaces, Labras Lake sites are usually marked by the presence of Riverton-like hafted bifaces, such as Merom Expanding Stem and Trimble Side Notched (Fortier 1996:100).

A four part settlement model has been devised for the Labras Lake phase (Emerson et al. 1986:250–252). This model consisted of four site types: 1) base locales that were associated with a medium to large sedentary group; 2) base camps that were associated with a single band; 3) residential extractive camps that were occupied by residential groups; and 4) extractive loci that were occupied by special purpose task groups and were occupied for a short period of time (Emerson et al. 1986).

Marge Site

The Marge site (11MO99) is located on an older colluvial terrace along the Mississippi River floodplain in Monroe County, Illinois (Fortier 1996). The site was excavated during the FAI-270 Archaeological Mitigation Project. The investigations at the site consisted of auger probes, a hand-excavated test unit, mechanized removal of the plow zone, and feature excavation. Several components were identified. These consisted of two Late Archaic components and a Terminal Late Woodland/Emergent Mississippian occupation. Most of the Late Archaic occupation at the site was assigned to the Labras Lake phase.

Thirty-three Late Archaic features, including pits, a prepared hearth, a possible structure, and a rock concentration, were identified at the site. These features occurred in three spatially segregated clusters along the landform. A single residential structure (Feature 2) was identified in the central feature cluster. It was a subsurface basin that measured approximately 17 sq m. A variety of artifactual debris was recovered from the structure, consisting of flake debris and modified implements. Charred nutshell was fairly abundant. There was no indication of multiple fill zones (Fortier 1996:101). This possible structure also contained six additional interior features.

Five radiocarbon dates were obtained from Labras Lake features at the site (Fortier 1996:95–97). These dates ranged from 3380±70 B.P. (cal. 1830–1520 B.C.; p = .936 [2σ]) to 3210±70 B.P. (cal. 1640–1370 B.C.; p = .962 [2σ]) and firmly placed the late component during the Labras Lake phase (Fortier 1996:96). The dates also appear to indicate that two of the feature clusters are contemporaneous.

Cultural materials recovered from the site were consistent with two individual Late Archaic components. The Labras Lake component is represented by a series of stemmed and side-notched specimens, including Springly and Merom Expanding Stemmed. Additional Late Archaic specimens, including Saratoga Straight Stemmed and the newly defined McLean type, were also recovered from the site (Fortier 1996:66–74).

The Labras Lake paleoethnobotanical assemblage was dominated by a suite of plant remains common to other Late Archaic assemblages throughout the region (Simon 1996). Charred nutshell accounted for the majority of remains recovered. Most of the nutshell consisted of thick-shelled hickory, followed by walnut family and acorn. A variety of wood charcoal was indentified in the assemblage, with red mulberry accounting for the most commonly identified species. Additional charred wood included red oak group, elm, hickory, and walnut along with small amounts of birch, persimmon, and ash (Simon 1996:90). Only a small amount of seeds were recovered from the deposits, consisting of goosefoot, maygrass, erect knotweed, grass, and wild bean. The identified suite of plant remains were consistent when compared to other Late Archaic assemblages throughout the American Bottom region (Simon 1990:93).

The Late Archaic Labras Lake component was interpreted as a residential extractive camp (Fortier 1996:101). Based on the recovered artifacts, the site was likely occupied as a specialized fall nut-processing camp.

Floyd Site

Another Labras Lake phase site in the American Bottom is the Floyd site (11S621) (Evans 2001). Located in the northern portion of the American Bottom within the floodplain proper, the site is situated along the outer bank of a paleochannel meander of Cahokia Creek. The site was excavated as part of the FAP-310 project (the northern extension of the earlier FAI-270 project).

Although most of the cultural materials recovered from the site were associated with the later Prairie Lake phase (see below), a minor Labras Lake component was also identified at the site. Cultural material associated with the Labras Lake phase appears to be minimal, consisting of at least 23 individual hafted bifaces, including Merom Expanding Stem, Bottleneck Stemmed, and the newly identified Whale-tail types (Evans 2001:63–70). These hafted bifaces were manufactured from a variety of lithic raw materials, including Burlington, Salem, and unidentified.

In addition to the Labras Lake phase hafted bifaces, 16 specimens were recovered that were assigned to either the Labras Lake phase or the slightly later Prairie Lake phase. These hafted bifaces, all assigned to the Floyd type, exhibit expanding stems with diagonally oriented notches. Morphologically, this hafted biface form is similar to the Motley type, although the notches exhibited by the Floyd type are not as large as the former type. The lithic assemblage was composed of a variety of local and near local lithic raw material resources that were dominated by Burlington and Salem.

Prairie Lake phase (circa cal. 1400–900 B.C.)

The Prairie Lake phase appears to be part of a continuum of localized adaptations occurring during the Late Archaic subperiod. The Prairie Lake phase appears to be related to the Kampsville phase in the lower Illinois River valley (Asch and Asch 1986).

Meyer Site

The Meyer site (11S321) is located in the American Bottom along the southern edge of the Bullfrog Station Meander within the floodplain proper (Fortier 1986; Fortier et al. 1998). A total of 13 Prairie Lake phase cultural features, arranged in 2 spatially segregated clusters, were identified at the site. All of the features were shallow basins. No structures or burials were identified during the investigations.

The artifact assemblage included a variety of flaked stone tools. These included bifaces—both hafted and unhafted specimens—scrapers, unifaces, wedges, gravers, spokeshaves, and various informal flake tools. Non-chert tools also included grinding stones, slot abraders, and ground hematite. The 16 hafted bifaces consisted of a variety of stemmed Late Archaic specimens, including Dryoff, Mo-Pac, and possible Apple Blossom Stemmed forms (Fortier et al. 1998:207–216). Lithic raw materials were likely derived from local source areas situated approximately 2 km (1.2 mi) to the east.

Paleoethnobotanical remains recovered from feature contexts identified charred wood, nutshell, and seeds. Wood charcoal constituted the most abundant botanical remains identified and included such species as sycamore, oak, elm, and hickory, among others. A small amount of charred nutshell was recovered and consisted primarily of walnut and hickory. Like the nutshell, charred seeds were rather scarce, consisting of single examples of grape and greenbrier. In addition, a single piece of cucurbit (*Cucurbita sp., cf. pepo*) was recovered from the site. This specimen is the earliest known piece of squash or gourd in the American Bottom.

The authors conclude that the site likely represented a short-term residential camp situated in the context of a larger Late Archaic settlement model (sensu Emerson 1984). The

spatial patterning exhibited at the Meyers site appeared to be similar to other Late Archaic sites in the American Bottom (Emerson 1984; Fortier 1984, 1986; McElrath 1986, 1987). Based on the recovered cultural materials, they suggested that the occupation of the site may have been restricted to a single season or shorter.

Floyd Site

Another Prairie Lake phase site in the American Bottom is the previously discussed Floyd site (11S621) (Evans 2001). Although it was suggested that most of the 195 features identified at the site were assigned to the Prairie Lake phase, a detailed breakdown of the individual temporal assignments for each of the features (or feature clusters) was not provided in the report (Evans 2001:21). Most of the identified features at the site—consisting of pits, posts, chert concentrations, and rock clusters—appeared to have been arranged in a series of 7 clusters along the northern edge of the paleochannel. No structures were identified at the site.

Eight radiocarbon dates were obtained from Prairie Lake phase feature contexts at the site. The uncalibrated dates ranged from 2990±80 B.P. (cal. 1420–1010 B.C. p = 1.0 [2σ]) to 2790±90 (cal. 1140–800 B.C.; p = .939 [2σ]) (Evans 2001:10).

Cultural materials recovered from the site included a rather substantial lithic assemblage dominated by hafted bifaces, although other tools, such as unifaces, informal flake tools, and core tools, were also identified. Fire-cracked rock was also recovered from feature contexts at the site. The recovered hafted bifaces consisted of a variety of Prairie Lake phase specimens, including Dyroff, Mo-Pac, and Springly types (Evans 2001:74–82). These later Late Archaic hafted bifaces were manufactured from a variety of local and near local lithic raw material resources, including Bailey, Burlington, Cobden, Salem, and unidentified.

Combined flotation samples along with hand-collected plant remains revealed a prevalence of upland plant resources (Parker 2001a). Wood charcoal included a wide variety of upland resources, including hickory, red oak, oak, coffeetree/locust, elm, and mulberry, among other species. Charred nutshell was the most ubiquitous resource recovered and was dominated by thick-shelled hickory, followed by hickory/walnut family, acorn, pecan, black walnut, and hazelnut. Although there were a wide variety of seeds recovered from feature context, the overall counts for those seeds were low. Recovered seeds included barnyard grass, chenopod, panic grass, and amaranth, among others. These resources appear to reflect a variety of processing and preparation activities routinely performed in the domestic setting. Parker concluded that the paleoethnobotanical assemblage is consistent with "the domestic activities of a base camp (Parker 2001a:126)."

Faunal remains were recovered from approximately 25 percent of the features. The assemblage consisted of highly fragmented, and commonly calcined, specimens. Classification of the remains was not possible due to their fragmentary nature; therefore, classification only included specimens that were identified as either small- or medium-sized mammals (Evans 2001:115–116).

The results of the excavations and analysis suggest that the site likely functioned as a multi-season base camp. The site was likely repeatedly occupied throughout the Prairie Lake phase, although it is likely that a minor Labras lake phase component was also present. Based on the results of the various analyses conducted, domestic tasks likely dominated the daily activities at the site. Evans (2001) suggests that the occupations may have been intensive and, based on the recovered paleoethnobotanical remains, a certain degree of gardening may have also taken place. The procurement and processing of nut resources were significant activities conducted on-site. The author suggests that the site was not likely part of a larger base locale (sensu Emerson 1980).

Miscellaneous Late Archaic Sites

The following site, while not directly located within the confluence region proper, is

situated in east-central Missouri. Given the site's importance in understanding Late Archaic lifeways, the Callaway Farms site is included below.

Callaway Farms

The Callaway Farms site (23CY227) was located on a paleo-point bar along the southern side of the Missouri River floodplain near the base of a near vertical bluff in southern Callaway County, Missouri (Harl et al. 2001). The investigations were conducted in advance of the Highway 94 relocation. Phase II and III investigations at the site consisted of hand excavated test units, mechanized removal of the plow zone, and feature excavation. In addition, geomorphic investigations were also conducted at the site.

The investigations revealed the presence of a substantial Late Archaic occupation represented by 2 feature concentrations, structures, and activity areas. A total of 250 features were identified, including basins, pits, artifact concentrations, and 6 residential structures. The structures were generally oval shaped basins measuring approximately 5-x-3 m to 6.5-x-5 m in size. The basins were generally 30–40 cm (12–16 in) in depth and contained cultural materials. A series of interior pits and smaller basins were generally located along the edges of the basin.

A series of 14 radiocarbon dates were obtained from Late Archaic features at the site. The dates range from 2760±70 B.P. (cal. 1060–800 B.C.; p = .972 [2σ]) to 2530±70 B.P. (cal. 810–480 B.C.; p = .932 [2σ]) (Harl et al. 2001:163). These dates are very comparable to one another, and in fact, the calibrated mean ages for the 14 dates range between 790 and 830 B.C. (Harl et al. 2001:163).

A large quantity of cultural materials was recovered from the site. Diagnostic artifacts included a series of expanding stem, corner-notched, and side-notched hafted bifaces (Harl 2007; Harl et al. 2001; Lopinot 2007). Lopinot (2007:21) suggested a provisional hafted biface type (i.e., Callaway Point), and it equated to Harl's Type I form. This type ranges in length from 3.6 to 8.4 cm, and they are typically longer than they are wide (Harl 2007:12–13). The blades are slightly excurvate and possess pronounced shoulder barbs. Additional artifacts recovered from the site included scrapers, gouges, gravers, adzes, and wedges. Non-chert tools included manos and metates, nutting stones, and an axe/celt fragment, along with an unfinished gorget.

Analysis of the paleoethnobotanical remains identified a variety of resources that were utilized. Mast resources were dominated by the presence of thick-shelled hickories and black walnut, along with lesser amounts of thin-shelled hickory, bitternut hickory, and acorn (Schroeder 2001). The wood charcoal assemblage was composed of ash, oak, persimmon, elm, hickory, maple/boxelder, and sassafras. A wide variety of charred seeds were recovered from feature contexts at the site. While most were starchy seeds, some oily seeds were also identified in the assemblage. Indentified species included *Chenopodium sp*. (goosefoot), goosefoot/pigweed, panic grass, Poaceae, maygrass, marshelder, sunflower, giant ragweed, and purslane, among others (Schroeder 2001:143). Based on seed size and morphology, the Chenopodium seeds were too small to be domesticated.

The faunal assemblage was poorly preserved at the site and reflects an emphasis on terrestrial species (Scott 2001). Most of the remains were identified in the structures of the western feature concentration. Of the identified remains, deer (and large mammal) dominated the assemblage, followed by turkey and turtle. The lack of recovered fish remains may have been the result of soil conditions.

The Late Archaic occupations at the site were interpreted as functioning as a residential camp. The number and presence of the structure indicated longer term occupations at the site. The layout of the features, including structures, indicated that there was an overall planned community (Harl et al. 2001:205). The structures were oriented along a zig-zag line along the landform. A variety of activities had been conducted at the site, including food processing and flaked stone tool production,

along with bone, hide, and wood working activities.

Summary

Based on data obtained from the above sites, and others throughout the region, a number of Late Archaic patterns can be identified. Judging from the increase in Late Archaic sites throughout the tri-state region, an increase in population can be postulated. Evidence of longer and more intensive site occupations further suggests that there was likely an increase in the degree of sedentism of Late Archaic groups. It was during this time span that the first evidence of significant occupations throughout the region is seen (McElrath et al. 1984). For instance, in the American Bottom, this time span was marked by major discontinuities and population incursions into the region (Emerson et al. 1986). It is in this subregion that multiple native groups may have been interacting, as evidenced by multiple Late Archaic phases and an overlap of radiocarbon dates (Fortier et al. 2006; McElrath et al. 1984; McElrath 1993). As such, it appears that the Late Archaic was a time of population movements and migrations throughout the Midwest. The diversity of these Late Archaic groups was reflected in the material culture recovered and identified from assemblages dating to this time span.

The Late Archaic represents a continuation of late Middle Archaic lifeways; however, artifact assemblages and adaptive strategies suggest increasing regional variability and specialization. Dragoo (1976:12–15) discussed several Late Archaic traditions throughout the eastern Woodlands and suggested that the distinctiveness reflected in their material culture stems from locally varied responses to regional environments. This shift towards more regional adaptations is also seen throughout the American Midcontinent with the proliferation of the various Late Archaic phases and complexes. Within the tri-state region, sites dating to this time span appeared to have been more numerous, occurring at higher frequencies than those of the preceding Archaic subperiods. A greater range of site types attributed to this time span have been documented for the area, including domestic structures (Fortier 1993; Sassaman and Ledbetter 1996), residential camps and extractive bases (Winters 1967, 1969), and mortuary facilities (Chapman 1975; Charles and Buikstra 1983), among others.

Recent research has documented the development and continuation of long distance exchange systems (Brose 1994; Brown 1977; Chapman 1975; Winters 1968). These trends appeared to have their origins during the later portion of the Middle Archaic (Jefferies 1996).

A variety of plant remains are common at Late Archaic sites. These include mast resources and potentially some early domesticated plants. The appearance of cultigens (i.e., marshelder, squash, sunflower, and sumpweed, among others) during the Late Archaic has been interpreted as evidence of early plant domestication by native groups throughout the Midwest (Asch and Asch 1985a: Chapman and Watson 1993; Simon and Parker 2006; Smith 2006; Yarnell 1993). At sites such as Koster, Napoleon Hollow, and Phillips Spring, early cultigens have been suggested to be the result of early domestication (Asch 1994; Asch et. al. 1972; Brown 1977:168 Chomko and Crawford 1978).

Watson (1985) outlined two different groups of cultigens that appear in the archaeological record during the Late Archaic. These complexes include both the East Mexican Agricultural Complex and the Eastern United States Agricultural Complex. The first suite of plants, the East Mexican Agricultural complex, includes such non-native varieties as squash (*Cucurbita pepo*), bottle gourd (*Legenaria siceraria*), and maize (*Zea mays*). Watson, like Struever and Vickery (1973), suggested that maize, squash, and bottle gourd were domesticated in Mexico, were then imported into the eastern United States by way of the Gulf of Mexico, and then made their way up the Mississippi River and its tributaries.

In contrast to the non-native domesticates, the second complex (the Eastern United States Agricultural Complex) includes such native plants as sunflower (*Helianthus annus*), sumpweed (*Iva annua*), chenopod (*Chenopodium sp.*), maygrass (*Phalaris sp.*), and knotweed (*Polygonum sp.*). Domestication of these native cultigens has been inferred, based on the larger seed sizes of archaeologically recovered specimens when compared to those identified from non-cultural contexts (i.e., in the wild).

Recent research throughout the eastern Woodlands has suggested that squash was under cultivation in the mid-South by the late third millennium B.C. (Adovasio et al. 1981:74). Evidence from the Midwest has suggested the sunflower, Chenopodium, sumpweed, and perhaps squash-gourd achieved cultigen status by circa 1000 B.C. (Smith 1987, Yarnell and Black 1985).

Smith (1987) proposed that indigenous development of horticulture in the Midwest could have been achieved by inadvertent impacts to the environment caused by human settlement. He noted that Chenopodium, sumpweed, and cucurbits naturally occur in floodplain settings and in areas that were intensely, and repeatedly, occupied. These disturbed areas exhibit increased sunlight and soil fertility. Human plant use and processing activities would have continued to add seeds to these disturbed areas, enhancing the plants' range and productivity. This interpretation seems to be substantiated by more recent investigations conducted throughout the southeastern and midwestern United States. Yarnell and Black (1985) found that garden plots filled with squash-gourd, bottle-gourd, sunflower, maygrass, sumpweed, and Chenopodium were in use by ca. 2500–1000 B.C. in the mid-South and Midwest.

Further east in Kentucky, data from Cloudsplitter Rockshelter suggest that squash may not have diffused into the East or Southwest from Mexico, as previously postulated by Struever and Vickery (1973), but that it may have evolved in situ from North American stock (Cowan et al. 1981:71). Desiccated squash rind was recovered from the Late Archaic deposit that was associated with a radiocarbon date of 3728±80 B.P. (cal. 2350–1910 B.C.; $p = .974$ [2σ]) (Cowan et al. 1981:71). Seeds of the Eastern Agricultural Complex (i.e., sunflower, sumpweed, maygrass and erect knotweed) are sparse in the Late Archaic levels in the site, but after 3000 B.P., all members of the Eastern Agricultural Complex underwent a sudden and dramatic increase in the rate at which they were being deposited in the site. This increase may be indicative of the wholesale introduction and adoption of the complex into the region. The Late Archaic and subsequent Early Woodland inhabitants of Cloudsplitter appear to have followed a similar trajectory in cultivated plant usage experienced in several other river drainages in the eastern Woodlands (Cowan et al. 1981:71).

The above data can be used to generate hypotheses concerning the Late Archaic in northeast Missouri. A variety of site types have been suggested, ranging from large, intensively occupied base camps, to smaller residential extractive camps and limited activity areas. Numerous features and possible structures would be expected at the larger base camps. These sites may also exhibit evidence of planned settlements. Smaller residential extractive camps will be indentified by few features (mostly hearths), lack of structures, and a smaller, less diverse artifact assemblage. Limited activity sites will lack structures and features and have very focused artifact classes present. Fiber-tempered ceramics, if they exist in the region, will be associated with Nebo Hill phase sites. A number of plant species are expected on Late Archaic sites and may include early domesticates. Chipped stone assemblages are expected to be dominated by local sources.

Woodland Period (circa cal. 1000 B.C.–A.D. 1400)

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The beginning of the Woodland Period is generally marked by the widespread adoption of pottery. This temporal demarcation varies from region to region and is generally thought to be time-transgressive from the southeastern U.S. to the northeastern and midwestern U.S. Similarly, other adaptive changes (i.e., settlement patterns, resource exploitation) may or may not co-occur regionally with this initial pottery technology. As may be seen in various regions of the Midwest, the initial appearance of pottery does not seem to alter the extant Late Archaic life style (e.g., Farnsworth and Emerson 1986).

As a chronological tool, the Woodland Period has been further divided into Early (circa cal. 1000–200 B.C.), Middle (circa 200 B.C.– A.D. 500), and Late (circa 500–1400 A.D.) subperiods. As will be seen below, the Middle and Late Woodland subperiods are markedly different from the preceding Late Archaic and Early Woodland subperiods. As such, debate continues over where to draw the line between the Late Archaic and Early Woodland subperiods. Despite this quandary, the Woodland Period may be generalized as an age of increasing sedentism with a focus on localized resource procurement, increasing population aggregation, and an increasing reliance on cultivated, starchy (and oily) annuals.

Early Woodland (circa cal. 1000–200 B.C.)

The Early Woodland subperiod is a generally ill-defined time frame between the Late Archaic and later Woodland subperiods (Martin 1997). In the Mississippi River valley, data is largely lacking for this subperiod, and so the temporal boundaries tend to change as we gather more data and develop a better understanding of the cultural historical relationship to the preceding and following time periods.

Traditionally, archaeologists working in the American midcontinent have set the beginning of the Woodland period around 700–100 B.C. in the belief that a pottery technology was widely adopted throughout the region at this time (Emerson 1986:621–623). However, subsequent data (as discussed below) suggested that there were problems with this time frame. The first problem was with the identification of Late Archaic ceramics in northwestern Missouri. As previously noted, Reid discussed coarse fiber-tempered ceramics at Site 23CL11, a Late Archaic Nebo Hill phase occupation (Reid 1984b). Radiocarbon dating of nutshell charcoal recovered from a sealed hearth at that site yielded a date of 3555±65 B.P. (cal. 2040–1740 B.C.; p = .965 [2σ]) (Reid 1984b:58). Reid hypothesized that these early ceramics were likely found throughout the midcontinent; however, due to erosional processes, these early, coarse ceramics rarely survived in the archaeological record.

As described in greater detail below, the Early Woodland subperiod has often been seen as a two part cultural sequence. The initial widespread cultural manifestation of the Early Woodland is commonly referred to as the Marion Culture (Alex 2000; Emerson 1986; Farnsworth and Asch 1986). Marion sites are characterized by the presence of Marion Thick sherds and Kramer hafted bifaces.

In post-Marion times, another ceramic tradition appeared over a broad area of the American Midwest: Black Sand (Alex 2000; Farnsworth and Asch 1986; Morgan et al. 1986; Munson 1986). This tradition is marked by Liverpool Series ceramics and included various types, such as Liverpool Cordmarked and Black Sand Incised.

Black Sand sites throughout the region vary in topographic location. In the lower Illinois River valley, Black Sand sites tend to be commonly located near backwater lakes, marshes, and sloughs (Farnsworth and Asch 1986:409–413). In eastern Iowa, Black Sand

sites commonly occur along sand ridges throughout the valley bottoms of the larger rivers.

The earliest widespread evidence of ceramics in the American Midwest are those of the Marion Culture (i.e., Marion Thick) (Emerson 1986; Farnsworth and Asch 1986). Emerson (1986:623) noted that these early ceramics likely entered into the Midwest following an east-to-west route originating from the Northeast. Marion Thick ceramics are thick-walled, coarse pottery. These vessels exhibit narrow, flat bases. Surface treatments typically included both exterior and interior cord-marked or fabric-impressed surfaces. These vessels are typically tempered with crushed rocks (i.e., grit). Later Early Woodland ceramic assemblages consisted of a wider variety of ceramic types, including Liverpool, Black Sand, and "Peisker" Series pottery.

Early Woodland lithic technology appears to be a continuation of earlier Late Archaic strategies. A variety of stemmed bifaces, particularly straight and contracting stemmed specimens, are routinely identified at Early Woodland sites. During Marion times, the Kramer hafted biface type is the characteristic hafted biface dating to the early portion of the Early Woodland subperiod (Christenson 1977; Justice 1987; Munson 1971; Perino 1985). By Black Sand times, the straight-stem Kramer hafted biface gave way to a variety of contracting stem hafted bifaces, including such types as Belknap, Dickson Contracting Stemmed, Adena, Waubesa, and Gary.

Early Woodland horticultural activities appear to have been limited (Emerson 1986; Martin 1997). Based on extant evidence, it appears that Early Woodland plant use strategies were similar to those of the preceding Late Archaic. There is a slight increase in the use of cultigens, such as little barley, goosefoot, and sumpweed, during Early Woodland times. In the midcontinent, a small amount of squash (*Cucurbita pepo*) has been recovered from Early Woodland contexts, including from the Fiege site in the American Bottom (Emerson and Fortier 1986), the Gast Springs site in southeast Iowa (Dunne and Green 1998), and Ambrose Flick in the Sny Bottom of west-central Illinois (Morgan et al. 1986; Stafford 1992). Given the available evidence, it appears that horticultural activities were likely a supplement to the dietary regime of these Early Woodland hunting and gathering groups.

The Red Ochre Complex has been defined for the mortuary component of the Marion phase populations, particularly in west-central Illinois (Esarey 1986). Burial mounds are known from Red Ochre sites throughout the region. These mounds tend to be smaller than those of subsequent Middle Woodland times. Burials were commonly covered in powdered red ochre and were often accompanied by grave goods, especially those of nonlocal or exotic nature, such as copper. Turkey-tail hafted bifaces made from blue-gray cherts (including Cobden from southern Illinois and Ste. Genevieve from southeastern Indiana) commonly occur in Red Ochre burials. In eastern Iowa, the Ryan Focus (Logan 1976) is generally considered analogous to the Red Ochre Complex of western Illinois.

Northeast Missouri

Few Early Woodland sites have been documented in northeast Missouri, due primarily to a lack of cultural resource management (CRM) driven archaeological investigations. Martin (1997), in summarizing the Early Woodland subperiod, noted that the dearth of information is surprising given the prevalence of Early Woodland materials on the Illinois side of the Mississippi River.

While several sites near the project area have contained Early Woodland pottery (23CK116 and 23AD95), most of what is currently known of the Early Woodland in northeastern Missouri comes from sporadic work around the St. Louis region. At the nearby Haas-Hagerman site (23CK116) (an Illini village), two Black Sand-like rimsherds were recovered from excavations (Martin 1997:70). While these rim sherds display common Black Sand decorative techniques, such as nodes, incised lines, and fingernail-like punctations, they are thicker than the

classic examples. Martin (1997:71) suggests that the variations may represent a transition late in the Black Sand temporal sequence.

While not specifically in the Northeast `Prairie region, Site 23AD95 is located just two counties to the west. Materials from Site 23AD95 have not been systematically studied; however, portions of the Early Woodland artifacts have been variously illustrated (Chapman 1980; Martin 1997). Further south, a modest amount of information was also collected during the Cannon Reservoir Human Ecology Project (O'Brien et al. 1982). Finally, more intensive excavations have been undertaken in the St. Louis region including work at Burkemper (23LN104) (O'Brien et al. 1996) and at Site 23LN5, where a partially reconstructed Marion Thick vessel base was recovered (Martin 1997:71).

Due to the general paucity of reported Early Woodland components in the region, a site documented during the Cannon Reservoir Human Ecology Project (O'Brien et al. 1982) is used to exemplify the subperiod.

Collins Site

The Collins site (23MN223) was located on a low terrace along the west side of the Salt River. The site was investigated as part of the Cannon Reservoir Project (O'Brien and Warren 1982). The investigations at the site revealed that most of the prehistoric occupation dated to the Late Archaic and Early Woodland time span. Investigations at the site included mechanized removal of the plow zone and feature excavation.

The investigations at the site revealed approximately 32 features distributed in 3 tightly grouped feature clusters. In addition, a single circular to oval single-post structure was identified. Features included pits and shallow basins. Only 1 feature, a hearth (Feature 12), was classified according to function (O'Brien and Warren 1982:277–279). The remaining features were considered indeterminate.

Two radiocarbon dates of 2610±200 B.P. (cal. 1270–350 B.C.; p = .974 [2σ]) and 2520±150 B.P. (cal. 1000–350 B.C.; p = .978 [2σ]) were obtained from feature contexts (O'Brien 1985b:68). Although the dates clearly indicated that the primary occupation at the site dated to the Early Woodland, certain diagnostic artifacts (e.g., Early Woodland sherds) were generally lacking.

A sparse artifact assemblage was recovered from the site. Hafted bifaces recovered from Early Woodland features consisted of a series of specimens similar to those of the Late Archaic Sedalia phase (Chapman 1980:14). O'Brien and Warren (1982:279) suggest that those specimens were the result of style persisting through time rather than indicating the Late Archaic component. No Early Woodland ceramics were identified at the site.

Subsistence resources were recovered, including paleoethnobotanical and faunal remains. Paleoethnobotanical remains were relatively abundant in a number of the features (King 1982). Wood charcoal (not identified) made up most of the paleoethnobotanical assemblage. The vast majority of the charred nutshell was identified as hickory. Charred seeds included several possible native cultigens, such as chenopod, giant ragweed, sumpweed, and knotweed (King 1982:205). Analysis of the sumpweed seeds indicated that these seeds were likely "in the early stage of domestication" (King 1982:205). Analysis of the paleoethnobotanical remains suggested that the site was a cool-weather occupation.

Recovered faunal remains were sparse; only six taxa were represented (Bozell and Warren 1982:174). The assemblage was dominated by white-tailed deer and fox. Only the remains from a single fish (i.e., minnow) and bird (i.e., turkey) were recovered from the site.

Southeast Iowa

The Early Woodland is not well known in southeastern Iowa due to a variety of reasons. The primary cause is the lack of intensive investigations in the region. While Early Woodland sites are fairly common, few sites have been subjected to professional investigations (Thompson et al. 2003). Most

of what is known of this time span is known from surface collection artifacts.

Early Woodland sites are typically identified by the presence of Marion Thick and Black Sand pottery. Diagnostic hafted bifaces are commonly recovered and consist of a series of stemmed hafted bifaces that include the Kramer, Dickson, and Waubesa types.

Marion Culture (circa cal. 800–200 B.C.)

Throughout southeastern Iowa, the Marion Culture is known primarily from the presence of Marion Thick pottery and Kramer hafted bifaces. These artifacts are commonly recovered from Early Woodland sites throughout eastern Iowa along the Mississippi River valley (Alex 2000:90). Since only limited information is known of this time span, only the Gast Spring site will be discussed.

Gast Spring Site

The previously discussed multicomponent Gast Spring site (12LA152) was situated on a small alluvial fan near the Muscatine Slough in Louisa County, Iowa (Alex 2000; Dunne and Green 1998). Investigations at the site identified the presence of two Early Woodland components: Marion Culture and Black Sand Culture components.

The Marion component was represented by four features (i.e., Features A, B, C, and 7). Four radiocarbon assays date the Early Woodland Marion component. These dates range between 2710±90 B.P. (cal. 1130–750 B.C.; p = .97 [2σ]) and 2390±80 (cal. 780–360 B.C.; p = .983 [2σ]) (Dunne and Green 1998:50). Diagnostic artifacts collected from the Marion component included Marion Thick ceramics. Additional Marion artifacts included charcoal, FCR, and several flakes.

The Marion paleoethnobotanical remains were relatively sparse and consisted of charred wood, seeds, and a few pieces of nutshell. Charred wood was recovered from each of the Marion features, although wood identification was not conducted. Charred seeds consisted of purslane, panic grass, amaranth, cf. acalypha sp., Chenopodium, and little barley, among others. Based on seed size and seed coat thickness, Dunne and Green (1998) suggest that the Chenopodium and little barley seeds were likely domesticated. Nutshell was only represented by four small pieces of walnut.

Black Sand Culture (circa cal. 400 B.C.–A.D. 50)

After the Marion Culture, another ceramic tradition appeared throughout the region and in southeastern Iowa. This tradition is marked by Liverpool Series ceramics and included various types such as Liverpool Cordmarked and Black Sand Incised. In eastern Iowa, these sites are commonly identified on sand ridges throughout the valley bottoms of such rivers as the Mississippi and the lower Iowa.

Limited information is known about Black Sand occupations throughout the southeastern Iowa region. As such, only a few occupations will be described.

Gast Spring Site

A minor Black Sand component was identified at the Gast Spring site (12LA152) (Alex 2000; Dunne and Green 1998). This component was represented by two features: Features 2 and 5. No radiometric dates were obtained for the Black Sand component. The Black Sand component contained predominately Liverpool Series ceramics, bone, flakes, and a few unspecified hafted bifaces.

Black Sand paleoethnobotanical remains were sparse, consisting of a few pieces of charred wood and seeds (Dunne and Green 1998:58). A small amount of wood charcoal was recovered from the component. Charred seeds consisted of single specimens of green carpetweed and barnyardgrass.

West-central Illinois

When compared to northeast Missouri and southeast Iowa, the west-central Illinois Early Woodland is better known. Excavations began in this region in the early twentieth century and more recent intensive investigations throughout the region (primarily transportation

related projects) have continued to identify sites dating to the Early Woodland subperiod.

These sites are scattered across the region, with areas of note including Fulton County, Adams and Hancock Counties, and to the south, the Sny Bottoms. The Black Sand Culture, and subsequently the pottery, was initially defined at the Liverpool Mounds and Village site in Fulton County, Illinois (Cole and Deuel 1937). The Lima Lake locality in Adams and Hancock Counties is located on the Mississippi floodplain between the cities of Quincy and Warsaw. Numerous sites in this locality contained low density Early Woodland occupations. A large reconstructible Marion vessel was recovered during the Lima Lake survey, from Site 85H1 (Conrad et al. 1986).

More recent and intensive investigations have occurred in the Sny Bottoms (Stafford 1992; B. Stafford 1997). Investigations included work at Ambrose Flick, Bushmeyer, Sand Trees, and Rodgers Lake sites. These collections were the basis for creating a localized, chronological phase sequence. This sequence is briefly discussed below along with site specific data. The site specific data are largely confined to the Ambrose Flick site (Stafford 1992), as it is the most well known.

Marion Culture (circa cal. 800–200 B.C.)

Due to higher instances of professional archaeological investigations (brought about by CRM driven investigations), more is known of the Marion Culture in west-central Illinois than in the surrounding regions. In part, these investigations were conducted by the Center for American Archaeology (CAA) during the last 30 years.

As in neighboring regions, Marion sites are routinely identified on the basis of diagnostic artifacts, including Marion Thick ceramics, as well as particular hafted bifaces (i.e., Kramer, Dickson, and Waubesa types). Based on stratigraphic position and material culture, the Marion component was divided into an early (Marion) and later (Seehorn) sequence. These are discussed below.

Ambrose Flick Site

The Ambrose Flick site (11PK132) is situated along an alluvial fan setting in the Sny Bottom of the Mississippi River floodplain (Morgan 1986a; Stafford 1992). The site was investigated by the CAA as part of the previously discussed FAP-408 project. Intensive investigations at the site consisted of geomorphic trenching, mechanized stripping of plow zone, hand-excavated test units, and feature excavation. The investigations resulted in the identification of a multicomponent Early Woodland site containing a substantial Marion component along with minor amounts of Kinderhook and Snycartee phase materials. Sixty cultural features were identified in the Marion component and included hearths, pit hearths, pits, and refuse accumulations. To date, Ambrose Flick is the largest and best known Marion site in the region.

A total of 11 radiocarbon dates were obtained for the Marion component at the site (Stafford 1992). These dates range from 2550±75 B.P. (cal. 820–480 B.C.; p = .938 [2σ]) to 2350±90 B.P. (cal. 670–340 B.C.; p = .703 and 760–680 B.C.; p = .133 [2σ]) (Stafford 1992:96). These dates suggest a date range of approximately 800 to 350 B.C. for the Marion component at the site.

The excavations at the site recovered a sizeable Marion artifact assemblage consisting of ceramic, lithic, and subsistence remains. Ceramics recovered from the Marion component consisted of Marion Series sherds (Morgan 1992). Vessels were typically flat-bottomed jar forms, although the one rim sherd suggested that it originated from a shallow bowl (Morgan 1992:130). Most of the identified temper was crushed rock (i.e., grit). Exterior surfaces were typically cordmarked, with most exhibiting S-twist cordmarking. A few sherds exhibited fabric-impressed or plain exteriors. Most sherds exhibited coarse fabric-impressed interior surfaces. Decoration within the ceramic assemblage was minimal, consisting of only two sherds that displayed possible cord impressions (Morgan 1992:135).

The Marion component possessed a sizeable lithic assemblage (Stafford and

Stafford 1992). Numerous diagnostic hafted bifaces were recovered from Marion contexts, including Kramer and "Red Ochre Blades" (Stafford and Stafford 1992: 163–164). Additional lithic artifacts recovered included bifaces, drills, flake tools, scrapers, unifaces, and cores.

A substantial, and widely diverse, paleoethnobotanical assemblage was recovered from the Marion component (Asch and Sidell 1992). The assemblage was collected from feature and midden contexts. Approximately two-thirds of the wood charcoal was identified as ash. The remaining wood charcoal was identified as elm/hackberry, oak, black walnut/butternut, honey locust, cottonwood, and elm, among others. The charred nutshell assemblage was dominated by thick-shelled hickory followed by hazelnut and black walnut along with minor amounts of bitternut hickory, pecan, butternut, and acorn. The vast majority of the charred seeds were identified as little barley (Asch and Sidell 1992). Unspecified grass family accounted for the second most commonly identified seed type. The remaining taxon were represented by seed counts of less than 10 and included smartweed, Chenopod, persimmon, maygrass, and bedstraw, among others. In addition, a few pieces of Curitiba were also recovered from the Marion component.

The Marion component at the site was interpreted as representing a series of short-term residential camps or specialized procurement camps (Stafford 1992:302). The discrete activity areas would suggest that the occupations were focused along the natural levee of Pigeon Creek, where the site inhabitants likely focused on the plant resource procurement along with the cultivation of little barley. The densities of charred nutshell suggest that mast resources did not serve an important role in the site activities.

Seehorn phase (circa cal. 800–400 B.C.)

The Seehorn phase is part of the greater Marion Culture and is known primarily from the Sny Bottom of the Mississippi River (Morgan 1986a). The Seehorn phase is characterized by the presence of Marion Thick ceramics and Kramer hafted bifaces. In addition, the Seehorn phase also likely possesses Morton-like lanceolate specimens (Stafford 1997:5).

Ambrose Flick Site

At Ambrose Flick (11PK132), the Seehorn phase was interpreted as part of the Early Marion component (Stafford 1992:103). Although detailed analysis of the phase was not presented, some generalizations of this component were presented. This phase is defined primarily on the basis of the stratigraphic position with the primary Marion occupation. No specific radiocarbon assays were obtained from this component. Marion Thick ceramics and Kramer hafted bifaces were the principal diagnostics.

Black Sand Culture (circa cal. 400 B.C.–A.D. 50)

As with the previously mentioned regions, the Black Sand Culture appeared in west-central Illinois. Black Sand groups occupied west-central Illinois during the latter portion of the Early Woodland subperiod (post-Marion). Black Sand occupations throughout the region are marked by the presence of Liverpool Series ceramics, including Black Sand Incised. Hafted bifaces still include a series of contracting stemmed types, such as Kramer and Belknap, although early Middle Woodland types, including Snyders, begin to appear during the latter portion of the Black Sand.

Kinderhook phase (circa cal. 400–200 B.C.)

The Kinderhook phase is characterized by the presence of Liverpool Series ceramics and Belknap hafted bifaces. Radiocarbon dates from Ambrose (see below) provide the sole, well-dated Kinderhook occupation in the west-central Illinois region (Stafford 1997).

Ambrose Flick Site

The previously discussed Ambrose Flick site (11PK132) also contained a minor Black Sand Kinderhook phase component. The component is represented by midden contexts

as well as three small refuse concentrations. Two radiocarbon dates were obtained for the Kinderhook phase occupation. These dates are 2260±70 B.P. (cal. 420–150 B.C.; p = .959 [2σ]) and 2200±120 B.P. (cal. 540– A.D. 60; p = .992 [2σ]) (Stafford 1992:96).

The investigations recovered a modest-sized artifact assemblage consisting of ceramic, lithic, and subsistence remains. The Liverpool Series ceramics represent a second series of Early Woodland ceramics identified at the site (Morgan 1992). Vessel forms were not determined due to the small size of the majority of the sherds. Sand was the most commonly identified tempering agent in the Liverpool Series ceramics. A small amount of crushed rock was also identified as temper. Exterior surface were generally cordmarked, although a small number of plain sherds were also identified. The majority of the sherds were classified as Liverpool Cordmarked. Decoration, when present, consisted of incised lines, punctations, or a combination of the two techniques. Of the decorated sherds recovered from the component, most were classified as Black Sand Incised.

The Black Sand component produced a modest-sized lithic assemblage. Diagnostic hafted bifaces recovered from the Black Sand component consisted of Belknap and Peisker Diamond hafted bifaces. Most of these specimens were only recovered from Black Sand contexts and not from the earlier Marion component. Additional lithic artifacts recovered included bifaces, drills, flake tools, scrapers, unifaces, and cores.

A paleoethnobotanical assemblage was collected from the Black Sand Kinderhook component (Asch and Sidell 1992). The remains were recovered from both feature and midden contexts throughout the site. Almost half of the wood charcoal was dominated by the presence of black walnut, followed by oak, hackberry, hickory/pecan, and honey locust, among others. Charred nutshell included both thick-shelled hickory and black walnut/butternut. A small number of charred seeds were present in the assemblage, including bedstraw, grass, and bulrush, along with single specimens of ragweed, smartweed, blackberry, and dock.

The Kinderhook phase occupation was not interpreted in terms of site function due to a scarcity of features and the sparse artifact assemblage for the component.

Snycartee phase (circa cal. 200 B.C.–A.D. 50)

The Snycartee phase is a transitional phase spanning both the Early and Middle Woodland subperiods. Morgan et al. (1986) suggest that this phase should be viewed as Early Woodland (rather than Middle Woodland), since Snycartee represented the initial development of the Havana Tradition in the region. The Snycartee phase is characterized by Black Sand population(s) possessing some influences from nearby Havana groups (Morgan 1986a; Stafford 1997). Artifact assemblages tend to be identified by Liverpool Series ceramics combined with Havana ceramics and lithics (Snyders and North hafted bifaces). In the region, the Snycartee phase is best represented by the Bushmeyer site but is also present at Ambrose Flick.

Bushmeyer Site

The Bushmeyer site (11PK733) was situated along the edge of a sandy terrace of the Mississippi River in Pike County (Stafford 1997). The site was investigated prior to the planned construction of the Central Illinois Expressway from Jacksonville to Quincy, Illinois. The combined investigations at Bushmeyer and Sand Trees (not described here) resulted in the identification and definition of the Snycartee phase.

Investigations at Bushmeyer consisted of controlled surface collections, hand-excavated test units, mechanized stripping of the plow zone, and feature excavation. The investigations at the site resulted in the excavation of approximately 308 pit features. Six radiocarbon dates were obtained and ranged from 2330±70 B.P. (cal. 570–200 B.C.; p = .894 [2σ] and 750–690 B.C.; p = .074 [2σ]) to 1980±100 B.P. (cal. 210 B.C.–A.D. 250; p = .979 [2σ]) (Stafford 1997:83).

Both Liverpool and Havana Series ceramics were identified in the Bushmeyer ceramic assemblage (Stafford 1997). The Liverpool Series ceramics were predominately sand-tempered. Surface treatment was generally smooth cordmarked, although cordmarked, plain, and indeterminate treatments were also identified. Decoration was typically composed of dowel, cord-wrapped stick impressed, or fingernail pinched. Incising was also present in the assemblage.

The Havana Series ceramics were tempered with a variety of agents, including crush rock (i.e., grit), sand, grit/sand, and chert, among others. Havana Series ceramics typically possessed plain exterior surfaces, although smooth cordmarked sherds were also identified. Decoration was minimal in the assemblage, typically consisting of cord-wrapped stick or dowel impressed. Incised sherds were present but uncommon.

Most of the recovered hafted bifaces were assigned to the Early Woodland subperiod (Stafford 1997:26). Of these, Belknap and Peisker Diamonds were the most commonly identified hafted biface type. Kramer and Red Ochre specimens were also identified, albeit in lesser amounts. Early Middle Woodland Snyders and North hafted bifaces were also recovered from the site. Additional lithic artifacts included bifaces, chert axes and adzes, drills, scrapers, flake tools, and cores. Groundstone items consisted of hammerstones, manos and metates, abraders, pitted stones, plummet, and gorget, among others.

The paleoethnobotanical assemblage was modestly sized (Schroeder 1997). Wood charcoal was dominated by oak, followed by lesser amounts of ash, black walnut, hickory, and cottonwood, among others. Nutshell accounted for a smal proportion of the Bushmeyer paleoethnobotanical assemblage. Charred nutshells included thick-shelled hickory and walnut family shells, with lesser amounts of acorn, American hazelnut, black walnut, and bitternut hickory. Charred seeds were rare at the site, suggesting a lack of preservation. Seeds included knotweed, little barley, marshelder, and sunflower, along with a modern containment: wheat.

The Snycartee phase occupation was interpreted as a multipurpose residential camp occupied during the late Early Woodland subperiod. The occupants utilized a variety of locally-available resources "without the benefit of either small-seed or cucurbit horticulture" (Stafford 1997:136).

Ambrose Flick Site

A minor Black Sand Snycartee phase component was identified at Ambrose Flick (11PK132) (Morgan 1986a; Stafford 1992). This phase was identified as a light scatter of artifacts near the ground surface. Two radiocarbon dates were obtained for the Snycartee phase occupations. These dates consisted of 2160±70 B.P. (cal. 380–50 B.C.; p = 1.0 [2σ]) and 2110±70 B.P. (cal. 260–20 B.C.; p = .826 [2σ] and 360–270 B.C.; p = .174 [2σ]) (Stafford 1992:96).

Detailed information concerning the Snycartee artifact assemblage was not provided because this component is only known from non-feature contexts at the site. Diagnostic artifacts that are likely associated with the phase are the Belknap hafted bifaces and possibly some of the Black Sand sherds. Interpretations of the Black Sand Snycartee phase occupation were highly problematic due to the extremely sparse artifact assemblage and the lack of cultural features assigned to this phase.

Lower Illinois Valley

The Early Woodland subperiod in the lower Illinois Valley is well known. Much of the Early Woodland that has been identified has been identified through a series of transportation-related investigations, including FAP-408. Many of the archaeological projects in the region have been conducted by the CAA.

Marion Culture (circa cal. 800–200 B.C.)

As with other regions previously discussed, Marion sites are the initial Early Woodland cultural manifestations in the lower

Illinois Valley. Marion sites are characterized by the presence of Marion Thick sherds and Kramer hafted bifaces. Based on available data, Farnsworth and Asch (1986:356) suggest that the Marion groups did not appear to be permanent inhabitants of the region, since relatively few sites contain Marion sherds. In fact, of their survey of Marion sites in the lower Illinois and Sny Bottom of west-central Illinois, collections from only two sites contained more than 100 Marion Thick sherds: Ambrose Flick (5000+ sherds) (discussed in the above section) and Napoleon Hollow (148 sherds) (Farnsworth and Asch 1986:354). Only Napoleon Hollow, however, is situated within the lower Illinois Valley.

Napoleon Hollow Site

Intensive excavations at Napoleon Hollow (11PK500) revealed the presence of a minor Marion component (Wiant and McGimsey 1986). This component was identified through the presence of 148 Marion Thick sherds in three areas of the site during the excavation of the test units within Block IV and those additional test units throughout the floodplain portion of the site.

Only a single feature was identified as belonging to this component. This feature, a shallow basin, contained several pieces of burned limestone and charcoal. The analyzed charcoal that was recovered from this feature was distinctively different from the overlying Middle Woodland subperiod.

The Marion sherds compared favorably to those from neighboring regions (Morgan 1986a). Although most of the sherds were fairly eroded, many that were not eroded still possessed exterior cordmarking. Several fabric-impressed sherds were also identified in the assemblage. Most of the sherds were tempered with crushed rock. One flat basal sherd was identified and indicated out-flaring vessel forms. None of the sherds, however, were recovered from feature contexts. Many of the sherds were recovered from culturally disturbed areas of the site. For example, 23 Marion sherds were recovered from Block IV contexts in which Middle Woodland sherds were also collected. No faunal remains were reported for the Early Woodland component.

Kramer hafted bifaces were not recovered from the excavations. Several Belknap and Belknap-like specimens were recovered, however. These latter types have been attributed to both the Early and Middle Woodland subperiods.

Two radiocarbon dates were obtained from sediments located in the northern portion of the site. These sediments, while lacking diagnostic artifacts, were attributable to Early Woodland times. The dates were 2590±70 B.P. (cal. 900–510 B.C.; $p = .992$ [2σ]) and 2530±80 B.P. (cal. 810–480 B.C.; $p = .909$ [2σ] and 470–410 B.C.; $p = .091$ [2σ]) (Wiant et al. 1986).

A modest-sized Early Woodland paleoethnobotanical assemblage was recovered from the test unit excavations (Asch and Asch 1986). Only those samples that could be directly associated with the Early Woodland component were analyzed. Overall, the Early Woodland paleoethnobotanical sample was small, thus precluding detailed interpretation of the results. Willow (*Salix sp.*) comprised the majority of the identified wood charcoal. Other wood charcoal identified included Kentucky coffeetree/Honey locust, oak, elm/hackberry, and others. Identified nutshell included hazelnut, thick-shelled hickory, black walnut, and acorn (Asch and Asch 1986:461). Only a few charred seeds were recovered from the Early Woodland component, including four wild bean seeds and one seed each of water hemp, giant ragweed, goosefoot, dock, and grape (Asch and Asch 1986:461–464). In addition, several tuber fragments were also identified, many of which were identified as groundnut (*Apios americana*).

At the time of the excavations, the Early Woodland component at Napoleon Hollow included the largest assemblage of Marion Thick sherds in the lower Illinois Valley. The limited data set recovered and analyzed from the site yielded “very little information on the type of settlement that Napoleon Hollow represents” (McGimsey and Wiant 1986c:87).

The recovered materials were similar to other Early Woodland sites in the region.

Black Sand Culture (circa cal. 400 B.C. – A.D. 50)

Black Sand represents the latter portion of the Early Woodland subperiod. It is identified by the presence of Belknap hafted bifaces and Black Sand ceramics. Studies have shown that the Black Sand groups in the lower Illinois likely derived from populations located to the north (Munson 1982). Munson (1982) further suggested that the later local Middle Woodland Havana groups may have actually developed from these initial Black Sand populations. As McGimsey and Wiant (1986a:27) note, these earlier suggestions have been challenged, since Marion Thick ceramics have not been identified in the lower portion of the lower Illinois River valley; "thus, there is no evidence to support in situ development of Middle Woodland out of local Marion cultures."

The Peisker phase will not be described in this culture history due its ambiguous context at sites throughout the region (Farnsworth and Asch 1986:356–364). Farnsworth and Asch (1986) argue that the defining characteristic, Peisker Series pottery, only occurs at sites containing Black Sand Cypress phase occupations. These ceramics appear to be contemporaneous with the Liverpool Series ceramics common to those sites (Farnsworth and Asch 1986:356–357). They also argued that the Peisker Series pottery may actually represent trade items with the American Bottom Florence phase.

Cypress phase (circa cal. 650–50 B.C.)

The Cypress phase represents the definitive initial portion of the Black Sand Culture in the lower Illinois Valley and follows the previously described Marion groups. Cypress phase occupations are characterized by the presence of Liverpool Series ceramics in association with Belknap type hafted bifaces. In fact, in the lower Illinois River valley, Belknap hafted bifaces are the only types recovered in direct context with Liverpool Series ceramics (Farnsworth and Asch 1986:366).

At Cypress phase sites in the lower Illinois River valley, Liverpool Series ceramics vary slightly from Liverpool ceramics elsewhere (Farnsworth and Asch 1986:333). Temper tends to be made from crushed rock, especially crushed chert. These ceramics tend to exhibit a brightly-colored red-brown paste. Lastly, nodes are absent from Cypress phase Liverpool ceramics.

Cypress Land Site

The Cypress Land site (11GE119) is situated at the northern end of a long, linear sand ridge within the Mississippi River floodplain in Green County, Illinois (Conner 1986). Emergency salvage excavations were conducted at the site prior to a proposed road widening project. The excavations investigated both the main portion of the site as well as the southern edge, where a shell midden was identified (referred to as Cypress Land South).

A total of nine prehistoric pit features were identified at the site. Two post molds were also identified. In addition, five human burials were identified at the site. None of the burials contained grave goods, and all were located in ambiguous or temporally nondiagnostic contexts (Conner 1986:21). The investigations confirmed the multicomponent nature of the site, which contained both Late Archaic and Early Woodland components.

Five radiocarbon dates were obtained during the investigations, four from the main portion of the site and one from the southern shell midden. The four dates for the main portion of the site ranged from 4810±75 B.P. (cal. 3710–3490 B.C.; p = .83 [2σ] and cal. 3470–3370 B.C.; p = .159 [2σ]) to 2270±70 B.P. (cal. 520–160 B.C.; p = .993 [2σ]) (Conner 1986:23). A radiocarbon date of 4500±120 B.P. (cal. 3390–2900 B.C.; p = .899 [2σ] and cal. 3520–3390 B.C.; p = .1 [2σ]) was obtained from the shell midden (Conner 1986:23). The results of the radiocarbon dates suggest that there may be some contamination

of the samples between the Late Archaic and Early Woodland components.

The ceramic assemblage contains both Marion and Black Sand ceramics. Liverpool Series ceramics dominated the assemblage followed by a lesser number of Black Sand Incised sherds. Additional Woodland period ceramics also identified include Peisker Series, Morton Incised, and Sister Creeks.

Diagnostic Early Woodland lithic artifacts included Kramer and Belknap hafted bifaces. Several early Middle Woodland specimens were also recovered from the site, including Gibson and Steuben types. Additional lithic tools were also recovered from the site, including drills, scrapers, and flake tools. Groundstone items that indicated the presence of the Late Archaic component consisted of several grooved axes, hematite plummet, and grooved pebbles. In addition, several Matanzas hafted bifaces characteristic of the Helton phase were also recovered.

Conner (1986:52) notes the inability to separate much of the artifact assemblage as belonging to the Late Archaic or Early Woodland, given the apparent mixing and complex stratigraphy. Other than the ceramics and diagnostic hafted bifaces, "little material… can be specifically tied to a particular component" (Conner 1986:52). The sediments at the site have been subjected to a series of post-depositional mixing and reworking.

Persimmon Site

The multicomponent Persimmon site (11C152) was located along the right bank of the Illinois River, approximately 8.05 km (5 mi) upriver from its confluence with the Mississippi River (Titus, et al. 1996). Excavations at the site were conducted prior to the construction of a riverside levee and associated pump stations. The investigations at the site consisted of a series of hand-excavated test units, mechanized stripping of the plow zone, and feature excavation.

Based on the ceramic analysis, the site contained four components, including Black Sand Cypress phase (circa 550–230 B.C.), Black Sand Schultze phase, Havana Tradition (circa 50 B.C. –A.D. 250), and a Late Woodland Weaver/White Hall component (circa A.D. 400–700) (Titus 1996a:134). The investigations indicated that most of the prehistoric occupation of the site dated to the Black Sand Cypress and Schultze phase (Titus et al. 1996).

Two radiocarbon dates were obtained from feature context, although neither of the dates was considered accurate. These dates were 1570±60 B.P. (cal. 380–620 A.D.; p = .985 [2σ]) and 130±50 B.P. (cal. 1800–1950 A.D.; p = .574 [2σ] and 1670–1780 A.D.; p = .416 [2σ]).

Approximately one-half (49.2 percent; n = 343) of the ceramic sherds recovered were attributable to the Early Woodland subperiod. Most of the Early Woodland sherds (n = 229) were classified as Liverpool Series Cypress and Villegas variety sherds (Neal 1996:64–68). The remaining Early Woodland sherds were classified as Schultze phase pottery, including Liverpool Series Schultze variety sherds. Additional sherds recovered included Middle Woodland (n = 34; 4.9 percent) and Late Woodland (n = 10; 13.4 percent). Three hundred ten (44.5 percent) sherds were heavily eroded or considered too small for temporal assignment.

The lithic assemblage was manufactured primarily from locally available Burlington chert (Titus 1996b). Diagnostic lithic artifacts consisted of a single Belknap hafted biface. Additional lithic artifacts included bifaces, flake tools, scrapers, and amorphous cores.

Subsistence remains recovered from the site included both paleoethnobotanical and faunal remains. The paleoethnobotanical assemblage was sparse and was composed of primarily wood charcoal (Parker 1996). Wood charcoal consisted of hickory and oak (including specimens of the red oak group). Charred nutshell was minimal and only consisted of five pieces of black walnut and one acorn fragment. No carbonized seeds were recovered from the site. Several pieces of maize were identified in the assemblage

indicating contamination of some of the samples (Parker 1996:132).

The faunal remains consisted of a highly fragmented assemblage (Scott 1996). Few remains from the Early Woodland component were identifiable, with mammal remains accounting for the majority of these materials. White-tailed deer was the only mammal identified in this component. Aquatic resources included both fish (gar) and unidentified turtle remains.

The site was interpreted as a residential camp that was occupied repeatedly by small groups, particularly during the Cypress and Schultze phases. These occupations were likely of short duration, given the low density of features and low artifact diversity (Titus 1996a:139). Limited information was gathered pertaining to seasonality of site occupation; however, the presence of turtle and charred nutshell suggests that at least some of the occupations occurred during the summer and fall months.

Liverpool phase

Little is known of the Liverpool phase in the lower Illinois River valley. Within the floodplain proper, some sites further north and south of the Cypress phase distribution contain distinctively different ceramics (Farnsworth and Asch 1986:414). Sites include Versailles, Schieve, and Bartley II.

Liverpool phase ceramics consisted of pottery tempered primarily with sand mixed with crushed rock. Rims tend to exhibit a single row of nodes near the lip. A high percentage of the decorated Liverpool Series ceramics exhibit an array of shallow punctates near the rim.

Missouri-Mississippi River Confluence

Investigations throughout the American Bottom region at the confluence of the Missouri and Mississippi Rivers have resulted in the identification of four Early Woodland phases (as described below). These phases have been defined based on variances in artifact characteristics and absolute dates. It has recently been suggested that some of these phases likely represent distinct individual groups that were intrusive into the region (Fortier et al. 2006; Simon and Parker 2006). The generally small and ephemeral nature of most of these sites further implies that these groups were utilizing the region but not occupying it. Many questions remain, however, concerning the origins, relations, and temporal affiliations among these groups.

Changes in technology occurred during the initial portion of the Early Woodland subperiod, particularly with the widespread adoption of pottery into the region. Hafted bifaces were generally similar, although there appeared to be an increase in the use of contracting stem specimens. Evidence for Early Woodland plant use throughout the American Bottom is meager (Simon and Parker 2006). Broadly speaking, Early Woodland plant use was similar to that of the preceding Late Archaic subperiod. In various Early Woodland assemblages, wood charcoal was dominated by species from nearby habitats, and nutshell was composed primarily of hickory and a smaller amount of hazelnut (Simon and Parker 2006:220).

The four Early Woodland phases will be briefly described below, both generally and with site specific examples. The phases include the Carr Creek, Ringering, Florence, and Columbia phases. These phases may be typified by their occurrences at the Ringering, Florence Street, and Carbon Monoxide sites.

Carr Creek phase (circa cal. 800–400 B.C.)

The Carr Creek phase represents the southernmost documented expression of the Marion Culture (Evans and Evans 2000:299; Fortier et al. 2006). This phase represents the initial portion of the Early Woodland subperiod in the American Bottom. Sites dating to this time span are typically assigned on the basis of two diagnostic artifacts: Kramer hafted bifaces and Marion Thick ceramics (Evans and Evans 2000:249).

Ringering Site

A minor Carr Creek phase component was identified at the Ringering site (11MS71)

(Evans and Evans 2000). Forty-nine Carr Creek phase cultural features were identified at the site. These included pits, rock clusters, artifact concentrations, and chert blank caches. Five radiocarbon dates were obtained from the Carr Creek phase component. The dates range from 2330±90 B.P. (cal. 670–200 B.C.; p = .901 [2σ]) to 2670±180 B.P. (cal. 1290–390 B.C.; p = 1.0 [2σ]) (Evans and Evans 2000:249).

A modest sized artifact assemblage was recovered from the site (Evans and Evans 2000). Ceramics consisted of Marion Thick sherds. Although the small size of the sherds precluded detailed vessel reconstructions, two generalized vessel forms were identified; both were tall jars. One form was a funnel-shaped jar with a flat base, and the second form was similar, although it had a pronounced exterior ridge along the middle portion of the vessel. Tempering agents included crushed rock, chert, and small amounts of grog. The Marion sherds are characterized by possessing exterior and interior cordmarking.

The lithic assemblage consisted of items manufactured from local and near-local lithic raw materials. The flaked stone assemblage was dominated by the presence of near-local Burlington chert. Thirty-nine Carr Creek phase hafted bifaces were recovered from the site, including such types as Turkey-tail and Kramer, along with several unidentified specimens. Additional lithic artifacts identified from the site consisted of bifaces, unifaces, pièces esquillées, and cores.

Carr Creek phase subsistence remains consisted of faunal and paleoethnobotanical items. The faunal assemblage was heavily calcined and highly fragmented. Only two pieces of bone were identified to the genus level (both were white-tailed deer). The paleoethnobotanical assemblage was dominated by charred nutshell, including thick-shelled hickory, along with small amounts of walnut and acorn (Simon 2000a). Charred wood included hickory, followed by small amounts of ash, mulberry, and oak. Seeds were scant, primarily consisting of unidentifiable fragments. Only two seeds were identifiable (one persimmon and one hawthorn).

The Carr Creek phase component was interpreted as a seasonal (or multi-seasonal) occupation by either a nuclear family or a small extended family group (Evans and Evans 2000:384). Contrary to previous assumptions by Emerson and Fortier (1986) that Carr Creek groups focused on aquatic resources, the people inhabiting the Ringering site focused on mast resources. The temporal assignment of the Carr Creek phase has been expanded to approximately cal. 800 B.C. to allow for the Ringering radiocarbon dates (Evans and Evans 2000).

Ringering phase (circa cal. 800–700 B.C.)

"The Ringering phase is the American Bottom equivalent of what has been referred to as the Black Sand Culture" (Evans and Evans (2000:299). This phase is largely defined by the presence of Liverpool series pottery. In contrast to Marion Thick pottery, Liverpool vessels have a sandy paste, generally exhibit smoothed-over-cordmarked exteriors, and generally lack decoration. Outside of the Ringering site, little is known of Ringering phase occupations throughout the American Bottom. The phase appears to be limited temporally but may be contemporaneous with the previously discussed Carr Creek groups. Just as the Carr Creek phase appears to be the southernmost extension of the Marion Culture, the Ringering phase appears to be the southernmost extension of Black Sand Culture. The minimal data concerning this phase suggests a northward expansion of the culture through time (Evans and Evans 2000:299).

Ringering Site

The type site for this initial phase of the Early Woodland subperiod is the previously discussed Ringering site (11MS71) (Evans and Evans 2000). The site is situated along a series of sand dunes overlying the Savanna Terrace. The site was investigated as part of the FAP-310 Project. Investigations at the site consisted of surface collections, hand-excavated test units, mechanized plow zone removal, and

feature excavation. The investigations revealed the presence of multiple prehistoric occupations that include Early Archaic, Middle/Late Archaic, as well as Early Woodland (Carr Creek, Ringering, and Columbia) components.

Seven cultural features were assigned to the Ringering phase component. These include pits, rock clusters, and artifact concentrations. Temporal assignment of the feature was based on feature contents or feature association. A single radiocarbon date of 2530±140 B.P. (cal. 980–360 B.C.; p = .994 [2σ]) was obtained from a Ringering phase feature (Evans and Evans 2000:301).

The ceramic assemblage was composed of Liverpool Series ceramics. Vessel form was not determined, as no basal sherds were identified in the assemblage. All of the sherds have a sandy paste. Sherds were tempered with crushed rock, although sand, chert, and grog were also present in minor amounts. Exterior surfaces were either cordmarked or plain. Of particular interest was the greater proportion of decorated sherds of the Liverpool series in the Ringering assemblage when compared to other regional sites. Decorations at Ringering included various incised designs along with punctuations (Evans and Evans 2000:307–308).

No diagnostic hafted bifaces were recovered from Ringering phase features. The assemblage had few informal tools—29 flake tools and a single pièces esquillées. Groundstone tools included pitted cobbles, manos, and an abrader.

Ringering phase subsistence remains were extremely sparse. Only a single feature contained any evidence of paleoethnobotanical remains (two small pieces of ring porous wood). No detailed faunal analysis was reported in the published report, since only a few faunal remains were recovered from the component.

Florence phase (circa cal. 400–150 B.C.)

Based on current research, it now appears that the Florence phase represents an intrusion of peoples into the American Bottom from more southern locales (Fortier et al. 2006). The pottery decoration suggests that these people had cultural ties with the mid-South. The Florence phase peoples brought with them differing lifestyles than the preceding American Bottom Early Woodland groups. Florence phase peoples were more adapted to riverine environments than the preceding groups and appear to have occupied larger, longer-term camps (Fortier et al. 2006). They also brought with them a different ceramic technology (i.e., the use of grog temper). This phase is known primarily from its type site, the Florence Street site.

Florence Street Site

The Florence Street site (11S458) was located along a ridge on the Mississippi River floodplain within the Goose Lake Locality in St. Clair County, Illinois (Emerson et al. 1983). The site was excavated as part of the FAI-270 Archaeological Project. The investigations at the site included surface collections, hand-excavated test units, mechanized stripping of the plow zone, and by feature excavation. These investigations identified the presence of a substantial Early Woodland Florence phase component. The site also contained a Mississippian Sand Prairie phase component that overlaid the Early Woodland component.

The Florence phase component was represented by the presence of several activity areas that included numerous features (i.e., midden areas, pits, hearths, surface hearths, rock concentrations, and post molds). In addition, a single circular-to-oval structure was identified at the site. The structure measured approximately 7.4-x-5.7 m, and the structure's perimeter was lined with a series of post molds. Five features were identified within the structure, all of which were situated in its southwestern portion.

Three radiocarbon dates were obtained for the Early Woodland component. These dates were 2400±75 B.P. (cal. 770–370 B.C.; p = 1.0 [2σ]), 2290±80 B.P. (cal. 550–150 B.C.; p = .949 [2σ]), and 2130±110 B.P. (cal. 400 B.C.–A.D. 70; p = 1.0 [2σ]) (Emerson et al. 1983:176). The authors suggested that the last

date of 2130±110 B.P. did not accurately reflect the temporal age of the Florence phase component due to a higher chance of contamination from the overlying Mississippian component (Emerson 1983:176).

The investigations resulted in the recovery of a substantial artifact assemblage. The ceramics were identified as belonging to the newly defined Florence Series, which includes Florence Zoned, Florence Cordmarked, and Florence Plain, along with associated varieties. Vessel forms tended to be either conoidal or subconoidal, possessing either round or angular flat bases (Emerson 1983:106). The Florence Series ceramics were predominately tempered with grog, although crushed rock and sand were also used. A variety of exterior decorations were identified in the assemblage, including various fingernail punctations (gouge, pinched, and impressed), individual cord impressions, and smoothed-over cordmarking. A single miniature vessel was also recovered from the component.

The investigations also recovered a diverse lithic assemblage. Diagnostic lithic artifacts recovered from this component consisted of a series of contracting stemmed specimens that were classified as belonging to the Dickson Cluster. Hafted biface types included Waubesa-like and the newly defined Goose Lake type (Emerson et al. 1983:70). Additional lithic artifacts that were recovered included bifaces, drills, scrapers, and flake tools, along with blades and blade-like flakes. Groundstone tools consisted of a variety of cobble implements, such as manos, pitted stones, and hammerstones, along with sandstone abraders and several limestone tools.

Subsistence remains were comprised of both faunal and paleoethnobotanical remains. The faunal remains were dominated by the presence of mammal remains, with white-tailed deer accounting for the vast majority of the identified remains (Cross 1983). Additional terrestrial resources included elk, raccoon, beaver, pocket gopher, and muskrat. Fish was commonly identified in the assemblage, with gar accounting for most of the identified remains followed by bowfin, freshwater drum, and buffalo fish. Freshwater mussels and land snails were also identified in the assemblage. Several pieces of wild turkey were also identified.

The paleoethnobotanical remains consisted of a variety of upland and bottomland resources (Johannessen 1983). Wood charcoal consisted of cottonwood/willow, birch, sycamore, Kentucky coffee tree/honey locust/mulberry, and pecan, among others. The charred nutshell was composed of a variety of species comprised of primarily black walnut followed by hickory/walnut (*Juglandaceae*), and thick-shelled hickory. Seeds recovered from Florence phase features were dominated by goosefoot (*Chenopodium*), with lesser amounts of goosefoot/amaranth, grass, sumac, erect knotweed, and maygrass, among others.

The site was interpreted as a permanent habitation for a "single social group, such as an extended family," for a short time span, maybe upwards of a year (Emerson 1983:175). As Emerson noted, this site fits well within the definition of a "residential base" as defined by Binford (1980). Emerson (1983) further suggested that the Florence phase inhabitants likely followed a settlement system similar to logistically organized collectors. Resources would have been brought to the site from a limited number of source areas. Most of the identified fish were commonly found in oxbow lakes and backwater areas, habitats that the Goose Lake locality would have provided (Cross 1983:148). Paleoethnobotanical resources, particularly the wood and nutshell charcoal, indicated a reliance on trees situated along active rivers.

Columbia phase (circa cal. 150–100 B.C.)

The Columbia phase was originally defined as the Columbia Complex during the analysis of several sites after the FAI-270 Archaeological Project, particularly at the Carbon Monoxide site (Fortier et al. 1984). Subsequent research at later excavations, such as at Ringering, has led to the transformation of this complex into a phase. Due to

similarities in the material culture and later absolute dates, it is currently believed that the Columbia phase is related to the preceding Florence phase (Fortier et al. 2006). This proposed continuation between the Florence and Columbia phases is the only antecedent-descendent relationship that has thus far been proposed for any of the identified American Bottom, Early Woodland phases.

Carbon Monoxide Site

The multicomponent site, Carbon Monoxide (11MO593), was situated along an inner channel sand ridge of the Hill Lake meander scar (Fortier 1985). Investigations at the site included hand-excavated test units, mechanized removal of the plow zone, and feature excavation. Most of the prehistoric occupation of the site occurred during Columbia phase (at the time of the report publication it was defined as the Columbia Complex). A minor Marion phase occupation was also identified.

Eighteen features were assigned to the Columbia phase component, including 11 pits, six activity areas, and one structure. The structure consisted of a basin measuring approximately 2.4-x-1.7 m. No associated post molds were identified with this structure. The basin fill contained two fill zones and a modest sized artifact assemblage. A single radiocarbon date of 2120±100 B.P. (cal. 390 B.C.–60 A.D.; p = 1.0 [2σ]) was obtained from the Columbia phase occupation (Fortier 1985; Fortier et al. 2006).

The ceramic assemblage was dominated by plain and cordmarked, grog-tempered sherds. These ceramics were classified as Columbia Plain and Columbia Cordmarked. Fortier (1985:62) noted that these ceramics were similar to the plain and cordmarked Crab Orchard ceramics of southern Illinois.

The lithic assemblage was predominately manufactured from locally available Salem chert. Diagnostic hafted bifaces included a series of contracting Dickson Cluster specimens. Additional lithic artifacts included scrapers, drills, gravers, flake tools, cores, and a gouge. Fortier (1985:102) suggested that the closest analog to the Columbia component lithic assemblage was the assemblage recovered from the Florence phase component at the Florence Street site.

Ringering Site

A minor Columbia phase component was identified at the Ringering site (11MS71) (Evans and Evans 2000). This component is represented by five pits, one artifact cluster, and one structure basin. Feature 153, the structural basin, is an oval basin measuring approximately 5.4-x-3.2 m (17.7-x-10.5 ft) (Evans and Evans 2000:318–320). Two pit features were located within the southern edge of the basin. No post molds were identified. An associated living surface was not identified at the base of the basin, and cultural materials were recovered from throughout the basin fill.

Two radiocarbon dates were obtained from the Columbia phase component (one was obtained from earlier investigations). The two dates were 2150±70 B.P. (cal. 390–40 B.C.; p = .999 [2σ]) and 2330±90 B.P. (cal. 670–200 B.C.; p = .901 [2σ]) (Evans and Evans 2000:317–318).

A modest sized artifact assemblage was recovered from this phase. The ceramics were identified as either Columbia Cordmarked or Columbia Plain. The sherds were tempered with variations of grog and fine sand. Exterior surfaces were either cordmarked or plain. No decoration beyond the aforementioned surface treatments was identified. The authors estimated that only two or three vessels were present during the Columbia phase occupation (Evans and Evans 2000:327).

The lithic assemblage was primarily composed of artifacts that were recovered from within, and adjacent to, the structural basin. Diagnostic hafted bifaces were limited to the newly defined Holding Contracting Stemmed type (Evans and Evans 2000:332–333). Additional artifacts included unhafted bifaces, unifaces, informal flake tools, pièces esquillées, as well as several cores. Groundstone tools consisted of various cobble tools.

Subsistence remains recovered from the Columbia phase component were sparse. Poor preservation of the faunal assemblage plagued species identification. Those elements that were identified consisted of white-tailed deer and raccoon. The paleoethnobotanical assemblage was dominated by the presence of charred nutshell, including thick-shelled hickory, along with lesser amounts of pecan, hazelnut, and acorn (Simon 2000a:365–376). Identified wood charcoal consisted of hickory, ash, mulberry, and oak. The vast majority of the charred seeds were unidentified; only two fragmented chenopod seed fragments were identified.

As with the Carr Creek phase component, the Columbia phase component was interpreted as functioning as a periodic seasonal (or multi-season) occupation by either a small nuclear or small extended family group (Evans and Evans 2000:384). Like the previous Early Woodland components, the subsistence remains were dominated by mast resources, further suggesting the terrestrial focus of the Columbia phase component.

Summary

As may be seen from the above discussion, Early Woodland sites in Missouri have rarely been documented or intensively investigated. This situation is slightly better on the Illinois side of the Mississippi River where larger construction projects have resulted in an increase in surveys. Similarly, more information is available for the St. Louis region of Missouri. Despite this general paucity of information, however, many overall trends and regional variations may be noted.

At one time, the Early Woodland was defined by the beginnings of pottery, burial mound construction, and early plant domestication. It now seems clear, however, that this definition does not work well for the Midwest. While several of these characteristics begin earlier in the Late Archaic subperiod, burial mound construction does not appear to have been common until much later. Compounding the issue is that these changes do not seem to appear simultaneously within regions. In all, these factors complicate the issue of separating the Early Woodland from the terminal Late Archaic. Some researchers have chosen to simply arbitrarily divide the two subperiods based on a general time frame.

In general, settlement patterns seem to shift from larger, intensively occupied, upland base camps in the Late Archaic (i.e. Nebo Hill and Sedalia) to smaller, less intensively occupied riverine habitats (i.e. floodplains). These smaller camps may have been exploiting shorter-term seasonally available resources near lakes, swamps, and sloughs. These bottomland sites typically have one of two archaeological footprints. These include either low density scatters over large aerial extents or smaller scatters with clearly defined boundaries.

Early Woodland sites typically contain Marion or Black Sand pottery and a limited variety of hafted bifaces. Farnsworth and Asch (1986:407) have proposed that distributions of these distinctive projectile points (i.e. Belknap) in the Illinois River valley may provide a means of identifying additional sites, which may not contain pottery. They have suggested that the early use of pottery may have been more site specific and not in widespread use (similar to later Woodland habitation sites). This would suggest that currently documented sites (those with higher archaeological visibility) along the major river systems are only a fraction of the total settlement system. This supposition is further supported by data from Missouri as a whole (Martin 1997:89).

Evidence of horticulture is limited but present during the Early Woodland subperiod. Data suggests that groups were supplementing their hunting and gathering with a variety of plants in the early stages of domestication, including but not limited to little barley and goosefoot. Masting resources continue to be important. Faunal assemblages are dominated by white-tailed deer; however, smaller mammals, fish and other aquatic resources, and avian species were also exploited.

Based on the above data, a few generalized hypotheses can be generated

concerning Early Woodland occupations in northeast Missouri. A variety of site types and sizes are known from the tri-state region. These range from small extractive sites to larger sites that were likely inhabited on a multi-seasonal basis. The larger sites are expected to have a large number, and a wider variety, of feature types, reflecting multiple activities being conducted on-site. The Early Woodland subperiod is also marked by the initial widespread occurrence of ceramic vessels in the midcontinent. Early Woodland lithic technology appears to form a continuum from Late Archaic technology. Diagnostic hafted bifaces would include a series of stemmed specimens, such as Dickson and Gary. Subsistence resources, including both plant and faunal resources, would increasingly reflect a continuation of Late Archaic subsistence practices.

Middle Woodland (circa cal. 200 B.C.–A.D. 500)

Throughout the midcontinent, the Middle Woodland subperiod is marked by one of the most dramatic cultural florescences in the eastern Woodlands and is commonly referred to as Havana-Hopewell (Struever and Houart 1972). Havana-Hopewell is characterized by interregional exchange systems that commonly involved the circulation of nonlocal (or exotic) raw materials, such as obsidian, copper, mica, and shell. These raw materials were often manufactured into exchange items that included platform pipes, beads, cutouts, nonutilitarian celts, reel-shaped gorgets, panpipes, blades, and figurines, among many others (i.e., Seeman 1979; Struever 1964; Struever and Houart 1972; Yerkes 1988).

Several regional expressions of Havana-Hopewell have been identified in the midcontinent, including Kansas City Hopewell of western Missouri (Kay and Johnson 1977), the Nickerson phase of southeastern Iowa and northwestern Illinois (Bennett 1945), the McGregor phase of northeastern Iowa (Logan 1976), and Norton/Converse in the southern portion of Michigan (Fitting 1970). As Yerkes notes, these regional manifestations may represent expansion and migrations of Illinois Valley Havana groups, "followed by the independent development of these 'daughter' complexes with their distinctive artifact styles (Griffin 1967; Kingsley 1981; Struever 1964, 1968a), or alternatively, they may have been local developments (Salzer 1986)" [1988:324].

Middle Woodland sites tend to be larger than those of the preceding Early Woodland. Villages, such as Holding (Fortier et al. 1989), Smiling Dan (Stafford and Sant 1985), and Dash Reeves (Fortier 2001), are commonly located in the major river valleys. In contrast, various camp types are commonly situated throughout the valleys as well as in the adjacent uplands. Smaller extractive sites are routinely found in the uplands further away from the main valleys (Farnsworth and Koski 1985; Katz 1990; Roper 1974; Yingst 1990a).

During the Middle Woodland, the increasing complexity of mortuary practices culminated in the creation of elaborate burial mounds (Braun 1979; Charles 1992, 1995). The construction of burial mounds was particularly prevalent in the lower Illinois River valley, where they have been interpreted as acting as territorial markers for the local and/or regional Middle Woodland populations inhabiting the region (Charles 1992). Mounds were also constructed throughout southeastern Iowa, such as at the Toolesboro Mounds State Preserve (Alex 2000). Many of the individuals buried within Middle Woodland mounds were interred with grave goods, including platform pipes, stone tools, finely manufactured pottery vessels, and other items manufactured from exotic raw materials, such as copper, galena, and obsidian. It has been suggested that those individuals that were interred in mounds may have occupied social positions of higher status due to their association with these uncommon (or rare) artifacts.

Middle Woodland ceramics have been generally classified as belonging to one of a series of types and varieties specific to the Havana Series (after Griffin 1952). Havana Series pottery generally consisted of a series of conoidal jar forms exhibiting rounded bottoms and slightly constricting necks. These

vessels were generally tempered with a variety of crushed rocks (i.e., grit). Surface treatment of the vessels was generally either cordmarked or smoothed over cordmarked. Decorative elements routinely identified on Havana pottery included incising, nodes, dentate stamping, and cord impressions.

The use of exotic lithic raw materials, such as obsidian and Knife River Flint, are commonly noted in Middle Woodland lithic assemblages in the Midwest (Conrad 2004; Griffin 1965; Griffin et al. 1969; Hughes 2006; Hughes and Fortier 1997, 2007). Obsidian, when recovered from the tri-state area, typically occurs only in Middle Woodland contexts. Most of the obsidian from the region has been recovered from sites in the American Bottom. In addition to the occurrence of Knife River Flint and obsidian, a variety of blue-gray cherts (from closer source areas), including Cobden and Ste. Genevieve cherts, are common at Middle Woodland sites throughout Illinois and Missouri (Morrow 1987, 1988; Morrow et al. 1992).

In addition to the use of nonlocal lithic raw materials, Middle Woodland lithic assemblages display some distinctive characteristics. First and foremost is the presence of a blade technology throughout the eastern Woodlands, particularly in Illinois and Ohio (Fortier 2001; Montet-White 1968; Odell 1994, 1996; Parry 1994). Generally, most Middle Woodland blade cores are conical in shape, producing lamellar blades of regular shape. In addition to the above mentioned lithic tools, Fortier (2000) also noted the occurrence of a formal small tool tradition. This tool tradition, occurring primarily in the American Bottom, is marked by the presence of small formalized tool forms, such as gravers, thumbnail scrapers, perforators, and drills. Diagnostic hafted bifaces include such types as, Snyders, Manker, Gibson, Norton, and Steuben.

Middle Woodland subsistence has been characterized by a hunting, gathering, and cultivating economy (Yerkes 1988). Paleoethnobotanical assemblages indicate an increasing reliance on the cultivation of starchy seeds, such as chenopod, little barley, and erect knotweed. For example, in west-central Illinois, the production of native seed crops increase dramatically when compared to earlier times (Fritz 1993). The occurrence of starchy seeds tends to dominate seed assemblages throughout the region. In the American Bottom, although seed counts increase during the Middle Woodland subperiod, it isn't until early Late Woodland times when seed counts increase to levels witnessed in west-central Illinois (Fritz 1993:46).

One of the earliest lines of evidence for the presence of tobacco comes from the lower Illinois Valley in the Middle Woodland component at Smiling Dan. One seed was recovered from a feature that was dated to 1790±80 B.P. (cal. A.D. 60–420; p = 1.0 [2σ]) (Asch 1994; Asch and Asch 1985b:384).

Middle Woodland faunal assemblages are best characterized by a "localization in subsistence pursuits" (Sant and Stafford 1985:25). Although the procurement of faunal resources would be considered local, white-tailed deer dominate many of the Middle Woodland assemblages throughout the region. This localization in resource procurement continues into the early Late Woodland (Styles 1981).

The following sections will briefly describe the various phases and sites for the northeast Missouri region and the surrounding locales.

Northeast Missouri

When compared to the lower Illinois Valley, the Middle Woodland is poorly known in the northeast Missouri region. Several sites within Lewis and Clark Counties have reported Middle Woodland components; however, these sites represent small scatters or they have not been fully evaluated. For example, a Middle Woodland component is at the Haas and Hagerman site (23CK116) on the Des Moines River in northeastern Clark County. Grit-tempered pottery was found here, but this component had been disturbed by later

occupations. Little information about the Middle Woodland component at this site is documented (Grantham 1993:2). Along the east side of the Mississippi River in Illinois, especially in the Sny Bottom, considerably more information is known for this period (see below).

Havana Tradition (circa cal. 200 B.C.–A.D. 200)

The Havana Tradition is seen as the initial formation of the Middle Woodland subperiod in northeastern Missouri. Although this time span is not well known, some information was gleaned from the Cannon Reservoir Human Ecology Project at sites such as Cave and Hatten Village (O'Brien et al. 1982).

Monroe phase (circa cal. 200 B.C. – A.D. 200)

The Monroe phase represents the Middle Woodland Havana Tradition in northeast Missouri (Donham 1981, 1982a; Donham and O'Brien 1985). This phase is known primarily from the Salt River area of the state.

Monroe phase ceramics appear to signify local "decorative tradition that continues throughout the Middle Woodland and early Late Woodland [sub]periods" (Donham 1982a:130). Monroe phase ceramics are typically tempered with crushed rock. The most common decorative element consists of impressions and nodes along the rim–lip junction. Surface treatments include plain, cordmarked, and smoothed-over cordmarking. Decorative elements include minor amounts of Havana decoration, such as zoned incising, linear trailing, and punctations.

Diagnostic lithic artifacts include a series of Snyders and Snyders-like hafted bifaces. These specimens are broad corner-notched forms.

Hatten Village Site

Hatten Village (23MN272) was excavated as part of the Cannon Reservoir Human Ecology Project (O'Brien et al. 1982). Excavations at the site identified a primarily Middle Woodland occupation. Approximately 36 cultural features were identified, including shallow basins, bell shaped pits, and hearths. One burial was also identified. Thirty-one of the features were concentrated in a series of three feature clusters. Although the feature clusters were thought to represent house (or residential) clusters, no direct evidence of residential structures (e.g., post molds) was noted during the excavations.

Two radiocarbon dates were obtained for the Monroe phase occupation (O'Brien 1985b:68). These dates were 2000±100 B.P. (cal. 210 B.C.–A.D. 240; p = .961 [2σ]) and 1950±140 B.P. (cal. 230 B.C.–A.D. 390; p = .959 [2σ]).

Monroe phase ceramics consist of crushed-rock tempered pottery (Donham 1982a). Decorative elements included conical punctates, cord-wrapped stick impressions, hollow stick impressions, incised lines, and interior and exterior bosses (or nodes). Two small cordmarked vessels were recovered from the burial and were associated with a radiocarbon date of cal. 211 B.C.–A.D 238. (Donham 1982a:121).

Lithic artifacts included flake debris and cores (Lewarch 1982). Additional unspecified tools were also recovered from the site.

A modest amount of subsistence remains was recovered from the site. The paleoethnobotanical assemblage was dominated by the presence of wood charcoal (King 1982). Identified charred nutshell included hickory, black walnut, and hazelnut. Faunal remains included a variety of terrestrial and aquatic resources (Bozell and Warren 1982). Mammals comprise the majority of the identified remains, although fish and reptiles comprise just over half of the identified assemblage. Key taxa identified include white-tailed deer, box turtle, sucker, and sunfish-bass (Bozell and Warren 1982:174).

The faunal and paleoethnobotanical remains suggest that the site was occupied from the spring through early fall months. Based on the spatial analysis of the features, it appears that three household clusters occupied the site. These clusters were spaced approximately 15–17 m apart. No information

was presented to examine the contemporaneity of the three clusters.

Wombles Site

The Wombles site (23PI73) is situated on a low terrace near the base of the Salt River valley wall in Pike County, Missouri (Donham 1982b). Investigations at the site were conducted in advance of a proposed highway construction project and included surface collections, hand-excavated test units, mechanical removal of the plow zone, and feature excavation. Radiocarbon dates were not attempted for this site.

Eight cultural features were identified at the site, and these consisted of shallow basins, deeper storage pits, and deep basins. A few cultural materials were recovered from these features. No evidence of structures was identified at the site.

Ceramics recovered from the site generally consisted of cordmarked jars. Additional exterior surface treatments included plain, burnish smooth, smoothed cordmarked, and fabric impressed. Interior surfaces were typically plain. Decoration, although uncommon, typically consisted of exterior nodes (Donham 1982b:72). In addition, cordwrapped tool impressions also infrequently occur. Other decorations include a variety of trailed line designs located near the rim-lip junction.

Diagnostic hafted bifaces were typically side notched (Donham 1982b:75). Similar hafted bifaces were also identified at other Middle to early Late Woodland sites in the Salt River valley (Cannon Reservoir Human Ecology Project). Several corner-notched specimens were also identified in the assemblage; these hafted bifaces were similar to Bulverde, Dehli, and Marshall types and are similar to examples recovered from the Middle Woodland component at the Pigeon Roost Creek site (Donham 1982b:77). Additional lithic tools recovered from the site include unhafted bifaces, scrapers, flake tools, and cores. Non-chert items consisted of metates and hammerstones, as well two grooved axes.

Subsistence remains were quite sparse at the site. White-tailed deer was the sole identified faunal resource. The scant paleoethnobotanical assemblage included charred nutshell and wood charcoal.

Central Valley phase (circa cal. A.D. 200–600)

The Central Valley phase displays a continuation of previous Havana Tradition influences. This phase is known primarily from the Salt River area of Missouri, and it shows a marked increase in similarity with central Missouri ceramic styles (Donham 1981, 1982a). Central Valley phase ceramics display decorative elements that are similar in nature to those Hopewell assemblages along the lower Missouri River. Vessels tend to be primarily medium-sized un-shouldered jars (Donham 1982a:123). Surface treatments tend to be either plain, cordmarked, or smoothed-over cordmarking.

Cave Site

The Cave site (23MN796), a multicomponent Woodland period occupation, was located along the slopes overlooking the Middle Fork of the Salt River. The site was investigated as part of the Cannon Reservoir Human Ecology Project (O'Brien et al. 1982) and consisted of mechanized removal of the plow zone and feature excavation.

Investigations at the site identified approximately 63 cultural features, most of which were shallow basins. In addition, single examples of compound, bell-shaped, and hourglass features were identified. Fourteen of the features contained human burials (O’Brien and Warren 1982:276). These latter features were considered the “cemetery area” of the site (i.e., Donham 1981) and based on diagnostic hafted bifaces, the “temporal span of the burial is at least several hundred years” (O’Brien and Warren 1982). The burials were likely Late Woodland in age (O’Brien 1985c).

Of the seven radiocarbon dates obtained from the site, only two dates appear to accurately date the Middle Woodland subperiod (O’Brien 1985b; O’Brien and Warren 1982). These dates were 1450±70 B.P. (cal. A.D. 430–680; p = 1.0 [2σ]) and 1390±60

B.P (cal. A.D. 550–720; p = .934 [2σ]). The remaining assays date the Early Woodland and Late Woodland components.

The ceramics were typically medium-sized unshouldered jar forms. Decoration was generally limited to the neck and rim-lip junction and typically consisted of smoothed-over cordmarked rims and necks with exterior nodes. Cordmarked sherds exhibiting cordwrapped tool-impressed were recovered from a feature that produced a radiocarbon date of cal. A.D. 546–724 [2σ] (Donham and O'Brien 1985:196). An embossed rim was recovered from a hearth that produced a date of cal. A.D. 431–679 [2σ] (Donham and O'Brien 1985:196).

Lithic artifacts included both Middle and Late Woodland diagnostics, including corner and side-notched hafted bifaces. No Archaic period artifacts were recovered from the cultural features.

Miscellaneous Middle Woodland Sites

The following site discussion includes a site for which a precise temporal assignment was not determined. This site, 23MA3, was excavated during the first half of the twentieth century. Subsequent analysis of the recovered artifact assemblage has not been conducted, and there are no known radiocarbon dates.

Site 23MA3

Site 23MA3 was located near the bank of Bay de Charles north of the modern city of Hannibal, Missouri (Eichenberger 1944). Excavations at the site were conducted by the Marion-Ralls Archaeological Society and consisted of hand-excavated test units. Based on the limited excavations, the investigators considered the site to be of a single component nature.

The ceramic assemblage was characterized by the presence of thick, cordmarked or smooth, crushed-rock tempered jars. Most common decorations included embossing (i.e., exterior nodes), lip notching with cordwrapped tools, and various stamping (including dentate and rocker stamping) and punctations (Chapman 1980:53; Eichenberger 1944:22, 28, 30). Cross-hatching and single cord impressions were also present, albeit in lesser amounts. In addition, "medium to crude pottery platform pipes" are also present in the assemblage (Eichenberger 1944:25).

Diagnostic hafted bifaces included Steuben and Snyders types (Eichenberger 1944:22, 26). Additional lithic artifacts included bifaces (e.g., reworked specimens), ovoid scrapers, and drills, as well as conical cores and blades. Non-chert artifacts included grooved axes, celts, hammerstones, a crystal from a broken quartz geode, and several gorgets.

The site was interpreted as a village occupied by people who were associated with the Hopewell ceremonial complex (Eichenberger 1944:31). It was suggested that the site displayed similarities with other sites in the nearby region, including sites near St. Louis.

Southeast Iowa

Similar to northeast Missouri, the Middle Woodland subperiod in southeast Iowa is not well known. Much of what information is known from the region has been collected as part of CRM-driven projects along the Mississippi River in eastern Iowa (e.g., Alex 2000; Louis Berger Group, Inc., 2001; Stephenson and Doershuk 2004).

Although many of the Middle Woodland sites tend to be small, larger occupations, such as those at Gast Farm in Iowa and Putney Landing in Illinois, are known from the region. The larger sites tend to be concentrated along the Mississippi River valley. Likewise, the distribution of burial mounds within the area also appears to be limited to the major river valleys, particularly along the Mississippi River in eastern Iowa (Alex 2000). During the late nineteenth century, these mounds were some of the first archaeological sites investigated in the region. Few of the sites, however, have been the subject of intensive professional investigations.

In the region, evidence of involvement in the Hopewell Interaction Sphere is generally limited to the Mississippi River trench

(Stephenson and Doershuk 2004:24). It is here in this portion of the state that exotic trade goods are sometimes found in Middle Woodland grave contexts. For example, at the Gast Farm site (see below), obsidian, galena, Illinois pipestone, and various exotic cherts were identified.

Stephenson and Doershuk (2004:24–25) note that Middle Woodland sites further away from the Mississippi River valley do not contain the exotic trade goods more common at sites closer to the river. Although finished items made from exotic raw materials are routinely identified, such as hafted bifaces made from Cobden chert or Knife River Flint, the occurrence of these items is much less frequent than in the Mississippi Valley sites.

Havana Tradition (circa cal. 200 B.C.–A.D. 200)

The strongest presence of the Havana Tradition in Iowa is along the Mississippi River in the eastern portion of the state (Alex 2000). Generally speaking, the Havana Tradition is considered the initial expression of Middle Woodland lifeways in southeastern Iowa.

Black Sand ceramics have been noted at several Havana sites throughout the region. The co-occurrence of Black Sand and Havana is noted, particularly during the early portion of the Havana Tradition, at sites such as Sand Run West and Gast Farm. The co-occurrence of these ceramics may indicate a developmental sequence between transitional populations (Fortier 1986).

Gast Farm Site

The Gast Farm site (13LA12) is located on an alluvial fan within the Mississippi River valley in Louisa County Iowa (Dunne 2002; Johnson 2002). Investigations at the site were conducted as part of a multiyear archaeological field school. Excavations at the site included controlled surface collections, hand-excavated test units, and feature excavation. The site was occupied during a lengthy temporal span with Early Woodland Liverpool, Middle Woodland Havana, and Late Woodland components present (Johnson 2002). The Havana component was located along the distal portion of the fan

A large conical mound once stood near the center of the site but was bulldozed during the 1950s (Dunne 2002). In addition, several linear features are also noted on high-altitude aerial photographs, and these may be the remnants of larger earthworks (Dunne 2002:56–57).

A series of three radiocarbon dates were obtained from the Havana component (Dunne 2002:63). The dates range from 2000±80 B.P. (cal. 200 B.C.–A.D. 180; p = .985 [2σ]) to 1890±120 B.P. (cal. 170 B.C.–A.D. 400; p = 1.0 [2σ]).

Ceramics recovered from the Havana component were predominately Havana and Havana-like wares (Johnson 2002). A total of 12 features excavated during the field school investigations contained various ceramic types.

Food residue analysis of 66 ceramic sherds from the Havana component was conducted (Johnson 2002). The results indicated that fish (or plant), large herbivore, beaver, and indeterminate were processed using the analyzed Havana wares (Johnson 2002:162).

The paleoethnobotanical assemblage included a variety of charred wood, nutshell, seeds, and cucurbit rind (Dunne 2002). The assemblage was dominated by wood charcoal in which elm and oak were the most commonly identified tree species. Additional wood charcoal included true hickory, maple, and ash. Charred nutshell is only moderately represented in the assemblage, accounting for approximately 9 percent of the larger than 2 mm size grade (Dunne 2002:91). Identified nutshell included thick-shelled hickory, hazelnut, walnut, black walnut, and butternut. Forty-one pieces of cucurbit rind were identified in the assemblage. Over half of the sample (n = 27) was recovered from two features (both features were pottery sherd concentrations). A wide variety of seeds were identified in the paleoethnobotanical assemblage. Dunne (2002:97–115) classified

the seed assemblage in terms of cultivated taxa, grass, fruits, and weedy plants. Cultivated taxa included goosefoot, little barley, erect knotweed, maygrass, and sumpweed. Grass included grass family, panic grass, barnyard grass, and porcupine grass. Fruits included sumac, nightshade, and grape. Weedy plants consisted of such plants as carpetweed, amaranth, and purslane. The analyzed paleoethnobotanical assemblage suggested a minimum site occupancy from spring through the fall.

The faunal assemblage indicated a wide variety of animal species utilized by the Havana people occupying the site (Nevertt 2001). Mammals dominated the assemblage in terms of absolute count and minimum number of individuals (MNI). White-tailed deer was the most common mammal identified, followed by elk, beaver, raccoon, dog/coyote, pocket gopher, bobcat, and black bear. Fish comprised a significant percentage of the total assemblage and included such species as bowfin, channel catfish, bullhead, and buffalo fish, among others. Birds were not well represented in the assemblage and included duck, teal, American coot, and Canadian goose. Seasonality of the faunal remains further suggested spring through fall occupancy of the site.

Sand Run West Site

The Sand Run West site (13LA38) was located along Sand Run Slough, the southern outlet of Lake Odessa in Louisa County, Iowa (Benn 1987). This multicomponent site was investigated under contract with the Rock Island District, Corps of Engineers.

The Havana component was represented by a series of features, including artifact concentrations, basins, and pits. A single radiocarbon date was obtained for the Havana component: 1760±80 B.P. (cal. A.D. 70–430; p = .998 [2σ]) (Benn 1987:20).

A substantial ceramic assemblage was recovered from the Havana component during the excavations. Havana Series sherds dominated the assemblage and included such types as, Naples Dentate Stamped, Havana Cordwrapped Stick, Havana Incised, Havana Zoned Dentate, Havana Cordmarked, Havana Plain, and Hummel Stamped (Benn 1987:57–59). For the most part, these vessels were tempered with crushed rock. The lip portions of rims were generally thicker than the rim walls. Only five Hopewell sherds were identified in the assemblage. Additional ceramic items included three pipes, a figurine head, and a ceramic disk fragment.

A modest-sized lithic assemblage was recovered from the Havana component (Stanley and Hoppin 1987). Diagnostic hafted bifaces recovered included Ansell Constricted, Gibson, Manker Stemmed, Manker Corner Notched, and Snyders Corner Notched specimens. Additional lithic tools consisted of scrapers, unifaces, unhafted bifaces, drills, and various flake tools. A modest blade and blade core assemblage was also recovered from the site.

Subsistence remains, including both paleoethnobotanical and faunal remains, were recovered from the Havana component. The paleoethnobotanical assemblage consisted of wood charcoal, nutshell, and charred seeds (Lopinot 1987). The wood charcoal was dominated by hickory, although walnut family, hackberry/elm, ash, and cottonwood/willow were also identified. Charred nutshell included hickory, black walnut, acorn, and bitternut. The charred seed assemblage was modest in comparison to the Late Woodland component. Starchy cultivated seeds were dominated by Chenopodium and erect knotweed. Oily seeds consisted of one marsh elder specimen. Weed seeds included panic grass, amaranth, and purslane.

A sparse faunal assemblage was recovered from the Havana component (L. Kelly 1987). The assemblage was dominated by the presence of aquatic species, such as various fish and turtles. Fish remains included unspecified catfish and bullhead. All of the identified turtle species consisted of soft-shelled specimens. Mammals, including white-tailed deer, were also recovered.

The site was interpreted within Struever's (1968b) settlement model for the lower Illinois

River valley and was classified as a base settlement, or a permanently occupied site located in the Mississippi River floodplain. The recovered artifacts indicated that a wide variety of activities had taken place on-site.

West-central Illinois

Numerous Middle Woodland sites are known from west-central Illinois, particularly from the uplands of the region (Yingst 1990a). While Middle Woodland sites in the region are plentiful, the occupation of those sites appears to be on a smaller scale than those of the lower Illinois Valley (O'Gorman and Hassen 2000).

Middle Woodland site locations throughout the region indicate a preference for certain topographic positions. For example, in the Sny Bottom, Middle Woodland sites tend to be situated along backwater areas, such as at the base of the Mississippi bluffs, or along natural levees overlooking backwater sloughs (Benn et al. 1994). Little information is known from the Missouri side in this portion of the Mississippi River. Middle Woodland sites throughout the Sny Bottom and surrounding uplands do not routinely exhibit primary evidence for participation in the larger exchange system (i.e., the Hopewell Interaction Sphere) (O'Gorman and Hassen 2000; Yingst 1990a).

Havana Tradition (circa cal. 200 B.C.–A.D. 200)

The Havana-Hopewell manifestation in west-central Illinois seems to be on a much smaller scale than other parts of the Midwest, for example, the lower Illinois Valley. Evidence of participation in the Hopewellian Interaction Sphere seems to be minimal at best, with generally fewer copper, galena, nonlocal cherts, and mica objects being present. True Hopewell vessels also seem rare compared to other areas. Both Farnsworth and Asch (1986:443) and Wagner (1990) suggest that parts of west-central Illinois may not have participated in the Hopewellian Interaction Sphere much at all, instead representing a local cultural tradition that was minimally influenced by, but not incorporated into, the larger regional Hopewell movement.

Atlas phase (circa cal. A.D. 1–200)

The Atlas phase represents the Middle Woodland in the Sny Bottom during the Havana Tradition. Sny Bottom Atlas phase sites tend to be organized on a smaller scale than their lower Illinois River valley counterparts (O'Gorman and Hassen 2000:278). In the Sny Bottom, exotic raw materials, such as mica, copper, and obsidian, rarely occur.

C. House Site

The C. House site (11PK903) is a multi-component occupation located on a sand ridge within the Sny Bottom in Pike County, Illinois (O'Gorman 2005:5-16). The main occupation of the site relates to the Middle Woodland Havana-Hopewell culture. Through a combination of hand excavation and mechanical stripping, a total of 70 features and 13 post molds were identified as the Middle Woodland component (O'Gorman and Mauch 2005:17-25). Feature type mainly included refuse pits, but lithic pits, hearths, and earth ovens were also identified. The structure was identified as a rectangular basin measuring approximately 4-x-5 m. This structure contained approximately 35–45 cm of fill, and no wall posts were found associated with it.

Four radiocarbon dates were obtained from the Middle Woodland occupation at the site. These dates ranged from 1980±70 B.P. (cal. 170 B.C.–A.D. 140; p = .970 [2σ]) to 1920±70 B.P. (cal. 60 B.C.–A.D. 250 A.D.; p = .988 [2σ]) (O'Gorman and Mauch 2005:26).

The C. House site ceramic assemblage consisted almost entirely of Havana Plain and Cordmarked vessels, with a few Havana Zoned and Naples Stamped examples. Only one Hopewell vessel was identified from the site (O'Gorman 2005:49-58).

The lithic assemblage was mostly made up of local Burlington cherts with a few Cobden/Dongola and Excello cherts being present as well. A large concentration of the non-Burlington cherts from the site were recovered from one feature that was interpreted as a workshop/lithic disposal area. Snyders and North hafted bifaces were

common. Also present were several adzes, numerous cores, drills, gravers, and hoe flakes (Goatley 2005:59-86).

Subsistence remains included a meager paleoethnobotanical assemblage including charred seeds and nutshell. The seeds were mostly chenopod and knotweed, while the nutshells were acorn, black walnut, and hickory (Schroeder 2005: 93-106). Faunal remains were meager as well with deer definitely being present along with some turtle, fish, bird, and mussels (Styles and White 2005:87-92).

Eagle and Rodgers Lake Sites

The following two sites, Eagle and Rodgers Lake, were investigated as part of an ongoing highway construction project (Wagner 1990). The sites are situated close to one another; Eagle is located on a terrace setting, while the Rodgers Lake site is located on the eastern levee of Eagle Slough. These sites are approximately 240 m (787 ft) from one another.

Eagle Site: Investigations at the Eagle site (11PK563) revealed the presence of a small cluster of eight cultural features, including hearths and pits. A single radiocarbon date of 1830±70 B.P. (cal. A.D. 50–360; p = 0.978 [2σ]) was obtained from wood charcoal from a hearth (Wagner 1990:22).

Preservation of organic materials was poor, and no identified faunal remains were recovered. The meager paleoethnobotanical assemblage was dominated by the presence of unidentified wood and bark charcoal. Hickory, acorn, black walnut, and hazelnut nutshell account for a small fraction of the total assemblage. No seeds were identified. Based on the recovered artifacts (as described below), the site was likely occupied to gain access to bottomland mast resources.

Middle Woodland artifacts were recovered from the site in both feature and non-feature contexts. The vast majority of the ceramics recovered from the site consist of sand-tempered Havana Series ware, although a few limestone-tempered Hopewell sherds were identified. The Havana Ware sherds included a variety of types, including Havana Cordmarked, Havana Zoned, Dentate, Havana Plain, Naples Dentate Stamped, Naples Cordwrapped-Stick Stamped, Neteler Stamped Dentate, and Steuben Punctated (Wagner 1990:40).

In terms of the lithic assemblage, 10 of the 11 hafted bifaces were Middle Woodland types and consisted of Steuben, Snyders, Manker/Norton, and Marshall Barbed, along with several unidentified Middle Woodland specimens. The lithic assemblage lacks much evidence for blade production. Only six blades were identified in the assemblage, and only two of the 14 cores were pyramidal (Wagner 1990:25–27).

Rodgers Lake Site: The multicomponent Rodgers Lake site (11PK790) was also investigated as part of the FAP-408 highway project (Wagner 1990). In addition to the Atlas phase Middle Woodland component, the site produced evidence of both earlier and later occupations, including Black Sand/Snycartee, Marion, and early Late Woodland cultural features.

The Middle Woodland component at the site is represented by two small clusters of features (hearths and shallow basins). No structures were identified, although pieces of daub were recovered from several of the pits in each feature cluster (Wagner 1990:28).

Three radiocarbon dates were obtained from wood and nutshell charcoal recovered from feature contexts. These dates firmly bracket the Middle Woodland span and range from 1900±70 B.P. (cal. 50 B.C.–A.D. 260; p = .986 [2σ]) to 1640±70 B.P. (cal. 250– A.D 560; p = 1.0 [2σ]) (Wagner 1990:22). The latter of the three dates appears to post-date the currently accepted range for the Atlas phase (O'Gorman and Hassen 2000).

Wood charcoal dominated the assemblage in terms of count and weight data, with oak accounting for most of the identified samples (Wagner 1990:30). Mast resources included thick-shelled hickory, black walnut, acorn and hazelnut. Only a few seeds were identified from feature fill, including single examples of

persimmon, sedge, knotweed, maygrass, and goosefoot. A single historic wheat seed was also recovered from a feature.

The Rodgers Lake ceramic assemblage is dominated by the presence of Middle Woodland ceramics varieties. All of the diagnostic Middle Woodland sherds are sand-tempered, although occasional grog or crushed-rock (i.e., grit) tempered sherds were identified. Most of the sherds represent Havana Series vessels, including such types as Havana Plain and Cordmarked, Naples Cordwrapped-Stick Stamped, and Neteler Crescent Stamped. Most of the rim sherds are undecorated; however, decorations, when present, consist of vertical impressions at the lip/rim junction, nodes, and horizontal stamped impressions (Wagner 1990:36). In addition to the predominate Middle Woodland sample, a small number of additional ceramics were also identified, including Black Sand Incised and Marion.

A modest sized lithic assemblage was recovered during the investigations. A detailed analysis of the lithic raw materials utilized at the site was not presented. Middle Woodland hafted bifaces, such as Gibson, Norton, Manker, Snyders, and Steuben, were recovered from the site. Several groundstone items (manos and metates) were recovered from Middle Woodland features. Four hoe resharpening flakes were recovered from Middle Woodland pit features. Similar to the Eagle site, blade technology is not well represented in the lithic assemblage. Four of the 15 blades were recovered from Middle Woodland feature contexts. Only two pyramidal cores were identified in the lithic assemblage.

When examined together, the Eagle and Rodgers Lake sites were described as a "local tradition influenced by but not fully participating in the greater Havana-Hopewell network" (Wagner 1990:41). The ceramic assemblage shows clear Havana affiliations, although it retains slight differences that sets this assemblage apart from the larger network. Wagner further indicates that this "distinctiveness" continues into the early Late Woodland La Crosse phase of the Sny Bottom (Wagner 1990:41).

Coldfoot Site

Another Havana phase site in west-central Illinois is Coldfoot (11PK752) (Katz 1990). The site was investigated by the CAA as part of the Central Illinois Expressway project (FAP-408). The site is unusual in several aspects, including the fact that it is a buried upland site and that the site is situated at a greater distance from the Illinois River than many other Middle Woodland sites.

Cultural materials recovered from the site were similar to those from other Havana phase sites throughout the region. The lithic assemblage consisted of fire-cracked rock, flaked stone tools, bladelets, and flake debris. Modified implements included two hafted bifaces belonging to the Dickson Cluster (Belknap type), several fragmentary bifaces, and a single hammerstone (Katz 1990:101–102). The ceramic assemblage contained three rims, consisting of Naples Dentate Stamped, Havana Cordwrapped Stick, and indeterminate. The remaining body sherds appear to be similar to one of the three rims, suggesting the presence of three individual vessels. A scant paleoethnobotanical assemblage was recovered from the site and was composed of charred wood (mostly oak), charred nutshells (hickory and black walnut), and two charred seeds (knotweed or smartweed and sunflower family) (Katz 1990:105). To date, no radiocarbon dates have been reported for this.

Miscellaneous Sites

The following discussion includes a site that does not readily fit into the established cultural historic framework for west-central Illinois. In some instances, the investigators did not place the Middle Woodland component into an established phase. Only the Putney Landing site will be discussed.

Putney Landing

Located on a terrace of the Mississippi River in Henderson County (Markman 1988), Putney Landing (11HE3) encompasses

approximately 15 ha (37 acres). More precisely, the site is situated on the east bank of Campbell Slough and just south of Putney Creek. Present on the site are numerous mounds of unknown cultural affiliation. Employing both hand and mechanical excavation techniques, about 400 sq m of the site was investigated with a particular focus along the cut bank of Campbell Slough (Markman 1988:46–57). As a result of the investigations along Campbell Slough, approximately 87 cultural features were identified and excavated (Markman 1988:71–101). Based on diagnostic artifacts, most of the features and cultural material recovered from the site relate to the Middle Woodland.

Five radiocarbon dates were obtained for the Middle Woodland occupation. These dates ranged from 2040±55 B.P. (cal. 190 B.C. – A.D. 70; p = 1.0 [2σ]) to 1120±90 B.P. (cal. A.D. 680–1050; p = .980 [2σ]) (Markman 1988:421–425). At least one of the dates (1120±90 B.P.) was considered too recent for the Middle Woodland component.

Common ceramic types present included Havana Cordmarked and Havana Plain, which were the most prevalent types, followed by Naples and Havana Zoned, among others. A small number of Hopewell series vessels were also recovered from the site, as were a few Pike/Baehr, Late Woodland, and Early Woodland Black Sand sherds (Markman 1988:123–198).

The lithic assemblage from feature contexts for the site included mostly Snyders hafted bifaces but also included a few Manker and Stueben examples as well (Jeske et al. 1988:201–222). Various other hafted bifaces were collected from the midden, including Madison, Waubesa, Norton, Kramer, and Ansell, among others. Most of the Middle Woodland assemblage consisted of local Burlington/Keokuk cherts, although roughly a quarter of the assemblage was classified as unspecified nonlocal cherts (some obsidian was present). Heat-altered cherts were very common. Other tools recovered from the site include those for cutting soft materials, scraping, graving, planning, piercing, drilling, and tool manufacture (cores).

Subsistence remains indicate that the site was likely occupied during the late summer-fall transition with heavy reliance on cultivated starchy and oily seeds and nuts (King 1988:293–307). The starchy seeds were represented by sumpweed, knotweed, and chenopod, while the oily seeds included hickory, black walnut, hazelnut, and acorns. Faunal remains indicate that white-tailed deer was very important, as were mussels, fish, turkey, elk, duck, squirrel, and geese (Styles and Colburn 1988:308–337).

The site was interpreted as a "multi-functional village center" (Markman 1988:347) that did not conform to the established settlement model for the lower Illinois Valley. The site was likely occupied on an extended seasonal, if not year round, duration. The dense occupational deposits at the site suggested that the site was intensively occupied.

Lower Illinois Valley

Much is known of the Middle Woodland subperiod in the lower Illinois Valley when compared to the neighboring regions. Research conducted during the last 40 years (especially the investigations conducted by the CAA) has described various aspects of Middle Woodland lifeways. As McGimsey and Wiant (1986a:28) note, as of 1980 over 150 sites containing Middle Woodland components have been identified in the lower Illinois Valley. Only one-third of those sites have even been partially excavated.

In 1968, Struever developed a Havana settlement model for the Illinois River valley, and this model had been refined by the works of Asch and others (D. Asch et al. 1979). Three site types have been described: (1) permanently occupied base camps situated at bluff-base settings; (2) mortuary (or other ritual camps) related to bluff-top mound centers; and (3) "regional transaction centers" represented by various floodplain sites. As McGimsey and Wiant (1986a:28–29) suggested, these larger sites may have served

as territory markers rather than as economic centers.

In terms of subsistence resources, recent research has suggested that there is little difference in animal exploitation between Havana mound centers, such as Napoleon Hollow and Baehr-Gust, and village or hamlet sites, such as Smiling Dan (Holt 2006). A limited amount of feasting may have occurred at those Havana centers on the basis of slightly higher percentages of elk and dogs. Holt (2006:461–462) points out that there was no evidence of an elite social group that would "have been provided with animal products from a large area."

Havana-Hopewell (circa cal. 200 B.C.–A.D. 200)

Unlike west-central Illinois sites, lower Illinois Valley sites dating to this time period show immense evidence for full participation in the Hopewellian Interaction Sphere. As will be highlighted below, numerous sites have produced raw material and finished products that reflect this participation, including the presence of Hopewell vessels, mica, copper, galena, nonlocal cherts, and obsidian. Many of these sites were spatially extensive, with some containing mounds. Havana-Hopewell sites discussed include Napoleon Hollow, Smiling Dan, Massey, and Archie.

Napoleon Hollow

Located along Napoleon Creek in Pike County, Illinois, this site (11PK500) covers an estimated 15 ha (37.06 acres) of floodplain. Napoleon Creek is a tributary for the Illinois River, the latter being situated about 100 m to the east of the site. Of the total site area, only about 15 percent was investigated as a result of proposed road construction. Excavations at the site included geologic testing, backhoe trenches, and block excavations over the course of several years (Wiant and Styles 1986:38-49).

By far, the largest occupation at the site relates to the Middle Woodland, particularly between 50 B.C. and A.D. 150 (Wiant et al. (1986:69-74). Radiocarbon dates taken from various Middle Woodland contexts at the site provide a range of 1800±70 B.P. (cal. A.D. 70–390; p = 1.0 [2σ]) to 2000±70 B.P. (cal. 200 B.C.–A.D. 140; p = .99 [2σ]). Other temporal periods were also represented including minor components relating to the Early Woodland Marion and Late Woodland Weaver and White Hall occupations. The Middle Woodland Havana-Hopewell occupation consisted of at least five distinct components (McGimsey and Wiant 1986b:528-533). The main Havana-Hopewell component investigated at the site was located in Excavation Block IV, which produced at least one structure and 15 associated features. The structure was circular with a diameter of about 8 m and a doorway located on its northwest side. Feature types included hearths and refuse pits, although the majority were ephemeral basins of unknown function.

The Havana-Hopewell assemblage for Block IV was consistent with other such assemblages in the region. Ceramics included a high percentage of Havana Plain and Cordmarked vessels with Naples Stamped and Havana Zoned being abundant as well. The smaller proportion of vessels were classified as Hopewell, including cross-hatched rims and Hopewell Zoned (Morgan 1986a:374-426). The lithic assemblage consisted mostly of local Burlington cherts, although about 30 percent were nonlocal. Nonlocal cherts included nonlocal Burlington, obsidian, and non-Burlington (McGimsey et al. 1986a:190-270). Subsistence remains were meager in terms of flora with a small percentage of seeds and nutshell being present (Asch and Asch 1986:427-509). The faunal assemblage contained a large amount of white-tailed deer but also had fish, bird, and reptiles present (Styles and Purdue 1986:513-524).

Smiling Dan

The Smiling Dan site (11ST123) is located in the floodplain of Campbell Hollow Creek about .9 km (.5 mi) from the Illinois River valley. This multi-component site, which is roughly 1 ha (2.4 acres) in area, contained Archaic, Middle Woodland, and Late Woodland occupations (Stafford and Sant 1985:447–455). The main occupation,

however, appears to have been during the Middle Woodland, based on diagnostic artifacts and radiocarbon dates. Radiocarbon dates ranged from 1630±80 B.P. (cal. A.D. 240–600; p = 1.0 [2σ]) to 2020±75 B.P. (cal. 207 B.C.–A.D. 133; p = .98 [2σ]) (see Stafford and Sant 1985:85, Table 6.1). Investigations at the site consisted of roughly 6,400 sq m of excavations that included both hand excavations and mechanical removal of overburden.

A total of 182 pit features were identified and investigated as a result of mechanical stripping and unit excavations. Feature morphology included conical pits, bell-shaped pits, decreasing-sided pits with flat bases, expanding pits, and parallel-sided pits with flat bases (Stafford and Sant 1985:135–159). Feature function included hearths for cooking, general trash disposal, and storage. Three structures were identified as well, two of which were roughly rectangular with floor areas of 56 sq m and 80 sq m.

Artifact analysis indicated a fairly typical Havana-Hopewell assemblage. The ceramics included the usual types, from the frequently occurring Havana Plain, Havana Cordmarked, and Naples to the less common Havana Zoned, Hopewell, and Pike/Baehr vessels (Morgan 1985:183–257). The lithic assemblage consisted of large numbers of Snyders and Snyders-like hafted bifaces (e.g., Norton, Manker) in addition to Marshall and Steuben hafted bifaces (Stafford and Sant 1985:292–295). Blades were also common within the assemblage. Local Burlington was the dominate chert type at the site, although a fairly large sample of nonlocal cherts was present, including Dongola, Cobden, Kaolin, Mill Creek, and Flint Ridge. Obsidian was also present.

Subsistence data from the Middle Woodland occupation at the site included both floral and faunal remains. Floral remains included the widespread presence of nutshell, particularly hazelnut and thick-shelled hickory, but also other types in much lower frequencies. Cultivated seeds were common and included maygrass, knotweed, little barley, and goosefoot. A very small amount of tobacco was also present, as were some fruits and berries (Asch and Asch 1985b:327–401). The faunal sample included both terrestrial and aquatic animals. The former consisted of deer, rabbit, turkey, squirrel, and crane, while the latter was represented by bullhead, bowfin, turtles, and some mussels (Styles et al 1985:402–435).

Massey and Archie Sites

The Massey (11MG15) and Archie (11MG17) sites were investigated prior to the commencement of the Central Illinois Expressway (FAP-408) highway project (Farnsworth and Koski 1985). The sites are situated close to one another; Massey is situated on a small upland ridge spur overlooking a tributary to Sandy Creek, and the Archie site is located approximately 1 km to the east on a ridge spur overlooking another tributary to the same creek. Emergency salvage excavations were conducted at the Archie site after construction activities severely disturbed the site.

Massey

Investigations at the Massey site consisted of controlled surface collection, hand-excavated test units, mechanized removal of the plow zone, and feature excavation. These investigations revealed the presence of a modest-sized Middle Woodland occupation along with two minor Archaic components. The Middle Woodland component is represented by 22 features, including shallow, medium, and deep basins, deep pits, bell shaped pits, and post pits. Many of the 40 post molds identified belong to a Middle Woodland structure. This single post structure measured approximately 7-x-8 m in size.

Two radiocarbon dates were obtained for the Middle Woodland component from Massey. These dates were 1930±70 B.P. (cal. 90 B.C.–A.D. 240; p = 1.0 [2σ] and 1750±70 B.P. (cal. A.D. 120–430; p = .987 [2σ]) (Farnsworth and Koski 1985:18).

The ceramic assemblage was dominated by Massey Cordmarked and Massey Fabric Impressed sherds (Farnsworth and Koski

1985). Temper was composed primarily of crushed rock, although grog was also present in significant quantities in the Massey Series ceramics. Jar forms dominate the assemblage. Additional ceramic types included smaller amounts of Hopewell and Baehr. A notable observation regarding the Massey ceramic assemblage is the lack of Havana wares present at the site. The authors indicate that the majority of the sherds are similar, in terms of temper, paste, and surface treatment, to Crab Orchard Series vessels characteristic of Middle Woodland sites more than 160 km to the south (Farnsworth and Koski 1985:151).

The Middle Woodland lithic assemblage was dominated by the presence of locally available Burlington chert (Cook and Koski 1985). Diagnostic hafted bifaces recovered from the site included Gibson, Belknap, Norton, and Steuben specimens. Additional lithic tools identified from the site consisted of a variety of formal and informal tools, such as scrapers, gravers, adzes, microdrills, spokeshaves, wedges, flake tools, and chert hammerstones. Ten blades, including both utilized and non-utilized specimens, were also recovered. Groundstone items consisted of manos, metates, and an abrader. Evidence of hoes were present in the form of hoe resharpening flakes. Some of these latter flakes refit to hoe flakes recovered from the Archie site.

Paleoethnobotanical resources consisted of a variety of local resources (Asch and Asch 1985c). Wood charcoal dominated the assemblage and included such species as hickory, oak, and elm, as well as lesser amounts of maple, hawthorn, honey locust, black walnut, and ash. Charred nutshell included hazelnut, thick-shelled hickory, black walnut, bitternut, and acorn. Most of the charred seeds were identified as erect knotweed. Other seeds included grape, pokeweed, Chenopodium, little barley, elderberry, and sunflower, along with other species. Cucurbit rind fragments were also identified.

The Massey site was interpreted as a Hopewellian farmstead occupied by a "single socially marginal family group" (Farnsworth and Koski 1985:226). The paleoethnobotanical assemblage indicates that the site was likely occupied throughout much of the year. The presence of the Massey Series ceramics suggests infrequent direct trade with native groups in southern Illinois.

Archie

The emergency salvage investigations at this site consisted of feature excavation. A total of five features, consisting of basins and a rock concentration, were identified.

Two radiocarbon dates were obtained for the Middle Woodland component at Archie. These dates ranged from 1900±70 B.P. (cal. 50 B.C.–A.D. 260; p = .986 [2σ]) and 1800±70 B.P. (cal. A.D. 70–390; p = 1.0 [2σ]) (Farnsworth and Koski 1985:18).

The ceramic assemblage was dominated by Massey Cordmarked and Massey Fabric Impressed sherds (Farnsworth and Koski 1985). Temper was composed primarily of crushed rock, although grog was also present. Jar forms dominate the assemblage. Additional ceramic types included smaller amounts of Hopewell, Baehr, and indeterminate Middle Woodland. As with the Massey site assemblage, no Havana wares were identified in the assemblage. The Massey wares were similar to Crab Orchard Series vessels found further south.

A sparse lithic assemblage was recovered from the site (Cook and Koski 1985). Diagnostic hafted bifaces consisted solely of Norton specimens. Additional lithic tools included bifaces, scrapers, and a wedge. Several blades were also recovered from the site. Nonchert tools included grinding stones and hammerstones. Several blades were also recovered from the site. Evidence of hoes was present in the form of hoe resharpening flakes. Some of these hoe flakes refit to hoe flakes recovered from the Massey site.

Paleoethnobotanical resources identified in the Archie assemblage consisted of a variety of local resources (Asch and Asch 1985c). Wood charcoal was the most commonly identified resource and included

types such as hickory, oak, and elm, along with lesser amounts of hawthorn, honey locust, and black walnut. Charred nutshell included hazelnut, black walnut, thick-shelled hickory, acorn, and bitternut. The vast majority of the charred seeds were identified as erect knotweed. Other identified seeds included pokeweed, Chenopodium, little barley, maygrass, and bedstraw, among other species. Cucurbit rind fragments were also identified.

Like the Massey site, the Archie site was also interpreted as a Hopewellian farmstead that was occupied by a single family group. The paleoethnobotanical assemblage indicates that the site was likely occupied throughout much of the year. The presence of the Massey Series ceramics suggests infrequent direct trade with native groups in southern Illinois.

Missouri-Mississippi River Confluence

Middle Woodland sites in the Missouri-Mississippi River confluence region are more numerous than earlier Woodland occupations. Middle Woodland sites in the American Bottom are generally smaller than those sites in the Illinois Valley. In addition, these sites generally do not contain the elaborate characteristics (i.e., Hopewell Interaction Items, Hopewellian ceramics, and elaborate mortuary practices) that are typical of Middle Woodland sites in the lower Illinois Valley (Kelly 2002). Three Middle Woodland phases have been defined for the American Bottom region, including the Cement Hollow, Holding, and Hill Lake phases (Fortier et al. 1984; Kelly 2002; Maher 1996).

Cement Hollow phase (circa cal. 100 B.C.–A.D. 50)

The Cement Hollow phase represents the initial portion of the Middle Woodland subperiod in the American Bottom region. Currently, there is no evidence that these early Middle Woodland groups were derived from the local Early Woodland populations (Kelly 2002). As Fortier (1998:355) noted "in terms of subsistence, settlement patterning, and technology, early Middle Woodland Cement Hollow phase occupations differ imperceptibly from previous Early Woodland settlements in this area." Rather, it appeared that these groups may have originated in areas further north.

Artifact assemblages are characterized by Havana Plain and Cordmarked ceramics, including decorated Havana types (e.g., punctations, zoned, and dentate stamping). Hopewell wares appear to be uncommon in Cement Hollow phase sites. Diagnostic hafted bifaces include Manker and Snyders types.

Kelly (2002:147) noted that the Cement Hollow phase settlement model included two settlement types: residential camps (such as Petite Michele) and extractive loci (such as Mund). Cement Hollow phase components have been identified in at least four sites in the American Bottom, including Mund, Petite Michele, and Widman (Kelly 2002:147). Of these sites, only Petite Michele will be discussed further.

Petite Michele Site

The Petite Michele site (11S750) is situated along a natural levee of the Mississippi River (Fortier 2004). The site was excavated as part of the FAI-255 transportation project. Investigations at the site consisted of controlled surface collection, mechanical removal of the plow zone, and feature excavation. The investigations revealed the presence of a large early Middle Woodland occupation represented by 87 cultural features, most of which were situated along the highest portion of the landform. The features include 86 pits, consisting of cooking and storage features along with a single pottery concentration. Two of the pits contained human burials.

A total of eight radiocarbon dates, including both AMS and conventional assays, were obtained from the Middle Woodland Cement Hollow component (Fortier 2004:174). These dates range from 2340±70 B.P. (cal. 600–340 B.C.; p = .692 [2σ] and 320–200 B.C.; p = .175 [2σ]) to 1740±60 B.P. (cal. A.D. 130–420; p = 1.0 [2σ]) (Fortier 2004:173–175). None of the dates appear to

fall within the expected date range for the Cement Hollow phase (Fortier 2004:175–176). The AMS and conventional dates produced two individual date clusters and were not consistent with one another. Fortier (2004:176) argues that these dates should not be used to place the Petite Michele site within a chronological framework.

The ceramic assemblage was dominated by Havana wares. Temper was primarily composed of crushed rock and sand followed by smaller amounts of sand, grog, and limestone tempers. Jar forms were most commonly identified. Ceramic types included both Plain (var. Collinsville and var. unspecified) and Cordmarked (var. unspecified and var. Bottoms) (Fortier 2004:61–86). Additional ceramics included Havana Zone (including Dentate Stamped), Naples Stamped (var. plain), and Neteler Stamped (var. Dentate Crescent Stamped). Single sherds of Crab Orchard Fabric Impressed, Schafner Pinched, and Fettie Chevron (var. Dentate Stamped) were also identified.

The lithic assemblage was dominated by locally available lithic raw materials, including Burlington and Fern Glen cherts (Fortier 2004). Diagnostic hafted bifaces included Snyders Cluster specimens—Snyders and Manker types. Dickson/Waubesa, Mason Contracting Stem, and Steuben hafted bifaces were also identified, although these latter three types were recovered from poor depositional contexts (i.e., back dirt and plow zone contexts). Additional lithic tools identified at the site consisted of a variety of formal and informal tools, including scrapers, wedges, gravers, micro-drills, gouges, bifaces, and miscellaneous flake tools. In addition, blades were also recovered and appear to represent the first occurrence of blades from Middle Woodland contexts in the American Bottom (Fortier 2004:126). Non-chert tools consisted of grinding stones, multipurpose cobble tools, hammerstones, sandstone abraders, and celts/axes.

Information concerning subsistence consisted of both paleoethnobotanical and faunal remains. The paleoethnobotanical assemblage was dominated by wood charcoal (Parker 2004a). Charred wood species consisted of at least 10 species, including hickory, honey locust, oak, (including red and white), elms, and several others. Mast resources were represented by primarily hickory, hickory/walnut family, and acorn nutshell. A modest sized seed assemblage was recovered from the site. The vast majority of the charred seed assemblage consisted of the native cultivated grain, maygrass (Parker 2004a:160). Additional seeds included bedstraw, American locust, pawpaw, little barley, chenopod, and others.

The faunal remains were highly fragmented; only 61 of 833 fragments recovered were identifiable to the genus level (Penman and Kelly 2004). Terrestrial and aquatic resources dominated the identified assemblage. Terrestrial resource included white-tailed deer, muskrat, and coyote. Fish included gar, catfish, freshwater drum, bowfin, and pike. Frogs and turtles were also identified in the assemblage. Of particular note, only a small percentage of the bone was heat altered, suggesting that many of the faunal resources may have been boiled rather than roasted (particularly for the large mammal remains) (Penman and Kelly 2004:171).

The Petite Michele Cement Hollow occupation was interpreted as a residential camp that was likely occupied through a number of seasons. Analysis of the subsistence remains suggest that most of the occupation likely occurred during the fall through winter months. Subsistence appeared to be primarily based on hunting and gathering; little evidence of extensive horticultural activities was noted.

Holding phase (circa cal. A.D. 50–A.D. 200)

In the American Bottom, the Holding phase marks the beginning of Hopewellian influences throughout the region. While treated as a single entity in this report, this phase has been subdivided into two smaller subphases: the Holding I and Holding II phases (Kelly 2002; Maher 1996). The Holding I phase is characterized by the presence of Havana wares coupled with the

occurrence of Hopewell Zoned Incised and Hopewell Zone Stamped ceramics (Maher 1996). In contrast, Holding II phase is marked by the appearance of Pike Rocker Stamped and other later Middle Woodland ceramic types in approximately equal proportions throughout several sites. Three sites, Holding, Meridian Hills, and Bosque Medio, will be discussed below.

Holding Site

Located on a sand ridge of the Mississippi floodplain in Madison County, Illinois, this multi-component site (11MS118) encompassed an area approximately 5.2 ha (12.8 acres) in size (Fortier et al. 1989:1–3). Investigations at the site included only .6 ha (1.4 acres) that was to be impacted by proposed road construction. Through a combination of hand excavation and mechanical stripping, a total of about 6,000 sq m of the site was investigated. Of a total of 180 cultural features identified and recorded, 163 were determined through artifacts and radiocarbon dating to belong to the Middle Woodland. The other features were related to a nineteenth-century historic farmstead. Middle Woodland feature types included shallow roasting or cooking pits, deep refuse pits, possible storage pits, and pit hearths (Fortier et al. 1989:55-123).

Seven radiocarbon dates from Holding ranged from 1760±90 B.P. (cal A.D. 63–439; p = .97 [2σ]) to 2010±80 B.P. (cal 206 B.C.–A.D. 141; p = .96 [2σ]). These results can be referenced in Fortier et al. (1989:485, Table 96).

Ceramics from the site included numerous non-decorated utilitarian vessels with plain or cordmarked exterior surfaces. The site also had, however, a fairly large representation of decorated vessels belonging to Naples Stamped, Havana Zoned, and Hopewell types (Maher 1989:126-318). Jars were prevalent with few bowls present. The lithic assemblage consisted mostly of Burlington cherts, which included at least six varieties. Also present in the assemblage were Grimes Hill, Salem, St. Genevieve, Mill Creek, Dongola, Cobden, Kaolin, and Dover, among others (Williams 1989:319–428). Tools in the assemblage included a large number of drills, cobble tools for processing nuts and seeds, cores, blade cores, and hafted bifaces, such as Snyders, Norton, Gibson, Ansell, Manker, and Apple Creek. The presence of Hopewellian Interaction Sphere material, such as galena, copper, fluorite, and mica, indicates participation within that network.

Subsistence remains consisted of a wide array of floral resources that were exploited by the inhabitant of the site. Prominent were seed cultigens and wild resource. Seeds included the starchy cultivars knotweed, goosefoot, maygrass, and little barley, and the oily cultivars of sunflower. Nutshell was mostly black walnut, thick-shell hickory, acorn, hazelnut, and pecan hickory (Parker 1989:429–464). Faunal remains included mostly deer but also included some fish, mussels, and avian species (Kelly 1989:465–482).

Meridian Hills Site

Another Holding phase site in the American Bottom region is the Meridian Hills site (11MS1258) (Williams 1993). This site was excavated as an emergency salvage project due to impending encroachment of a housing development at the site location. Seventy-five features were excavated as part of the salvage work. The features included basins, pits, and bell-shaped pits, along with artifact concentrations. No radiocarbon dates were obtained for the Middle Woodland component.

The artifact assemblage appeared to have been typical of other Holding phase assemblages throughout the region (Williams 1993). Of the diagnostic ceramics, most were either Holding Plain or Holding Cordmarked. These vessels were typically large jars that exhibited a single row of embossed nodes just below the lip. Other decorated ceramics also included Hopewell Zone Stamped and Hopewell Zoned Incised, along with minor amounts of Naples Stamped, Montezuma Punctate, and a Brangenburg T-shaped rim. On the basis of the thicker lips and interior lip beveling of many of the sherds, the ceramic

assemblage may be closer to the earlier cement Hollow phase (Williams 1993:196). The lithic assemblage is composed of a variety of lithic raw material resources deriving from local and nonlocal source areas. Modified implements recovered from feature contexts included scrapers, nutting stones, manos, and hammerstones, along with several Snyder Cluster hafted bifaces (Manker type).

The site also possessed an exceptionally well-preserved paleoethnobotanical assemblage (Williams 1993:197) dominated by a series of starchy-seed cultigens. These included chenopod, maygrass, erect knotweed, and little barley. Charred nutshell included hazelnut, black walnut, hickory, and acorn. Wild plant remains were also recovered in abundance at the site, including sumac, raspberry or blackberry, cherry, and pawpaw (Williams 1993:197).

The site has been interpreted differently by various researchers. Fortier and others (Fortier et al 1989:568; Fortier and Ghosh 2000) identified the site as a "seasonal horticultural hamlet" in the Holding phase settlement model. In contrast, Farnsworth (1990:120) identifies the site as a "long-term residential occupation" on the basis of a "broad diversity of stone tools, Middle Woodland ceramics, nonlocal trade materials, and cultivated and noncultivated plant food remains" (Farnsworth 1990:120). Due to the difficulty and uncertainty in assigning the Meridian Hills site to a settlement model, Williams (1993:199) declines to place the site in a settlement model. No radiocarbon dates have been reported for this site.

Bosque Medio Site

The Bosque Medio site (11MS1672) is situated along a narrow upland ridge overlooking an unnamed tributary to Schoolhouse Branch in Madison County, Illinois (Fortier and Ghosh 2000). The site was investigated in 1996 in advance of borrow pit operations at the site location. A total of seven features were identified at the site; all were classified as basins. Radiocarbon dates were not reported.

Ceramics recovered from the site were diagnostic of the Middle Woodland subperiod. Four types of Middle Woodland ceramics were recovered from the site and include such types as Pike Rocker Stamped (var. Black Lane) Hopewell Cross Hatched (var. Mississippi) Hopewell Rocker Rim (var. West) and Havana Cordmarked (var. Bottoms) (Fortier and Ghosh 2000:17–22). These ceramics were tempered with a narrow variety of tempers, including grit, grog, and limestone.

The lithic assemblage is dominated by the presence of unmodified flake debris—only six flaked stone tools were identified during the investigations. The flaked stone tools included two biface fragments, two flake scrapers, a flake tool, and a complete Manker hafted biface (Snyders Cluster). Lithic raw materials were predominately Burlington chert (from local sources), although a wide variety of additional resources were utilized, including both local and nonlocal source areas. The non-chert tools included both grinding stones and pitted stones.

The paleoethnobotanical assemblage is dominated by wood, followed by nutshell and seeds (in terms of count data). Charred wood accounts for just over half of the paleoethnobotanical assemblage and includes such resources as elm, followed by maple, oak, hickory, and ash, among others. Both upland and bottomland resources were extensively utilized at the site. The prevalence of elm (upland resource) in the Bosque Medio site assemblage is considered typical of the upland surroundings in the lower Illinois River valley (Fortier and Ghosh 2000:35). Nutshell accounts for approximately one-third of the assemblage and is considered a diverse suite of nut resources, including hickory, walnut, hazelnut, butternut, acorn, and thin-shelled hickory. Of the identified seeds, maygrass and goosefoot account for the majority. Additional seeds consisted of erect knotweed, grape, panic grass, Chenopodium/Amaranthus, and grass family (Fortier and Ghosh 2000:40).

The site was interpreted as functioning as a short-term occupation, likely occupied on a

seasonal basis (Fortier and Ghosh 2000:47–50). On the basis of the Fortier et al (1986) Middle Woodland settlement model, Bosque Medio was considered as a short-term forager camp that may have been tethered to larger floodplain settlements. This type of site exhibited evidence for broader economic activities (Fortier and Ghosh 2000:50).

Hill Lake phase (circa cal. A.D. 200–350)

The Hill Lake phase is considered the terminal portion of the Middle Woodland subperiod in the American Bottom region. This phase is marked by a decline of Hopewell traits, such as decorated ceramics and blade production. Ceramics commonly consist of Pike Brushed. A small amount of Havana wares have also been identified in Hill Lake phase occupations. Blade production appears to be limited during this phase, although it continued at some sites, such as at Dash Reeves (Fortier 2001).

Dash Reeves Site

The Dash Reeves site (11MO80) was situated in the Mississippi River floodplain along the medial portion of an alluvial fan associated with Palmer Creek (Fortier 2001). The site was investigated as part of the FAI-270 archaeological project. The investigations at the site consisted of hand-excavated test units, mechanical removal of the plow zone, and feature excavation.

The investigations revealed the presence of 53 cultural features, including shallow basins, hearths, earthovens, and post molds. In addition, the Middle Woodland occupation also formed a thin midden throughout portions of the site. Generally speaking, the features were concentrated along an arc that followed two former creek beds.

Seven conventional radiocarbon dates were obtained from the site (Fortier 2001:258). These dates range from 1890±80 B.P. (cal. 50 B.C.–A.D. 270; p = .944 [2σ]) to 1660±80 B.P. (cal. A.D. 210–580; p = .992 [2σ]) (Fortier 2001:258). With the exception of the oldest date (1890±80 B.P.), the dates are fairly consistent with the Hill Lake occupation of the site and the corresponding artifact assemblage. In addition to the seven conventional dates, four AMS dates were also obtained from feature contexts at the site. These dates ranged from 1770±60 B.P. (cal. A.D. 130–410; p = 0.997 [2σ]) to 1625±60 B.P. (cal. A.D. 320–560; p = .942 [2σ] (Fortier 2001:261).

A substantial ceramic assemblage was recovered from the site (Maher 2001). Several varieties of Pike Rocker Stamped (e.g., var. Black Lane, Calhoun, and Fairmont) were the most commonly identified types in the Dash Reeves assemblage. Other types recovered included Pike Brushed, Hopewell Zoned, Hopewell Cross Hatched, Fourine Plain, and Baehr Zoned sherds. Few Havana Cordmarked or Havana Plain sherds were identified in the assemblage, suggesting that the assemblage was likely to date to the Hill Lake phase rather than the preceding Holding phase. In addition, a figurine fragment (consisting of a human head) along with two fragments of a clay ear spool were also identified at the site.

The lithic assemblage was dominated by the presence of locally available raw materials, including Ste. Genevieve red and Salem cherts (Fortier 2001:129). Diagnostic hafted bifaces recovered included a series of Middle Woodland types, such as Manker (including stemmed, corner-notched, and side-notched examples), Snyders, Gibson, and Clear Lake Side Notched specimens. In addition, several other non-Middle Woodland specimens were also identified in the assemblage. Other tools included bifaces, drills, scrapers, and adzes. Informal flake tools included scrapers, drills, perforators, and gravers. Non-chert tools consisted of a variety of items, including grinding stones, hammerstones, pitted stones, celts/axes, pestles, and a sandstone slot abrader, as well as two pieces of worked hematite.

The investigations at the site revealed substantial evidence for blade production, including 2,165 blades and blade fragments (Fortier 2001:138). The vast majority of the blades were manufactured from Ste. Genevieve, followed by a substantially fewer number of specimens made from Burlington,

Salem, Old Blue, and Cobden. Heat treatment was identified on 17.5 percent of the blades. Associated with these blades were a variety of blade core types, including prismatic, semiconical, cuboid, tabular, wedge, ball, multidirectional, nucleated, and tortoise (Fortier 2001:134).

The paleoethnobotanical assemblage was dominated by charred seeds (Simon 2001). Approximately three-quarters of the assemblage consisted of purslane seeds recovered from a single feature. Starchy seeds included maygrass, goosefoot, erect knotweed, and little barley. Approximately one-quarter of the paleoethnobotanical assemblage was composed of wood charcoal. Wood charcoal included hickory, oak (including both red and white), elm, ash, and walnut. Charred nutshell was not common at the site but included thick-shelled hickory, hazelnut, and black walnut.

The faunal remains were poorly preserved and highly fragmented, as was evident by the high instances of thermal damage (Brewer and Penman 2001). Most of the identified specimens were identified as white-tailed deer, although a variety of additional faunal remains were also recovered. Identified mammals are represented by raccoon, various rodents, woodchuck, and dog/coyote/wolf. Fish remains were also present, including gar, bowfin, rock bass, as well as specimens of the sunfish, minnow, and sucker families. A few reptile, bird, and amphibian remains were also identified.

Dash Reeves was interpreted as a specialized residential camp (Fortier 2001:274). The site was considered a specialized lithic production center where blades were produced en masse. No definitive evidence was found for structures at the site, although the presence of structure(s) was inferred in the northern portion of the site. Fortier (2001:274) also notes that the paleoethnobotanical assemblage is significantly less diverse than what "would be expected from a horticultural based settlement."

Miscellaneous Middle Woodland Sites

The following discussion includes several sites that did not readily fit into the established cultural historic framework. Investigations at some of the sites, for example, did not (or could not) readily assign particular phases to the various Middle Woodland cultural components. In addition, a number of sites containing Middle Woodland components have been investigated in areas further east of the confluence region in southwestern Illinois. Only two of these additional Middle Woodland sites will be discussed below.

Cowmire Creek Site

Located in Saint Louis County on the Kingston Terrace of the Missouri River (Craig and Vorreyer 2004), this multicomponent Middle Woodland site (23SL1056) encompassed nearly 2.8 ha (7 acres). The main occupation, however, appears to be restricted to a series of low rises that included an area about 45-x-120 m in size. It is this smaller, more restricted area that received the most extensive investigation, including the mechanical removal of the Ap horizon and feature excavation. A total of 457 cultural features were identified and recorded as a result of the stripping (Craig and Vorreyer 2004:51–83). These features comprised 12 distinct clusters. According to the investigators, these clusters likely represented task specific activities and chronological differences. Features morphology included basins, bell-shaped pits, flat-bottomed pits, and indeterminate with feature function spanning storage, refuse disposal, and cooking. No structures were identified, although some post molds were present.

Two Middle Woodland components were identified at the site. These components were tentatively assigned to the transitional Early to Middle Havana phase (circa 150 B.C.) and to the end of the Middle Havana phase (circa. A.D. 200) (Craig and Vorreyer 2004:271). A series of five radiocarbon dates were obtained from the two Middle Woodland components. Two dates were obtained from the Early to Middle Havana component. These dates were 2130±70 B.P. (cal. 370–20 B.C.; p = .983

[2σ]) and 2100±60 B.P. (cal. 230 B.C.–30 A.D.; p = .88 [2σ] and cal. 360–280 B.C.; p = .114 [2σ]) (Craig and Vorreyer 2004:267). Three dates were obtained from the late Middle Havana component, ranging from 1870±60 B.P. (cal. 3–259 A.D.; p = .974 [2σ]) to 1730±60 B.P. (cal. 140–420 A.D.; p = 1.0 [2σ]) (Craig and Vorreyer 2004:267).

The early Middle Woodland component was represented by diagnostic artifacts, including both ceramic and lithic items. Ceramics consisted of Naples, Havana Cordwrapped, and Hopewell wares. Diagnostic lithic artifacts included both contracting-stemmed hafted bifaces and Snyders or Norton types.

The late Middle Woodland component artifacts also included both ceramic and lithic artifacts. Ceramics consisted of an increase in the percentage of Havana Plain, Pike Rocker, and Baehr Brushed vessels. A corresponding decrease in Hopewell ceramics was also noted. Hafted bifaces identified included Snyders and Manker type hafted bifaces.

Both components appear to have a diverse assemblage of plant remains including cultigens and wild plant resources (Parker 2004b:205-223). Seeds in order of prevalence from the site were Chenopodium, little barley, maygrass, and erect knotweed, among others. Wild resources included a large amount of nutshell (i.e., hazelnut, hickory, acorn, and walnut) as well as some fruits and berries.

Most of the identified faunal remains consisted of terrestrial resources, particularly mammals (T. Martin 2004). The mammals were dominated by white-tailed deer. Additional identified mammal remains included single specimens of eastern cottontail, fox squirrel, and tree squirrel. Avian species included wild turkey, duck, and pied-billed grebe. Identified reptile remains consisted of a series of turtle remains, including painted, box, eastern box, and semi-aquatic pond turtles. Fish included catfish/bullhead, buffalo fish, channel catfish, and freshwater drum.

Point Shoal Site

The Point Shoal site (11MY97) is located in the uplands of Montgomery County, Illinois (Yingst 1990b). The site is situated along a secondary terrace of Shoal Creek, a tributary of the Kaskaskia River. The site was investigated in 1984–1985 as part of a proposed bridge replacement and roadway realignment construction project. Investigations at the site identified 15 cultural features and an amorphous stain; 5 of the features were distributed in a linear arrangement along the edge of the terrace. No structures or midden were identified. A single uncalibrated radiocarbon date of 1900±70 B.P. was obtained (cal. 50 B.C.–A.D. 260; p = .986 [2σ]) (Yingst 1990b:84). This date was considered acceptable based on the recovered cultural materials.

The investigations at the site included a modest sized artifact assemblage. Havana Series ceramics accounted for the vast majority of the recovered ceramics; only one Hopewell Series rim sherd was tentatively identified. The Middle Woodland lithic assemblage contained a wide variety of formal and informal tools, cores, lamellar blades, and associated flake debris. The modified implements included hafted bifaces, bifaces, scrapers, drills, and various informal flake tools. The hafted bifaces included various Snyders Cluster specimens.

The paleoethnobotanical assemblage is dominated by the presence of nutshell, particularly thick-shelled hickory and black walnut, along with minor amounts of hazelnut. The nut resources are divergent when compared to other Middle Woodland sites in the lower Illinois River valley, where hazelnuts tend to dominate (Yingst 1990b:83). Recovered charred wood is dominated by oak, with minor amounts of hickory, elm, coffeetree, sycamore, and ash. As Yingst (1990b:84) points out, the high nut:wood ratio of 10.83:1.00 for the paleoethnobotanical assemblage is more similar to Late Archaic assemblages than to other Middle Woodland sites. A meager seed assemblage was recovered from the site, including single

examples of maygrass and goosefoot (both considered to be potential cultigens).

The site appeared to represent a "short-term specialized camp… occupied during the latter half of the first century A.D." (Yingst 1990b:88). The author suggested two possible scenarios to explain the Middle Woodland component at the site (Yingst 1990b:88). The first suggested that the site was repeatedly occupied for short periods of time by a small group of people (possibly a family). The second suggests that the site was occupied for a single period of time over a season and each of the features represented the activity location of an individual task group.

Truman Road Site

The Truman Road site (23SC924), situated on an alluvial fan along the western edge of the Mississippi River, is located in St. Charles County Missouri (Harl 1999). Excavations at the site revealed the presence of a small Middle Woodland component represented by six cultural features arranged in roughly a circular pattern along the landform. The largest of these, Feature 24, appeared to have served as a cremation pit. This feature contained the remains of at least two cremated individuals. Human remains scattered throughout the feature fill suggested that this facility may have been repeatedly utilized.

Two radiocarbon dates were obtained for the Middle Woodland component at the site (Harl 1999:207). Charred plant remains from Feature 24 produced a radiocarbon date of 1700±70 B.P. (cal. A.D. 209–471; p = .888 and A.D. 476–534; p = .072 [2σ]). The remaining assay, recovered from Feature 293, produced a date of 1860±60 B.P. (ca. A.D. 20–261; p = .950 [2σ]).

The ceramic assemblage is dominated by cordmarked jar forms, most of which were tempered with either crushed rock or grog (or a combination of the two temper types). Ware types included Havana, Naples, Hummel, Hopewell Zones, Neetler, and Sister Creeks Punctate ware types (Harl 1999:168–180). Additional ware types recovered from the site also included Montezuma and Pike/Baehr sherds. A few bowls possessing exterior decorations similar to Hopewell, Brangenburg, Montezuma, and Pike/Baehr were also identified in the assemblage.

The lithic assemblage is dominated by the presence of lithic raw materials (particularly Burlington chert) deriving from both local and near-local source areas. Modified implements recovered from the Middle Woodland investigations consisted of hafted bifaces (including Kramer, Dickson, Snyders, Ansell, and Norton specimens, along with a few Late Archaic types). Additional tools included scrapers, drills, retouched flakes, and lamellar blades. It should be noted, however, that the blades were only recovered from Feature 24, the single mortuary feature in the Middle Woodland component.

Subsistence resources identified at the site included both paleoethnobotanical and faunal remains. A modest-sized paleoethnobotanical assemblage was analyzed from the Middle Woodland features (Wright 1999b). Plant remains were dominated by the presence of both wood and nutshell charcoal. Only a cursory analysis of a small subsample of the wood charcoal was conducted. Identified wood charcoal included oak, maple, hickory, ash, willow/cottonwood, and sassafras. The charred nutshell assemblage was dominated by hickory and hazelnut, although lesser amounts of black walnut and acorn were present. The charred seeds identified included a limited variety of species, including Chenopodium, maygrass, erect knotweed, and little barley. Noncultivated seeds consisted of persimmon and grape. Additional floral remains identified in the assemblage included gourd rind fragments and grass stem fragments.

Only the faunal assemblage recovered from Feature 24 was analyzed (Styles and White 1999b). A large number of faunal remains were recovered from this feature (n = 3,840, including both bone and shell). Both aquatic and terrestrial resources were well represented in the assemblage. Of the aquatic resources, fish was commonly represented, with bowfin, various suckers, and various catfish accounting for most of the identified

fish remains. Freshwater mussels along with various frogs and turtles were also identified. Of the terrestrial animals, white-tailed deer accounted for the vast majority of the identified remains followed by raccoon, woodchuck, and a variety of smaller-sized mammals. Birds were commonly represented in the assemblage, including duck and turkey.

Due to the presence of the crematory facility, the site had been interpreted as a special purpose area likely associated with a nearby Middle Woodland village (23SC48/53/922). This site is situated along a bluff top immediately to the west of the Truman Road site. The presence of 64 lamellar blades, recovered exclusively from Feature 24, further suggested the specialized nature of the site.

Based on the variety of cultural materials recovered from the Middle Woodland component, a variety of additional activities were conducted on-site. These activities included lithic tool manufacturing and core reduction. The variety of the subsistence remains (including both floral and faunal) recovered from the Middle Woodland component indicated that the local environment was exploited.

Summary

Based on data obtained from the above sites and supplemented by others throughout the midcontinent, a number of generalized patterns can be identified. Judging from the increase of identified sites, an increase in population can be proposed for the region. Sites such as Holding and Putney Landing indicate that populations were either increasing or, alternatively, beginning to aggregate in locations for extended time spans.

In addition to the increasing populations, there is growing evidence that these Middle Woodland groups were moving across the landscape. Evidence is most pronounced during the initial portion of the Middle Woodland in the American Bottom region where settlement and subsistence practices along with material culture indicated that these initial groups consisted of peoples originating from northern locales (Fortier 1998). Currently it is unclear whether these movements represent occasional forays into new territories or whether there were wholesale population migrations from one region to the other.

The Middle Woodland also witnessed the widespread exchange of nonlocal (or exotic) raw materials, such as obsidian, mica, and copper, as well as finished goods, including pipes, celts, and hafted bifaces. This exchange network, referred to as the Hopewell Interaction Sphere, manifested itself throughout the American midcontinent particularly, in the lower Illinois River valley, by the presence of nonlocal or exotic trade goods (Struever and Houart 1972). In certain regions, such as in northeastern Missouri and the American Bottom, this exchange network does not appear to have played a prominent role (as is evident by the apparent scarcity of trade goods) (Fortier 1998; Kelly 2002).

Aspects of Middle Woodland technology have also been noteworthy. In terms of lithic assemblages, biface technology still appears to be prominent as tool assemblages are commonly dominated by hafted bifaces. The production and utilization of prismatic blades is a classic Middle Woodland hallmark (Odell 1994, 1996). Blades were likely used for a variety of tasks, including cutting and scraping of both soft and medium-soft substances (Odell 1994). In contrast, in mortuary contexts blades were used differentially. Modified blades were used primarily to scrape soft to medium substances, while unmodified blades were used to cut soft substances (Odell 1994:113–117). The use of blue-gray cherts appears to have gained in popularity during the Middle Woodland (Morrow 1987, 1988; Morrow et al. 1992). Numerous cache blades (or disk cores) have been recovered from mortuary contexts in Middle Woodland mounds from both the lower and central Illinois River valley (Morrow et al. 1992). Formal digging implements, such as hoes, begin to appear during this time. Ceramic vessels show increasing evidence of regionalization as surface treatments and decorations become more varied.

Middle Woodland subsistence has been characterized as a hunting, gathering, and cultivating economy (i.e., Yerkes 1988). Starchy seeds, such as chenopod, little barley, and erect knotweed, play an increasing role during this time span. The earliest occurrence of tobacco was identified in the Middle Woodland component at the Smiling Dan site. The procurement of faunal resources appears to become increasingly localized.

The data, as presented above, can be used to generate hypotheses concerning Middle Woodland occupations in northeast Missouri. A variety of site types are known from this time span, ranging from small upland habitations to larger settlements. Given the topography of the AOS project area, the latter are expected. These larger sites should have a large number of features, including storage facilities and the possible presence of residential structures. Ceramics are expected to be tempered using crushed rock. When present, decoration of vessels would likely consist of nodes, dentate stamping, and zoned decorations. Diagnostic hafted bifaces are typically corner notched, including specimens in the Snyders Cluster. Local Burlington/Keokuk chert is expected to dominate lithic assemblages, although blue-gray chert is expected to be represented in small quantities on sites. Prismatic blades may be present. Items associated With the Hopewell Interaction Sphere are likely to be present in small amounts on larger, more riverine oriented sites. Subsistence resources should include domesticated starchy seeds along with minor amounts of oily seeded plants. Faunal resources would reflect a localizing strategy of subsistence.

Late Woodland (circa cal. A.D. 500–1400)

In recent years there has been a renewed interest in the Late Woodland subperiod of the American midcontinent (Emerson et al. 2000). These recent investigations throughout the northeastern Missouri/western Illinois region have documented the widespread occurrence of Late Woodland components and have resulted in the definition of several phases and subphases and have contributed to a much broader understanding of cultural processes and behavior dating to this time frame (Fortier and Jackson 2000; Green and Nolan 2000; Kelly 2002; Koldehoff 2002; Kreisa et al. 2002; Meinkoth et al. 2000; Meinkoth et al. 2001; O'Brien 1996; O'Gorman and Hassen 2000; Reeder 2000a, 2000b; Simon 2000b; Styles 1986, 2000). It appears that many of the distinctions between these Late Woodland phases and cultures are based on geographic region, since only slight variations of material culture exist (i.e., particularly ceramic and lithic assemblages).

For example, in the east-central Missouri region, several Late Woodland phases have been defined (Meinkoth et al. 2000). While the systematics of these various phases are fairly well known in their respective core areas, the border regions of those phases are not as well defined. The Maramec Spring phase is located to the west and southwest of the project location (Marshall 1958; Reeder 1988, 2000a). The series of Late Woodland phases, including the Rosewood, Mund, and Patrick phases, are situated to the east along the Missouri-Mississippi River confluence and adjacent American Bottom regions (Harl 2000). Several Late Woodland phases, including Ralls, are located in the northeastern portion of the state north of the Missouri River (Chapman 1980; Meinkoth 2000). In the Ralls phase heartland along the Salt River several additional spatially restricted Woodland phases have also been defined, including Salt River, Ralls, and Perry phases (Donham 1982a; Donham and O'Brien 1985). In the southern portion of the Ralls phase, the Graham phase has been recently proposed (Sturdevant 1990). Although not discussed in this volume, the contemporary Boone phase is located to the west of the project area.

Although there are slight differences in manufacturing and decorative techniques, most Late Woodland ceramic assemblages are similar in most respects. The basic ceramic vessel is typically conoidal to subconoidal and exhibits either cordmarked or plain surfaces (Chapman 1980; Donham 1982a; Marshall

1958; Meinkoth et al. 2000; Reeder 1988). Decoration, when present, is concentrated at or near the rim and consists of such techniques as plain- or cord-wrapped stick impressions along the interior or exterior lip, punctates, nodes, minor amounts of curvilinear- or straight-line incising, and lip lugs. Tempering agents tend to vary geographically between the various core phase areas. For example, crushed-rock temper (i.e., grit) or sand tends to dominate many of the ceramic assemblages throughout northeastern Missouri. Limestone is typically more common in Maramec Spring phase assemblages that are south and west of the current project area and is considered diagnostic of that phase. Other temper types, such as grog, also occur infrequently in many of the other Late Woodland assemblages throughout the region.

In terms of lithic raw material selection, many of the Late Woodland assemblages (regardless of phase assignments) are dominated by the abundant good- to high-quality lithic resources of eastern and central Missouri. These local and near-local resources derive from the many Mississippian-age bedrock exposures common to the numerous drainages in the region (Ray 1984). Burlington-Keokuk cherts tend to dominate many of the Late Woodland assemblages throughout northeast Missouri and western Illinois, whereas several Ordovician resources, including Gasconade, Jefferson City, and Roubidoux cherts tend to be more common to the south and west. Overall, these regional trends in raw material utilization mirror what is typically seen from the American midcontinent, as many Late Woodland lithic assemblages are commonly dominated by local lithic resources (DelCastello 2001; Emerson et al. 2000).

Diagnostic hafted bifaces commonly associated with the Late Woodland phases in the region consist of a variety of medium- and small-sized hafted biface type clusters. Meinkoth (2000) noted that Late Woodland lithic assemblages throughout northeastern Missouri are dominated by a series of medium-sized hafted bifaces until circa A.D. 700, when smaller, more expediently produced flake points generally replaced these earlier bifaces. Lowe Cluster hafted bifaces are the dominant medium-sized hafted biface type cluster present and include such types as Ansell, Rice Side Notched, Bakers Creek, Chesser Notched, Lowe Flared Base, and Steuben Expanding Stem (Justice 1987). The latter segments of the Late Woodland phases (circa A.D. 700) tend to be dominated by the smaller, more expediently produced Scallorn Cluster bifaces and include Ellis, Koster Corner Notched, Klunk Side Notched, Sequoyah, and Scallorn types (Justice 1987). What are generally lacking, however, are the triangular forms, including both notched (i.e., Haskell, Morris, and Reed) and unnotched (e.g., Madison) varieties, that appear during the late portions of the Late Woodland subperiod when Mississippian groups further east appear to have influenced the Missouri groups (Benn and Ray 1996). Other point types, such as Gary and Snyders, once thought to have extended into the Late Woodland are generally now believed to date to the preceding Middle Woodland in eastern Missouri (Hoard 2000).

Regional archaeologists have commonly assumed that the introduction of the smaller flake point types (i.e., the Scallorn Cluster) represents the introduction of bow and arrow technology into the region (Kelly et al. 1984; Meinkoth et al. 2000). In adjacent regions, however, recent studies have demonstrated that the bow and arrow was likely introduced into the eastern Missouri/western Illinois region several centuries earlier than is commonly thought (DelCastello 2002, 2003, 2005; Nassaney and Pyle 1999; Shott 1996). The shift to small flake points likely marks an overall shift to expedient lithic technology by prehistoric native groups in the American midcontinent (Koldehoff 1987; Parry and Kelly 1987).

Northeast Missouri

In northeastern Missouri, there are several currently recognized Late Woodland phases that span A.D. 600–1000. These phases are differentiated from the preceding Middle Woodland phases (as well as from one

another) on the basis of subtle variations in the material culture, especially in terms of ceramic assemblages. The overwhelming majority of the information that we know concerning Late Woodland settlement patterns in this portion of the state derives from several large-scale archaeological projects of the last few decades (Harl et al. 1988; O'Brien and Warren 1979; O'Brien et al. 1982). Of these projects, the multiyear investigations in the Salt River drainage proved to be the most influential, including the Cannon Reservoir Human Ecology Project (Chapman et al. 1962; O'Brien and Warren 1979; O'Brien et al. 1982). These projects have documented the widespread occurrence of Late Woodland occupations in many environmental zones and topographic positions in the northeastern portion of the state.

Salt River phase (circa cal. A.D. 600–750)

The Salt River phase was first proposed by Hunt (1976) and was later refined by Donham (Donham 1982a; Donham and O'Brien 1985). This phase encompasses the early and middle portions of the Late Woodland subperiod. Although this phase is centered along the central portion of the Salt River, it has also been applied to adjacent localities as well (Meinkoth 2000).

The Salt River phase appears to represent a continuing influence from regional post-Hopewellian manifestations, including the early segments of both the Boone and Weaver phases (Donham 1982a). These influences are apparent in ceramic assemblages where Middle Woodland attributes, such as vessel form and decoration (i.e., nodes), continue to occur, albeit at reduced frequencies. Unshouldered jars were the dominant vessel form, typically exhibiting plain or cord-marked exterior surfaces, although some smoothed-over-cordmarking also occurs. According to Meinkoth (2000:246), when compared to the preceding Middle Woodland subperiod the diversity of vessel form and decoration appears to have increased during the Salt River phase. Decoration of Salt River vessels is restricted at or near the rim and includes noding, punctates, and cord-wrapped and plain-stick impressions.

Hafted bifaces typical of the Salt River phase components appear to express some continuity from the preceding Middle Woodland. Shallow side-notched (e.g., Rice Side Notched) and several expanding stem varieties, such as Bakers Creek, Lowe Flared Base, and Steuben Expanding Stem (Justice 1987), occur most frequently. Smaller corner-notched varieties begin to appear in the archaeological record during this phase (Donham 1982a).

During the Cannon Reservoir Human Ecology Project, several Salt River phase sites were investigated – of which several were radiometrically-dated. These dated sites include Cooper, Victor Bridge, Muskrat Run, and Ross (O'Brien and Warren 1982). Only Cooper and Ross will be discussed in greater detail.

Cooper Site

The Cooper site (23MN799) is a multicomponent site with a substantial Late Woodland Salt River phase component (Donham 1979; Donham and O'Brien 1985; O'Brien and Warren 1982:279–281). The site is located on a dissected terrace along the south bank of the Salt River. Excavations at the site in 1979 documented the presence of subsurface deposits dating to the Late Woodland and Late Archaic subperiods.

Excavations at the site consisted of the mechanized removal of the topsoil and block excavations. In the stripped portions of the site, 16 medium- to large-sized pit features were encountered, as was a thin sheet midden (O'Brien and Warren 1982). The block excavations totaled approximately 200 sq m and resulted in the identification of six hearths and seven pits (Donham 1979; O'Brien and Warren 1982). Additionally, six prehistoric burials, located on an adjacent ridge to the south, were also investigated during the fieldwork at the site (Donham 1979). The midden and the structures were believed to be Late Woodland, whereas the sub-midden features were considered to belong to the Late

Archaic component. When recalibrated, none of the three radiocarbon dates produced solid, irrefutable Late Woodland dates.

Ross Site

The Ross site (23MN260) is located on a hillslope and terrace along the South Fork of the Salt River (O'Brien and Warren 1982; Donham and O'Brien 1985). A sizeable Late Woodland Salt River phase component was present at the site, consisting of 15 basin-shaped pit features, three single post, rectangular-shaped structures, and one possible structure. Only five of the features appear to represent any sort of clustering at the site location. The features appear to be located at some distance from the structures, with the closest feature located 10 to 20 m away. Three radiocarbon dates were obtained from Late Woodland features ranging from 1720±50 B.P. (cal. A.D. 210–430; p = .983 [2σ]) to 1360±120 B.P. (cal. A.D. 430–900; p = .981 [2σ]) (O'Brien 1985b:68).

Ralls phase (circa cal. A.D. 750–1000)

The Ralls Focus was the first defined "Woodland Period" cultural manifestation in the northeast Missouri region and was partly based on the investigations of the numerous burial mounds of the region (Chapman 1948, 1980; Eichenberger 1944). Subsequent research focusing on non-mortuary contexts has revised this cultural construct into a phase that bridges the Salt River phase of the early Late Woodland and the latter Mississippian-influenced Late Woodland Perry phase.

A number of archaeological investigations have been important in refining the Late Woodland Ralls phase in northeastern Missouri. Of these, the most influential investigations were focused along the central Salt River drainage and were associated with large-scale reservoir construction activities, including the Joanna Reservoir Area (Chapman et al. 1962) and the Cannon Reservoir Human Ecology Project (O'Brien 1985a; O'Brien and Warren 1979; O'Brien et al. 1982). Other larger-scale surveys were also conducted along the Cuvire River (Harl et al. 1988) and the Loutre River (Martin 2004). Other sites with Ralls phase components present include RAS (Eichenberger 1944).

These combined investigations have documented the widespread occurrence of Late Woodland Ralls phase occupations throughout the region. Based on the limited knowledge of the Ralls phase settlement system, it appears that habitation sites are concentrated in bottomland settings, although bluff base localities, bottomland terraces, and rockshelters were also extensively occupied (Meinkoth 2000; Warren 1982:353–354). Structures have only been positively identified at a single location: the Ross site (23Mn260) (Heldman 1962:52–71; O'Brien and Warren 1982:256–258). Additional sites, including Violette's Camp (23MN837) (Meinkoth 2000:244) and Collins (23MN223) (O'Brien and Warren 1982:257), have also produced post mold patterns that are suggestive of structures.

Mortuary sites appear to be concentrated along many of the river valleys throughout northeastern Missouri and are typified by low rock cairns or earthen mounds, often with interior stone structures (Chapman 1980; Meinkoth 2000; Niquette 1986). Many of these mounds are arranged in groups along bluff edges, although individual mounds have also been identified in floodplain settings.

Ralls phase ceramic assemblages are dominated by grit/sand-tempered, conoidal to subconoidal jars. These vessels have either plain surfaces and are referred to as Chariton (or Graham) Plain, or they possess vertical to-oblique-cordmarking and are referred to as Darnell (or Graham) Cordmarked (Chapman 1980:280–281). Ralls phase ceramics are typically tempered with grit and/or sand, although grog-tempered vessels also occur infrequently (Chapman 1980; Donham 1982a). Decoration is generally confined at or near the neck and rim and typically consists of interior and exterior plain- and cord-wrapped stick impressions or, to a lesser extent, exterior cord impressions (Chapman 1980; Meinkoth 2000). Gently castellated rims are sometimes present in the ceramic assemblages in the region, and this vessel form appears to occur later in the

sequence (Eichenberger 1944; Meinkoth 2000).

On the basis of overall ceramic attributes, the Ralls phase displays some affinity with other groups throughout the upper Mississippi River valley (Meinkoth 2000). Eastern influences are evident by the presence of castellated rims that appear to suggest influences from western Illinois (Durst 2003; Fortier and Jackson 2000; O'Gorman and Hassen 2000; Maher 1992; Morgan 1986b). In fact, some researchers have even concluded that Ralls phase ceramics appear to reflect close affinities to Weaver ceramics of the lower Illinois Valley (Heldman 1962; Henning 1962, 1964). It has been suggested that the presence of sand tempering in Ralls phase ceramics indicates that these groups were part of a "larger Late Woodland cultural expression across the upper Midwest" (Meinkoth 2000:255).

Hafted bifaces commonly recovered in Ralls phase assemblages are typical of other late Late Woodland groups throughout eastern Missouri (Meinkoth 2000). Throughout much of the sequence, medium-sized specimens of the Lowe Cluster (i.e., Ansell, Bakers Creek, Chesser Notched, Lowe Flared Base, Rice Side Notched, and Steuben Expanding Stem types) are the dominant hafted biface form. Later in the sequence, however, expediently produced corner- and side-notched flake points, such as those of the Scallorn Cluster (i.e., Ellis, Koster Corner Notched, Klunk Side Notched, Sequoyah, and Scallorn hafted biface types), are more common. What are lacking, however, are the triangular points that are common during the latter Mississippian-like Perry phase (Meinkoth 2000).

Current knowledge of Ralls phase subsistence strategies is incomplete, since many early studies did not employ systematic flotation sampling in order to recover small subsistence remains. Much of our knowledge, including both faunal (Bozell and Warren 1982; Cross 1986; Yerkes 1986) and paleobotanical (Fritz 1986; King 1982), derives from investigations along the central Salt River (Meinkoth 2000). One of the only single component Ralls phase occupations for which systematic flotation sampling was employed was at the Bundy site (23Pi77) (Niquette and Donham 1986; Meinkoth 2000). By utilizing flotation sampling, researchers at the Bundy site were able to document the predominance of riverine resources, particularly fish (Cross 1986; Yerkes 1986). These detailed investigations also documented the presence of small plant remains (particularly starchy seeds) and indicated the need for systematic flotation sampling (Fritz 1986). The botanical assemblage identified at the Bundy site yielded informative data concerning the ubiquity of seeds at the site. In fact, Fritz (1986:118) noted that "Subtracting 575 maygrass seeds from Feature 23 at Garretts I, the Bundy site features yielded more seeds than the 1200 samples recovered from 12 Cannon Reservoir sites combined." Although maize was not identified at the Bundy site, several kennels were recovered from two of the sites in the Cannon Reservoir Project (Meinkoth 2000). It should be noted, however, that the Bundy site has been assigned to the Graham phase (Sturdevant 1990).

Graham phase (circa cal. A.D. 600/700–1000)

During the last decade, investigations in the southern reaches of northeastern Missouri have documented the regional prevalence of sand-tempered ceramics north of the Missouri River. The regional predominance of sand-tempered Graham Plain and Graham Cordmarked ceramics have prompted Sturdevant (1990:73) to propose the Graham phase for those Late Woodland manifestations in eastern Missouri. According to Sturdevant, the geographical extent of the Graham phase encompasses the southern extent of the Ralls phase along the Missouri River to as far north as the Bundy site (23PI77) in Pike County, Missouri (Niquette and Donham 1986).

The Graham phase was defined by Sturdevant (1990) for investigations at Site 23CY499 in Callaway County, Missouri. The site is situated on a terrace overlooking Crow Fork Creek, a small tributary of the Missouri

River. The archaeological investigations at the site included mechanized trenching, the mechanical removal of the plowzone, limited block excavations, and feature excavation. These investigations identified a modest sized Graham phase component consisting of seven features, including five pit features (most of which contained abundant limestone), a sand lens, and a scatter of cultural material that was interpreted as an activity area or possible structure. Two radiocarbon dates were obtained from a single feature (Feature 3, an earth oven) at the site, producing dates of 1190±60 B.P. (cal. A.D. 760–970; p = .838 [2σ]) and 1300±70 B.P. (cal. A.D. 620–890; p = 1.0 [2σ]) (Sturdevant 1990:67–68).

The cultural material recovered from the site is similar to that of other Late Woodland components in the region. The ceramics appear to be consistent with the published descriptions of Graham Plain and Cedar Creek Sand-Tempered (Chapman 1980; Sturdevant 1990:24–33). Over 93 percent of the sherds had plain exterior surfaces (Sturdevant 1990:28). If this is indeed correct, the high percentage of plain surfaced sherds would make 23CY499 atypical for this time period, since cordmarked sherds usually occur in higher frequencies than the plain surfaced sherds. While the assemblage was predominately plain, a series of decorative attributes were identified and include interior and exterior dentate scraping, interior and exterior tool impressions, cordmarking, and a single polished sherd. Sand was the most common temper type identified in the 23CY499 ceramic assemblage, accounting for roughly 99 percent of the assemblage, with the remaining sherds consisting of crushed limestone temper. In terms of the lithic assemblage, 23CY499 was dominated by local lithic raw materials, including Burlington chert, although the report did not systematically identify raw materials. Small, expediently produced flake points of the Scallorn Cluster (consisting of both Klunk and Koster types) dominate the formal hafted bifaces identified, although larger forms of the Lowe Cluster (i.e., Rice Side Notched and Steuben) were also recovered during the investigations at the site. Other lithic artifacts recovered during the investigations include bifaces, scrapers, and flake tools.

Southeast Iowa

In recent years, there has been a surge of research aimed at the Late Woodland subperiod in Iowa. Recent CRM investigations throughout southeastern Iowa have more fully documented the lifeways of the local Late Woodland populations (Benn 1987, 1992, 2001; Benn et al. 1994; Dunne 2002; Johnson 2002; Neverett 2001). In a recent review of the Late Woodland subperiod in Iowa, Benn and Green (2000) note that more Late Woodland sites are known from the state than from any other prehistoric subperiod.

Throughout the state, the Late Woodland is divided into two segments: early (A.D. 250–650) and late (A.D. 650–1100) (Benn and Green 2000:434). The initial segment, marking the early Late Woodland, has been referred to as the Weaver Horizon. The initial portion of the late Late Woodland is referred to as the Cordage Horizon (A.D. 650–800). The concluding segment of the late Late Woodland subperiod is referred to as the High Rim Horizon (A.D. 950–1100). These three horizons emphasize the changing nature of various technological aspects of the Late Woodland subperiod, such as ceramic and lithic technologies and subsistence practices.

Weaver Horizon (circa cal. A.D. 250–400)

The Weaver Horizon in southeastern Iowa represents the initial underpinnings of the Late Woodland subperiod. This time span is characterized as a post-Middle Woodland cultural phenomenon that is known from the Prairie Peninsula in Iowa, Missouri, and Illinois (Benn and Green 2000). This horizon is marked by the appearance of thin-walled ceramics. Weaver ceramics tend to consist of cordmarked, conoidal jar forms possessing constricted necks and low flaring shoulders (Alex 2000; Benn 2001; Benn and Green 2000). Decorative ceramic elements are uncommon and include tool impressions and punctates near the lip/rim junction. “Representational decorations” occur

infrequently and generally consist of chevrons and parallel line motifs (Benn and Green 2000).

Weaver lithic assemblages tend to retain certain Middle Woodland traits, including the use of certain flake tools, Steuben hafted bifaces, and the use of small cores. Small amounts of galena, copper, and mica have been recovered from early Late Woodland contexts throughout the region (Alex 2000; Benn and Green 2000).

In the midcontinent, several Weaver phases have been recognized (Green and Nolan 2000), including two from southeastern Iowa (i.e., Gast and Mephitis phases).

Gast phase (circa cal. A.D. 250–600)

The Gast phase is recognized as the earliest and best known occurrence of the early Late Woodland in southeast Iowa (Benn and Green 2000). Named after the Gast Farm site, this phase appears to be spatially restricted to southeastern Iowa, especially in the Three Rivers region of the state. Benn and Green (2000:437–438) note that at least two different Gast phase types have been identified. These include larger, ring midden sites, such as the Gast Farm site, and smaller site locations, including rock shelters and alluvial fan settings. By the end of the Gast phase, Late Woodland populations appear to have abandoned larger sites (for instance the Gast Farm site) in favor of smaller dispersed occupations, including smaller sites and single household occupations.

Gast Farm Site

The Gast Farm site (13LA12) is situated on an alluvial fan within the Mississippi River valley in Louisa County Iowa (Dunne 2002; Dunne and Green 1998). Excavations at the site were conducted during a multiyear archaeological field school. Excavations focused on the Weaver component consisted of hand-excavated test units and feature excavation. These investigations resulted in the identification of 137 Weaver component features, including earth ovens, pits, hearths, and post molds (Neverett 2001).

A total of 12 radiocarbon dates were obtained for the Weaver component at the Gast Farm site (Benn and Green 2000; Dunne 2002; Johnson 2002; Neverett 2001). These dates range from 1430±70 B.P. (cal A.D. 510–700; p = .901 [2σ] and A.D. 430–490; p = .073 [2σ]) to 1690±90 B.P. (cal. A.D. 130–550; p = 1.0 [2σ]) (Neverett 2001:26).

The analysis of a sample of ceramics indicated that most of the identified and typed sherds were classified as Weaver. Additional sherds typed as Liverpool and Marion, Havana and Baehr, and Weaver-like were identified in the assemblage. Ceramic types included Weaver, Cordmarked, Cordmarked Dowel Impressed, Plain, Plain Incised, Plain Punctated, and Plain Dowel Impressed (Johnson 2001: Appendix 1).

The Gast Farm lithic assemblage was dominated by items manufactured from locally-available Burlington chert (Alex 2000). Expediently produced tools were most commonly utilized at the site. Diagnostic hafted bifaces included Steuben specimens.

Analysis of the faunal assemblage indicated reliance upon local resources (Neverett 2001), a trend that had been documented in other portions of the Midwest (i.e., Styles 1981). These resources consisted of both terrestrial and aquatic resources that were readily available within 1 km of the site (Neverett 2001:205). Neverett (2001) notes that most of the mammalian species identified consisted of animals such as white-tailed deer, elk, squirrel, fox, and raccoon that routinely inhabit ecotonal regions spanning forest and prairie environments. Most of the avian fauna consisted of waterfowl, including Canadian goose, swans, cranes, ducks, grebe, and rails. Various turtle and fish species were also identified in the Gast Farm assemblage.

Paleoethnobotanical resources were commonly recovered from the Weaver component (Dunne 2002). Wood charcoal was the most commonly identified plant resource, primarily consisting of both white and red oaks. Hickory, maple, and elm were also identified in the assemblage. Thick-shelled hickories were the most commonly identified

charred nutshell in the assemblage, followed by hazelnut, black walnut, acorn, and butternut remains. Cucurbita pepo remains were also identified and were recovered from 70 percent of the Weaver flotation samples (Dunne 2002:147–148). Charred seeds were common in the assemblage, particularly cultivated species such as little barley, maygrass, chenopod, erect knotweed, sunflower, and sumpweed. Tobacco was identified from several Weaver features.

Sand Run West Site

The multicomponent Sand Run West site (13LA38) was located along Sand Run Slough, the southern outlet of Lake Odessa in Louisa County, Iowa (Benn 1987). The Late Woodland was represented at the site by Stratum I. A single pit feature was identified in this stratum. At least two Late Woodland components were recognized at the site, as determined from the artifact assemblages.

A single radiocarbon date was obtained for the Late Woodland occupation. A date of 950±70 B.P. (cal. A.D. 970–1230; p = .993 [2σ]) was recovered from the late Late Woodland component (Benn 1987:20).

Based on the ceramic assemblage, both early Late Woodland and late Late Woodland components were present at the site. The early Late Woodland assemblage is composed primarily of Weaver Series ceramics; Linn wares are only marginally represented (14 sherds) (Benn 1987:62). Types included Weaver Cordmarked, Weaver Plain, Levsen Dentate Stamped, and Levsen Punctated. These ceramics were generally tempered with crushed rock. The late Late Woodland component is represented by a smaller number of sherds. Most of these sherds were eroded and detailed typological analysis was not conducted. The late Late Woodland sherds were generally cordmarked and were decorated with a variety of cordmarking, and at least one of the sherds was tentatively identified as Minotts Cord Impressed.

The Late Woodland lithic assemblage is composed of a variety of expediently produced tools (Stanley and Hoppin 1987). Diagnostic hafted bifaces recovered from this component consisted of Ansell Constricted, Haskell, Manker Corner Notched, Marshall, Mills, and Reed specimens. Additional lithic tools included, unhafted bifaces, unifaces, and drills.

Subsistence remains consisted of a modest sized faunal assemblage (L. Kelly 1987). Mammal remains were recovered from general excavated contexts. These remains consisted of raccoon and elk. Unspecified fish remains, as well as freshwater mussels, were also identified. Paleoethnobotanical remains were not reported.

Mephitis phase (circa cal. A.D. 300–650)

The Mephitis phase is a regional Weaver variant centered in southeastern Iowa (Benn and Green 2000). Mephitis phase sites tend to be smaller in size when compared to neighboring Weaver phases. This phase is represented throughout the region by Late Woodland sites containing Henry Wares (Benn and Green 2000). Additional traits include Steuben or Steuben-like hafted bifaces.

Cordage Horizon (circa cal. A.D. 650–800)

This horizon reflects the initial portion of the late Late Woodland subperiod in the upper Midwest. In southeast Iowa, this horizon is marked by the shift to cord-decorated ceramics (Benn 2001; Benn and Green 2000). Pottery from this time span typically exhibits cordmarked exteriors. Predominate decorations consist of single cord impressions on the neck/rim area. These decorations generally include a variety of parallel or geometric cord impressions placed near the rim (Benn 2001).

Benn (2001:119) notes that during this time span, a series of additional changes were occurring with the local Late Woodland populations. Smaller, more expediently produced hafted bifaces (i.e., Klunk, Koster, and Scallorn) are evidence that the bow and arrow was in widespread use.

Louisa phase (circa cal. A.D. 850–1000)

The Louisa phase symbolizes the initial portion of the late Late Woodland subperiod in southeastern Iowa. This phase is represented throughout the region by the presence of cord-decorated ceramic wares, such as Burris Cord Roughened. These same ceramic wares appear to have contemporary analogs in west-central Illinois and in the Sny Bottom (Benn and Green 2000:457).

Louisa phase occupations have also been identified east of the Mississippi River in Illinois at Site 11HE378 (Benn and Lee 2002). A small household consisting of the remains of a rectangular structure and associated cultural materials were identified. Cultural materials including Burris Ware and Madison Triangulars and Klunk Side Notched hafted bifaces were recovered from these deposits.

Cross Site

The Cross site (13LA309) was located along the southern portion of Lake Odessa (Benn 2001). The site was investigated under contract with the Rock Island District, Corps of Engineers since Burris Ditch had been eroding part of the site. Investigations at the site included hand-excavated test units, geomorphic trenches, and feature excavation.

The investigations identified a modest sized Late Woodland Louisa phase occupation. This occupation was represented by the presence of numerous cultural features, including shallow basins, bell-shaped pits, roasting pits, and post molds. In addition, two residential structures were also identified (Benn 2001:11–17). These structures were rectangular in shape and were delineated by a shallow basin and a partial row of post molds. These structures measured approximately 5.5-x-8 m (18-x-26.3 ft) in maximum size.

Five radiocarbon dates were obtained from the site (Benn 2001:17–18). Three of the dates were not considered acceptable since they fell outside the expected range for the Late Woodland subperiod. The remaining two dates were 1270±60 B.P. (cal. A.D. 660–890; p = 1.0 [2σ]) and 1280±150 B.P. (cal. A.D. 500–1030; p = .973 [2σ]).

The investigations produced a modest sized ceramic assemblage (Benn 2001:83). All of the sherds were classified as Burris Ware and included such types as Burris Cord/Fabric Impressed and Burris Cord Roughened. Vessels were generally various jar forms that were tempered with crushed rock particles. Decoration was confined to the rim/neck junction and generally consisted of cord impressions, cord twist or knot impressions, and occasional stamped designs. Most of the identifiable cord impressions were Z-twist cordage. In addition, 13 sherd discs and 5 pipe fragments were recovered.

The lithic assemblage was predominately manufactured from several varieties of Burlington chert (Blikre 2001). Diagnostic hafted bifaces included medium-sized specimens consisting of single examples of Gibson and Steuben types. These larger specimens were interpreted as dart points. Smaller-sized hafted bifaces were recovered from both structures and included examples of Reed/Klunk, Koster/Scallorn, a Madison Triangular, along with several untyped flake points. These smaller hafted bifaces were interpreted as arrow points.

The paleoethnobotanical assemblage is composed of a variety of plant resources reflecting localizing behaviors. Most of the assemblage is composed of wood charcoal (Powell and Lopinot 2001). Elm family (including American elm, slippery elm, and hackberry) was the most commonly identified wood in the assemblage, followed by true hickory, honey locust, ash, and pecan hickory, among others. Charred nutshell included thick-shelled hickory, thin-shelled hickory, black walnut, and acorn. Most of the charred seeds were identified as chenopod, although significant percentages of knotweed were also identified. Maygrass, sunflower, amaranth, and panic grass were also identified in the assemblage.

The faunal assemblage was exceedingly small and highly fragmented (Benn and Straka 2001). Poor preservation prevented a detailed analysis of the assemblage, although some general trends were noted. Mammals were

present in the assemblage and included white-tailed deer and small to medium mammals. Unidentified fish and bird remains were also identified. Mussel shell, although in poor preservation, was also identified.

With the presence of two residential structures, the site was interpreted as a base camp where "horticulture and foraging for natural resources took place" (Benn 2001:122). The spacing of the two structures suggested that they were likely occupied contemporaneously. As Benn noted (2001:122), this pattern of small groups of structures is widespread during the Late Woodland of the upper Midwest.

High Rim Horizon (circa cal. A.D. 900–1050)

The High Rim Horizon marked the late Late Woodland subperiod. This horizon is marked by shifts in ceramic styles, as more care was taken to smooth vessel surfaces prior to the application of corded decorations. The most widely known High Rim ceramic type is the Minotts Cord Impressed (Logan 1976). This ceramic ware is widely distributed throughout eastern Iowa along the Mississippi River.

As Benn (2001:112) notes, the term "High Rim" is an oversimplification for a series of complex changes that occurred to ceramic vessels during post-A.D. 900 times. Based on vessel morphology, these latter wares (i.e., Minotts) appear to possess proportionally higher rims than those of the preceding initial Late Woodland.

Lithic assemblages dating to this time span were predominately manufactured from locally available lithic raw materials, especially one of the varieties of Burlington chert. Diagnostic hafted bifaces consist of a variety of small, expediently produced flake points, including Klunk Side Notched, Madison Triangular, and Scallorn Cluster specimens.

In terms of subsistence resources, the cultivation of maize was widespread throughout the region during this time span (Alex 2000; Benn 2001; Benn and Green 2000). Researchers have attempted to link the increasing cultivation of maize to a variety of social processes, including changing ceremonialism, such as World Renewal ceremonialism (i.e., Hall 1993).

Sweeting Site

One of the most well known sites belonging to the High Rim Horizon is the Sweeting site (12WS61) (Alex 2000; Benn and Green 2000). The site was located on a small upland ridge spur in Washington County, Iowa. Investigations at the site revealed the presence of numerous cultural features, including pits, hearths, shallow basins, post molds, and artifact concentrations. A possible residential structure was noted by an arrangement of 10 post molds and associated pits. A single radiocarbon date of A.D. 1050±80 was obtained from a feature. Identified ceramics consisted primarily of Minotts Wares, including Minotts Cord Impressed. The lithic assemblage consisted of both Cahokia Side Notched and Madison Triangular specimens. Maize was present in each of the flotation samples.

West-central Illinois

For the purposes of the current research, the west-central Illinois area encompasses much of the Galesburg Plain along with some of the adjoining Mississippi Valley (see Green and Nolan 2000:345–386). Late Woodland cultures in this area that will be discussed include the early Late Woodland cultures of South Branch and Weaver and the late Late Woodland culture of Bauer Branch. Although White Hall could be discussed in this section as well, we decided to include that discussion in the lower Illinois Valley section below, since it is better represented in that area.

Also included in this discussion will be Sny Bottom. In the Sny Bottom, three phases have been identified (O'Gorman and Hassen 2000): the early Late Woodland La Crosse phase (A.D. 300–600), and the slightly later Fall Creek (A.D. 600–800) and Poisson (A.D. 800–1100) phases. It is noted, however, by Conner (2002:277–283) that the distinction between the Fall Creek and the Poisson phases could not be verified with data collected from

the Hadley and McCraney Creek Valleys. Having said this, the phases have been kept for this report until further work helps to resolve the discrepancy. Another phase worth mentioning at this point is the proposed Myer-Dickson phase. Green and Nolan (2000) have placed both the Deer Track and Myer-Dickson sites into this proposed phase that they thought represented a possible terminal Weaver taxonomic unit. Given the low sample size and preliminary nature of this phase, no further mention of it will be attempted in this volume. Perhaps future work will better detail this phase.

South Branch phase (circa cal. A.D. 300–600)

The South Branch phase is an early Late Woodland manifestation that appears to be centered in and near the Bear Creek drainage in Adams and Hancock Counties, Illinois (Green and Nolan 2000). Both floodplain and upland settings in this area have been documented as having South Branch phase sites. In addition, South Branch sites are known from the Mississippi Valley in the northeast portion of Missouri. According to Green and Nolan (2000:357), all radiometric assays for South Branch sites have centroids ranging between A.D. 430 and 600. They go on to state that future work may enable the South Branch phase to be subdivided into earlier and later subphases once larger collections from well date contexts have been analyzed. No radiocarbon dates have been published for South Branch phase sites.

Two site types have been identified at this time, including both large nucleated villages and smaller seasonally occupied residential camps (Green and Nolan 2000:357). The large nucleated villages tend to be located along bluff bases on alluvial fans or terraces, while the smaller residential camps are found in both floodplain and upland settings. The presence of moderate to high densities of pit features have been recorded for South Branch sites with both large, bell-shaped pits and large, cylindrical, flat-bottomed pits being present. These latter features range in depth between 40 and 115 cm and have diameters between 75 and 130 cm (Green and Nolan 2000:357–358).

South Branch artifact assemblages are particularly distinctive due to the manufacture of net-impressed pottery (Green and Nolan 2000:358–359). Nolan (2001) identified two net-impressed types: South Branch Net Impressed and South Branch Net-Wrapped Paddle. The latter would produce net impressions that often overlapped each other, while the former, which was formed in a net-lined cavity, would not. In most cases, the net impressions were Z-twist. Nolan goes on to note that some cordmarked and plain-surfaced pots were present as well. Vessel form tends to be subconoidal jars, although late in the phase more rounded shouldered jars appear, often marked by punctates on the exterior portion of the neck. The subconoidal jars look similar to the Havana jars of the Middle Woodland on the basis of the square lips, relatively thick walls (5–12 mm), interior punched nodes just below the lip, and possibly some decorative traits. South Branch ceramics were usually tempered with sand, with some crushed rock being present.

Local Burlington or Keokuk cherts were the most commonly used raw material type for the flaked tools. The lithic assemblages from South Branch sites include such diagnostic hafted bifaces as Steuben, Ansell, and Mund types (Green and Nolan 2000:358). Ground-stone celts and cobble tools are typically present at these sites as well.

Subsistence remains indicated that a broad-spectrum collection strategy was used at this time. Aquatic and terrestrial resources were important, with an apparent reliance on deer. Floral remains include maygrass, knotweed, little barley, goosefoot, and sunflower, as well as thick-shelled hickory, black walnut, and hazelnut. Maize has not been identified at South Branch sites.

Since detailed reports for South Branch sites are currently lacking, no further site discussions will be attempted, except to indicate that several sites are known and they include E.E Andrew “40” (11A1061), Snowden (11A1387), and Leland Wollbrick

(11HA757) [see Green and Nolan 2000 for more details on these sites].

Weaver Variant (circa cal. A.D. 300–600)

Also within the early portion of the Late Woodland is the Weaver phase. This manifestation of the Late Woodland is found in both west-central Illinois and the lower Illinois Valley (referred to as the White Hall phase), and the central Illinois Valley. In west-central Illinois the Weaver phase or variant has been radiometrically dated to between A.D. 300 and 600, which is similar in time span to the Illinois Valley. Weaver sites have been identified in floodplain and upland settings, including along base bluffs, stream terraces, and alluvial fans (Green and Nolan 2000:352–353).

Both large and small Weaver phase sites have been investigated. The large sites (larger than .5 ha) tend to be located on alluvial fans and floodplain settings as are, for example, the Weaver type site (Wray and MacNeish 1961), Putney Landing (11HE3) (Markman 1988), and Rench (11P4) (McConaughy 1993). Some of these sites clearly have a circular village pattern, with some of those exhibiting central plazas. One example of this type of community organization is the Rench site (McConaughy 1993). The smaller sites (smaller than .5 ha) are located in both upland and floodplain settings. Weaver structures tend to be circular in planview and of single-post construction. Feature types include basin-shaped and flat-bottomed pits that functioned as earth ovens and storage pits (Green and Nolan 2000:353).

The artifact assemblage for Weaver sites includes a wide array of tools. Ceramics consist of Weaver Cordmarked and Weaver Plain vessels that were predominately subconoidal jars (McConaughy 1993:196–244; Green and Nolan 2000:353). These jars were tempered with crushed rock, usually some type of mafic material. Decorative traits include interior punched nodes and exterior lip impressions. According to Green and Nolan (2000:354), Weaver lithic assemblages in this area rely heavily on local sources and generally consist of Steuben expanding-stemmed hafted bifaces. Some exotic chert and contracting-stemmed or corner-notched hafted bifaces are also present.

As in the case of South Branch phase sites, subsistence remains indicate that a broad-spectrum economic approach was taken. Both terrestrial and aquatic animals were exploited, as were a variety of cultivated plants like goosefoot, little barley, knotweed, and maygrass. Wild resources included nuts, especially hickory. The only maize identified in Weaver context came from one feature that was radiocarbon dated to approximately A.D. 490 (Green and Nolan 2000:355).

Rench Site

The Rench site (11P4) is located on a Pleistocene terrace on the western side of the central Illinois River valley at the base of the bluff near Dickson Run (McConaughy 1993). Through a combination of hand and mechanical excavations it was determined that Rench represents at least three superimposed Weaver phase villages dating from A.D. 400 to 600. Each village was roughly circular in plan and arranged around an open, central plaza. It is estimated that each village covered an area about 180 m in diameter. Examples of houses from these various occupations indicate that generally they had oval shaped floor plans measuring about 4-x-7 m in size. Walls were constructed of single posts with wattle and daub finishes. Most houses had associated features that included basins, flat-bottomed, and bell-shaped pits. Feature function was presumed to be storage, earth ovens, and refuse disposal. Radiocarbon dates for the Weaver components at Rench ranged from 930±70 B.P. (cal. A.D. 990–1230; p = 984 [2σ]) to 1140±70 B.P. (cal A.D. 770–1020; p = .946 [2σ]) (McConaughy 1993:342, Table 13.4).

The Rench site artifact assemblage was varied. Ceramics belonged mostly to the Weaver Plain or the Weaver Cordmarked types, although a few pinch pots were present (McConaughy 1993:196–244). Other than the pinch pots, most vessels were jars, with the latter form consisting of three size categories. Jars typically had incurving rims. Temper was

crushed mafic material (likely metamorphic rock) and possibly sand. Average wall thickness for the Weaver pottery was about 6 cm (see McConaughy 1993:198, Table 8.2). Decoration, although rare, includes various exterior rim notching treatments, usually made with either a cordwrapped-stick or dowel. Steuben expanding stemmed hafted bifaces were the most prolific among Weaver contexts. Also present were drills, perforators, scrapers, spokeshaves, gravers, blades, cores, celts, and gorgets. Burlington chert comprised the vast majority of the raw material used for the flaked tools (McConaughy 1993:245–273).

Floral and faunal data suggest that Rench may have been inhabited year round by at least a portion of the population. Both terrestrial and aquatic resources were exploited, including white-tailed deer, turkey, fish (e.g., drum and buffalo), and mussels (Martin and Masulis 1993:274–307). Plant remains indicate that hickory nuts were important, as were the starchy seeds of maygrass, knotweed, little barley, and goosefoot (King 1993a:325–337).

Bauer Branch Phase (circa cal. A.D. 600–1000)

Following the Weaver and South Branch manifestations in west-central Illinois was the Bauer Branch phase, which has been radiometrically dated to between A.D. 600 and 1000. According to Green and Nolan (2000:361, Table 15.2) these dates ranged from 1020±70 B.P. (cal A.D. 880–1190; p = .924 [2σ]) to 1370±70 B.P. (cal. A.D. 540–780; p = .978[2σ]). Roughly centered along Upper Sugar Creek, Bauer Branch sites have been found in both upland and floodplain settings (Green and Nolan 2000:360). Typical Bauer Branch sites are small, residential occupations consisting of one or several households, some of which were likely occupied year round. Identified structure patterns suggest that both cold and warm-weather houses were used at this time. Both oval and rectangular-like structures have been recorded at several Bauer Branch sites to date, including deep basin, key-hole shaped structures. Feature types associated with these households include earth ovens and storage pits (Green and Nolan 2000:362–363).

The typical Bauer Branch artifact assemblage includes a varied ceramic and lithic inventory. Ceramic vessels were commonly grit-tempered, cordmarked jars with notched lips and punctated shoulders (Green and Nolan 2000:364–367). Jar morphology is constricted or necked with unrestricted rims that have weakly squared orifices and slightly raised corners. Lithic tools were generally fashioned from locally occurring cherts, particularly La Moine River chert and “Illinois Agate” (Green and Nolan 2000:364). Hafted bifaces include side-notched and unnotched triangular arrowpoints along with some expanding and contracting stemmed bifaces. Few other formal flaked tools were common, although expedient knives and scrapers were present. Ground stone objects like manos, metates, celts, and discoidals were relatively common as well.

Subsistence remains indicate that both wild and cultivated resources were important to Bauer Branch peoples. Cultigens include maygrass, sunflower, goosefoot, knotweed, squash, and maize. Wild resources, such as various nuts, were common in Bauer Branch diets, but other plants were also exploited, like blueberry, raspberry, and hawthorn. Faunal resources from the sites included fish, mussel, and white-tailed deer (Green and Nolan 2000:367).

La Crosse phase (circa cal. A.D. 300–600)

The La Crosse phase was defined based on excavations in the Fall Creek locality of the Sny Bottom. Radiocarbon dates from La Crosse phase sites bracket this phase between A.D. 300 and 600 (O’Gorman and Hassen 2000:286). This early Late Woodland manifestation is best known for its pottery, particularly the Sny Fabric Marked series. Cordmarked pottery is also present but generally constitutes a minor component of the assemblage. The most common hafted biface found on these sites is Ansell. La Crosse phase sites include La Crosse Pump Station (11PK69), Buffalo, Wet Willie, and Poisson (11PK924) (O’Gorman and Hassen

2000:286). Subsistence remains indicate that both terrestrial and aquatic resources were hunted, although no systematic analysis of faunal remains from any La Crosse phase site has yet been completed. Floral data indicate a heavy reliance on nuts, but cultigens are also present, including goosefoot and a small amount of maize (O'Gorman and Hassen 2000:286).

La Crosse Pump Station Site

The La Crosse Pump Station site (11PK69) is located on a natural levee of an old Mississippi channel. A total of 17 features were identified during the investigation, 14 of which were excavated (McGregor 1986:121–137). All features except one were roughly circular with irregular bottoms. The lone difference was a bell-shaped pit. No radiocarbon dates are available for this site.

The majority of sherds from the features were La Crosse Fabric Impressed. These sherds were generally sand tempered and had various types of notching on the interior and/or exterior of the rim. Lips were squared and interior punched nodes were common. Also present, but in lower frequencies, were plain-surfaced and cordmarked sherds. The lithic assemblage included contracting and expanding stemmed hafted bifaces, a drill, cores, scrapers, hammerstones, a celt, and a nutting stone. No information is currently available concerning the subsistence practices of the inhabitants living at the site.

Fall Creek phase (circa cal. A.D. 600–800)

Following the La Crosse phase in the Sny bottom is the Fall Creek phase. This phase has been radiocarbon dated to between A.D. 600 and 800. Perhaps the most visibly distinctive aspect of Fall Creek assemblages is the presence of small arrow points that mostly replace the larger stemmed points common during the early Late Woodland. This is also the time range in which the first maize begins to show up at some sites in the region. The fabric-impressed pottery of the La Crosse phase gives way to thinner-walled vessels belonging to the Sny Cordmarked Series that often have interior notched lips. Ceramic types present include Fall Creek Cordmarked, Bird Slough Banded Punctate, and Kuhlman Coarse Cord Impressed (O'Gorman and Hassen 2000:286–288). Little is currently known of Fall Creek subsistence practices. Examples of Fall Creek phase sites include Fall Creek, Wet Willie, and small components at the Poisson (11PK924) and Bird Slough (11PK902) sites.

Poisson phase (circa cal. A.D. 800–1100)

The Poisson phase follows that of the Fall Creek phase in the Sny Bottom and is currently understood to range between A.D. 800 and 1100 based on available radiocarbon dates. According to O'Gorman and Hassen (2000:289), Poisson phase artifact assemblages consist of the Poisson Punctate and Scenic Vista Cord Impressed types in addition to Fall Creek Cord Marked. Vessels with castellated rims increase in frequency during this phase, as do the use of sand and chert tempering agents. Maize appears to be better represented in the Sny Bottom at this time as well. Many of the markers that O'Gorman and Hassen (2000) use to separate this phase from the preceding Fall Creek phase have not been validated in other parts of west-central Illinois and, as such, should be viewed as tentative (Conner 2002:277–283). Poisson phase sites include Kuhlman, C. House, Scenic Vista, and portions of Poisson and Bird Slough.

Hadley and McCraney Creek Valleys

A total of six Late Woodland sites (11PJ441, 11PK446, 11PK447, 11PK700, 11PK1216, and 11PK1255) were investigated within the Hadley and McCraney Creek valleys (Conner 2002:277–282). All sites were located either on hillslopes, erosional terraces, or alluvial deposits. A combination of hand and machine excavation produced about 155 Late Woodland cultural features from the six sites. The most common feature type was a sub-rectangular pit with either a rounded or flattened bottom. Eleven radiocarbon dates were taken from Late Woodland contexts among the six sites. These dates clustered from 1110±70 B.P. (cal. A.D. 770–1040; p = .977 [2σ]) to 1330±70 B.P. (cal. A.D. 600–

880; p = 1.0 [2σ]) (Conner 2002:78, Table 3.7).

The ceramic assemblage from the six sites was mostly cordmarked jars. Tempering agents included sand, grit, and chert. Lip punctations (notching?) were common and appear to have been applied with either a plain dowel or with a cord-wrapped stick (or jointed grass stems). Cord impressed pottery was rare (Conner 2002:135–200). Hafted bifaces consisted of small Klunk and Koster arrowpoints, although a few Madison points were present as well. Other tools present include hammerstones, celts, discoidals, burins, gravers, and retouched flakes (Stafford 2002:201–248). It is unclear what chert types were selected for the making of the flaked tools at these sites. Plant remains included nutshell, goosefoot, maygrass, knotweed, and a small amount of maize (Schroeder 2002:249–277). Animal remains were not systematically analyzed but did include deer. As noted earlier, these Late Woodland deposits would overlap both the Fall Creek and Poisson phases as defined by O'Gorman and Hassen (2000).

Lower Illinois Valley

For the purposes of the present discussion, the lower Illinois Valley discussion will only consist of the main stem of the lower Illinois Valley, since the adjoining Sny Bottom material was previously discussed under the west-central Illinois section. These data will include both upland and floodplain settings. Although the White Hall phase could have entered discussions earlier in the chapter under the west-central Illinois section, we decided to reserve all such discussions until this point, since it is within the lower Illinois Valley that the White Hall phase is most prominent. Cultural manifestations to be mentioned within this section include the early Late Woodland White Hall phase (A.D. 400–700) as well as the slightly later Early Bluff (A.D. 600–800) and Jersey Bluff (A.D. 800–1350) phases in the lower Illinois Valley.

White Hall phase (circa cal. A.D. 400–700)

The early Late Woodland in the lower Illinois Valley has been defined as the White Hall phase, which has been radiocarbon dated to between A.D. 400 and 700 (see Studenmund 2000:306–309, Tables 14.1 and 14.2). These dates ranged from 1220±70 B.P. (cal. A.D. 670–900; p = .90 [2σ]) to 1630±70 B.P. (cal. A.D. 250–570; p = 1.0 [2σ]). Both Struever (1968:169–174) and Studenmund (2000:303) characterize this phase by the presence of sand-tempered, cordmarked jars that tend to have a decorated upper rim band bordered by a row of punctates that has been separated from the body surface treatment by a smooth-surface neck band. Jar forms can either have a conoidal or a coconut shape. Hafted bifaces at White Hall phase sites are thought to be restricted to the Steuben, although Studenmund (2000:317) notes that this association has not received much research and further work on this subject is needed. White Hall phase sites have been identified in upland and floodplain settings and include such sites as Axedental (11PK751), Elledge (11PK477), and John Roy.

White Hall phase sites have been divided into three types: short-term residential, long-term residential, and special-purpose (Stafford 1994:155). The residential sites are very similar to each other in terms of type of artifacts and features but differ in number of features, their reuse over time, and spatial arrangement. Feature types include basins and bell-shaped pits, although rarely do these features show evidence of in situ burning (Studenmund 2000:319). Subsistence remains from feature context indicate that both wild and cultivated resources were consumed. Maygrass, goosefoot, and knotweed are commonly found at White Hall phase sites, as are a variety of nuts, particularly hickory. Animal remains show that both riverine and terrestrial species were important food sources (Studenmund 2000:318–319).

Early Bluff phase (circa cal. A.D. 600-–800)

According to Studenmund (2000:321–324), only a handful of Early Bluff sites have

been excavated to date. Based on the limited data now available, she provides a date range between A.D. 600 and 800 for this phase (see Studenmund 2000:310, Tables 14.3). Radiocarbon dates ranged from 1210±70 B.P. (cal. A.D. 670–910; p = .878 [2σ]) to 1370±70 B.P. (cal. A.D. 540–780; p = .978 [2σ]). Known sites can be found on both upland and floodplain settings (e.g., bluff bases and terraces). Notable sites include Koster-East (11GE4), Worthy-Merrigan (11C382), Audrey (11GE20), and Pere Marquette Lodge 11JY72). The larger sites, for example Worthy-Merrigan (11C382), do appear to have a long-term residential function, but most are low density occupations that likely represent short-term sites. Although only cursory data are available about Early Bluff sites, a few generalizations are possible. Studenmund (2000) notes that Early Bluff features tend to be bell-shaped pits with some exhibiting in situ burning. One possible structure dating to this time from Worthy-Merrigan was roughly rectangular and about 5 sq m in area.

Artifact assemblages from Early Bluff contexts indicate that pottery vessels were slightly shouldered jars with constricted necks and rounded lips. Exterior surface treatment was usually cordmarking that extended from the lip to the base of the vessel. Hafted bifaces were small arrowpoints that would typically fit within the Klunk or Koster types. Animal remains were generally lacking from these sites, due to poor preservation, but deer and gar have been identified. Plant remains include hickory and black walnut as well as goosefoot and knotweed (Studenmund 2000). Since detail reports for Early Bluff sites are lacking, no further site discussions will be attempted.

Jersey Bluff phase (circa cal. A.D. 800-–1350)

The Jersey Bluff phase follows the Early Bluff phase in the lower Illinois Valley. Based on radiocarbon dates, it appears this phase ranges between A.D. 800 and 1350 (see Studenmund 2000:311, Table 14.4). Radiocarbon dates ranged from 880±70 B.P. (cal. A.D. 1030-1260; p = 1.0 [2σ]) to 1160±70 B.P. (cal. A.D. 760–1000 ; p = .882 [2σ]). Only a few Jersey Bluff sites have been excavated and adequately reported to date. Known data indicates that large sites are located along bluff bases or at the mouth of entering streams (e.g., Worthy-Merrigan [11C382] and Carlin [11C119]), while smaller sites are concentrated in the uplands on either side of the Illinois Valley trench (e.g., Healy [11JY60]). Feature types at these sites consisted primarily of bell-shaped pits that may have functioned for a range of activities like storage, earth ovens, and trash pits. Structures were typically small in area (3.5–8 sq m), consisting of rectangular basins set with single post construction.

Two vessel forms have been noted for Jersey Bluff sites: a shouldered jar with a restricted neck and a bowl. Both the bowls and jars had exterior cordmarking extending from the base to the lip. Decoration was rare until after A.D. 1000, at which time castellations, lug, and lip notching became common. Most of the pottery was grit tempered. Hafted bifaces include the small Klunk and Koster arrow points. Subsistence remains indicate a reliance on the usual plant domesticates and faunal resources, such as white-tailed deer, fish, and bird (Studenmund 2000:326–329).

Missouri-Mississippi River Confluence

The Late Woodland period of the confluence region is best known from investigations in the American Bottom of Illinois (Fortier and Jackson 2000; Harl 2000; Kelly 2002; Kelly et al. 1984; McElrath and Fortier 2000), although recent investigations in Missouri have also documented the presence of Late Woodland components in the St. Louis vicinity (Harl 2003). Three Late Woodland phases are currently recognized in the confluence region and include the Rosewood (circa A.D. 300–450), Mund (circa A.D. 450–600), and Patrick (circa A.D. 600–900) phases. A fourth cultural entity, an early Late Woodland component, is present at the Cunningham site (11MS1353) and reflects an admixture of Rosewood and Mund phases (Meinkoth et al. 2001). Due to the nature of

the current investigations, these confluence phases will only be briefly discussed.

Rosewood / Mund phases (A.D. 300–600)

Early Late Woodland ceramics in the confluence region are characterized as subconoidal (i.e., coconut-shaped), cordmarked jars (Kelly 2002). Cordmarking is primarily S-twist and extends to the lip. During the Rosewood phase, smoothed-over cordmarking occurs infrequently. Temper is typically crushed rock, although grit/grog and grog vessels occur with some frequency. Throughout this time, however, there appears to be a trend towards more grog tempering in the Mund phase (McElrath and Fortier 2000). Decoration includes nodes and plain- or cord-wrapped stick impressions along the lip and nodes along the neck area.

Hafted bifaces typical of this time span include shallow side-notched and expanding-stem forms (e.g., Mund and Lowe Flared Base). Small expediently produced flake points (e.g., Scallorn) do not appear until the Patrick phase (Fortier and Jackson 2000; Kelly et al. 1984; McElrath and Fortier 2000).

Settlement data indicates that early Late Woodland groups had extensively utilized the uplands surrounding the American Bottom (Bentz 1988a and b; Bentz et al. 1988; Kelly 2002). Most of the sites appear to have been small residential locations within the uplands, such as in the case of the Alpha 1 (11SG32) (Bentz 1988b), Leingang (11MO722) (Bentz 1988a), and Steinberg (11S653) sites (Lacampagne and Bentz 1988). Mortuary practices for the early Late Woodland are virtually unknown, since no cemeteries or mounds have been identified in the region (McElrath and Fortier 2000). Only a single burial from the Cunningham site has been identified (West 2001).

Cunningham phase (provisional)

The Cunningham phase has been provisionally suggested on the basis of investigations conducted at the Cunningham site. These excavations revealed the presence of an early Late Woodland component that appeared, in some regards, to be different from other nearby Late Woodland occupations.

Cunningham Site

The Cunningham site (11MS1353) is located in the northern portion of the American Bottom and is situated at the base of the bluff on a colluvial and alluvial fan. The excavations were conducted at the site in 1992–1993 by the Illinois Transportation Archaeological Research Program (ITARP) prior to the construction of a retention basin associated with a nearby reservoir (Meinkoth et al. 2001).

Over 100 features, including pits, artifact scatters, post molds, structures, and burials, were excavated during the ITARP investigations (Meinkoth et al. 2001). All of the identified features were excavated. The features consisted of various shaped pit features, whose inferred function ranged from storage and processing to cooking and other thermal-related activities (Hedman 2001). Human remains were identified from three features at the site (West 2001). Four rectangular to oval, shallow basin, post structures were identified in the northern portion of the site and were situated perpendicular to the bluffline. The structures were fairly small and generally lacked internal pit features. Three of the structures had limestone-lined hearths, while the fourth had a concentration of burned limestone that may represent a former hearth.

Ten radiocarbon dates were obtained from seven features and three structures (Meinkoth et al. 2001:19–21). These dates ranged from 1550±80 B.P. (cal. A.D. 340–650; p = 1.0 [2σ]) to 1210±80 B.P. (cal. A.D. 670–980; p = 1.0 [2σ]) (Meinkoth et al. 2001:20). The distribution of the radiocarbon dates revealed two approximate date clusters that spanned the early portion of the Late Woodland subperiod (Meinkoth et al. 2001: 19–21). The first cluster of four dates contains early dates ranging from cal. A.D. 535–539. The second cluster of four dates contains slightly later dates ranging from cal. A.D. 561–637. The last two dates were considered outliers and

had calibrated intercepts of cal. A.D. 677 and cal. A.D. 790.

A modest sized ceramic assemblage was recovered from the site during the ITARP investigations there (Meinkoth 2001). Vessel forms identified during the analysis included jars and pinch pots. In addition, a single pipe fragment was also recovered, as was a single fragmentary tab-like ceramics object. Jars were fairly consistent in terms of surface treatment and temper type. Most of the jar sherds contained either grit/grog (43.8 percent) or grog (40.9 percent) (Meinkoth 2001:78). Only 15 percent of the jar assemblage contained grit (or crushed rock) as a temper. Most of the temper would be classified as coarse to very coarse in texture.

The vast majority of the sherds exhibited cordmarked exterior surfaces and undecorated lip surfaces. Other exterior surface treatments that were present in small amounts included both smoothed-over cordmarking and plain surfaces. The cordmarking was primarily classified as S-twist (70 percent of the rim sherds). The remaining rims exhibited undefined, or indeterminate, cord twists. No definite Z-twist impressions were noted in the assemblage. Two basic decorative elements are present in the Cunningham site ceramic assemblage: lip decoration and nodding. Lip decoration included plain stick, cord-wrapped dowel, and notched impressions. Most of the lip decoration was located on the superior portion of the lip. Only 22 percent of the jars have nodes, including exterior, interior, and alternating exterior/interior variants.

Ten pinch pots were identified in the ceramic assemblage. Most of the vessels had plain surfaces, although a single vessel had a smoothed-over cordmarked exterior surface. Half of the pinch pots were not tempered, while the remaining specimens were tempered with either grog, grit, or a combination of grit/grog.

The Cunningham site excavations yielded a rather small lithic assemblage. This included flake debris, formal and informal tools, bifaces (consisting of both hafted and unhafted specimens), drills, scrapers, and other expediently-produced flake tools (McElrath 2001). Formal tools were dominated by a series of hafted biface forms, including Lowe Cluster specimens, along with the newly-identified Cunningham type (McElrath 2001:142). This latter hafted biface form possesses straight stems along with convex bases. This hafted biface form is similar to the Mund type Class 3 of the American Bottom (McElrath 2001:142) and to the earlier Kramer type of the Early Woodland subperiod (Justice 1987). Lithic raw material resources utilized at the site reflect a generalized local pattern of procurement and utilization. Burlington chert dominated the assemblage in terms of both count and weight followed by Salem chert, among others.

Subsistence remains recovered from the site included both faunal and paleoethnobotanical assemblages. The faunal assemblage was large and well preserved, consisting of a variety of fish and mammal remains (Bender and Brewer 2001). The analysis revealed a reliance on aquatic resources (including catfish, sunfish, bass, bowfin, among others, as well as freshwater mussels) that were procured from the various streams, lakes, and backwater sloughs in the local area. Terrestrial resources were dominated by white-tailed deer. Various birds were also collected from the nearby area.

Paleoethnobotanical resources were abundant at the site, particularly from the numerous features (Parker 2001b). The paleoethnobotanical assemblage was composed of charred seeds, nutshell, and wood. The vast majority of the recovered nutshell was hickory, followed by hickory/walnut and black walnut. Identified wood resources were primarily upland species, including oak and hickory, among others. Seeds were the most abundant and most ubiquitous botanical remain recovered from the site and included examples of various starchy- and oily-seeded plants. Both domesticates and wild species were identified in the assemblage. Starchy-seed included maygrass, erect knotweed, Chenopodium, little barley, and purslane, among a variety of other resources. A smaller amount of oily-

seeded plant resources were also identified, including: sumpweed/marsh elder, Cucurbitaceae, and sunflower. Several tobacco seeds were also identified. The paleoethnobotanical analysis indicated that the site was likely occupied throughout most, if not all, of the year. This interpretation is further supported by the presence of structures and larger storage pit features that likely stored those plant resources.

The Cunningham site was interpreted as a single component horticultural hamlet (McElrath et al. 2001:185). Several lines of evidence suggested that the site was only occupied for a short time span of several years, including the lack of structure rebuilding, ceramic similarity, and consistent floral and faunal remains.

Patrick phase (circa cal. A.D. 600–950)

Patrick phase ceramic assemblages are characterized by an increase of vessel form and decorative elements. While the subconoidal cordmarked jar continues to be the dominant vessel form, bowls begin to appear in some number. Cordmarking in Patrick phase assemblages generally extends to the lip and is primarily S-twist. Temper is either crushed-rock (grit) or grog (or a combination of the two). Decorative elements include plain- and cord-wrapped stick impressions along the lip, punctates, incising, and small lip lugs (Kelly 2002; Ozuk 1987).

Small corner- and side-notched flake points (e.g., Scallorn Cluster) are diagnostic of the Patrick phase. Researchers have commonly assumed that these small expediently produced points represent the introduction of the bow into the region (Kelly et al. 1984), although recent research has suggested otherwise (Shott 1996).

Patrick phase groups occupied a wider range of environmental zones and topographic positions than the earlier Late Woodland peoples in the region. Several site types have been identified, including hamlets, procurement/processing sites, and villages (Kelly 2002). In Missouri, smaller upland sites have also been identified at Boschert (23SG609) (Crampton and Geller 1988) and Little Hills Expressway (23SC572) (Lopinot 1991). Larger habitations, such as the Range site (11S47) (J. Kelly 1987), commonly occur on floodplain settings.

In addition to the many Patrick phase sites situated in the Mississippi River floodplain proper, numerous sites have also been identified and investigated in upland settings. These sites occur in a variety of settings, including upland ridges, blufftop locations, and interfluves. Throughout southwestern Illinois, many Patrick phase sites have been identified and excavated—many due in part to transportation-related construction projects.

As a general trend, the Patrick phase sites in floodplain settings tend to be larger than their upland counterparts, as described below. Another important difference is that upland Patrick phase sites are prone to use various forms of crushed rock as tempering agent in pottery manufacture, while those in the floodplain tend to employ grog temper. Upland sites also appear to have much lower seed counts per sample than those recovered from floodplain settings. For example, Fish Lake (11MO608) and Range (11S47) had counts of 39 and 48 respectively, while Cramer #2 (11SG99), Alpha (11SG32), and Columbia (11MO661) (upland settings) had .5, .7, and 7.1 respectively (Bentz et al. 1988).

Range Site

By far the largest of the Patrick phase sites to have been fully investigated and reported thus far is the Range site (11S47). The site is located about .5 km east of Dupo, Illinois. The Late Woodland component at this site is estimated to have been about 7 ha in area. Mechanical removal of the plow zone from that portion of the site to be impacted by construction activities produced about 1,872 Patrick phase features (J. Kelly 1987). These features included 38 keyhole structures, 43 small rectilinear structures, three large rectilinear structures, two screens, 169 earth ovens, nine hearths, and about 1,580 pit features of various functions. The ceramics were predominantly grog tempered and cord marked. Of the estimated 2,057 vessels, 81

percent were jars, 15 percent were bowls, and 4 percent were pinch pots. Decoration was mainly notching or slashing on the interior lip, although some cases of spouts were also identified. Lithics were mostly made of local Ste. Genevieve and Salem cherts for the cutting and scraping tools but had more distant sources for the formal tools. Maygrass, grass, goosefoot, and erect knotweed were the most common seeds recovered from feature contexts.

Fish Lake Site

Fish Lake (11MO608) is another Patrick phase site located in the American Bottom. This site is situated on Hill Lake meander about 5 km northwest of Columbia, Illinois. It is estimated to have been about 11 ha in area, and about 8,900 sq m of the area was stripped (Fortier et al. 1984). About 170 Late Woodland features were identified and excavated as a result of stripping. This total included 7 keyhole structures and two post structures. About 61 percent of the identifiable pits were flat bottomed and 33.1 percent were basined shaped. Five radiocarbon dates were obtained for the Patrick phase occupation. These dates ranged from 1390± 70 B.P. (cal. A.D. 530–780; p = .988 [2σ]) to 1170±110 B.P. (cal. A.D. 649–1043; p = .993 [2σ]) (Fortier 1984).

The excavations recovered a varied artifact assemblage. Most of the ceramics were grog tempered and cord marked with jars prevalent over bowls. A few miniature vessels and spouts were also present. Maygrass and Chenopodium comprised the majority of the seeds recovered from the site.

Woodland Ridge Site

Woodland Ridge (11MO880) is another large Patrick phase site located on a blufftop ridge south of Columbia, Illinois (Koldehoff 2002). Approximately 5,319 sq m of the site area was stripped, revealing 106 Late Woodland features, including two structures (Koldehoff 2002). Three radiocarbon dates were obtained from the Patrick phase component at the site and ranged from 1470±70 B.P. (cal. A.D. 429–664; p = 1.0 [2σ]) to 1110±70 B.P. (cal. A.D. 767–1038; p = .978 [2σ]) (Koldehoff 2002:35).

Nutshell, Chenopodium, maygrass, and erect knotweed were the most common constituents of the floral samples taken from feature contexts. Ceramics included 168 vessels, dividing into 70 percent jars and 30 percent bowls. Some pinch pots were also identified. The high percentage of bowls to jars is atypical, not just for the Patrick phase but also for most Late Woodland contexts in southern Illinois. Most of the vessels were grog tempered and cord marked, with S-twist dominating. Lithics were made mostly of local chert sources and generally had very low numbers of tools.

Alpha 3 Site

Alpha 3 (11S634) is a Late Woodland site overlooking Powdermill Creek in St. Clair County, Illinois (Bentz et al. 1988). Investigations at the site revealed the presence of 10 Patrick phase features, including bell-shaped pits, basins, and shallow basins. A single radiocarbon date of A.D. 660±75 was obtained for the Patrick phase occupation. Ceramics were mostly grit-tempered and cordmarked jars, although one possible bowl was present. Notching along the interior portion of the lip was common within the assemblage. S-twist cordage appears to be the main twist used. Local cherts, such as Salem, dominate the lithic assemblage, with tools represented in low numbers. Maygrass, goosefoot, and erect knotweed were most common in flora samples taken from the site.

Columbia Farms Site

The Columbia Farms site (11MO661) was located in Monroe County, Illinois, along the bluff top overlooking the American Bottom floodplain proper (Bentz et al. 1988). A total of 37 cultural features, including basins, earth ovens, and roasting pits, were identified and excavated at the site. No radiocarbon dates were obtained for the Late Woodland Patrick phase component. Ceramics were mostly grog tempered, although some grit-tempered vessels were present. Exterior surface treatments were primarily cordmarked, with S-

twist cordage prevailing. The lithic assemblage is dominated by local resources, such as St. Louis/Salem cherts, although approximately 75 percent of the completed bifaces were manufactured from Burlington chert (Bentz et al. 1988). The paleoethnobotanical assemblage was dominated by Maygrass, goosefoot, and erect knotweed.

Stonegate Site

The Stonegate site (11S1141) is a small Patrick phase occupation situated on an upland ridge overlooking the West Fork of Richland Creek (Brine and Craig 1997). Eighteen cultural features were identified at the site, consisting of primarily shallow circular and oval shaped basins along with deeper bell-shaped pits and hearths. The majority of the ceramic assemblage consisted of grit-tempered, cordmarked jars exhibiting S-twist cordage. A small amount of grog tempering and plain-surfaced vessels were also present. Although decoration was not common, when present, it was restricted to the lip/rim juncture and consisted of notching with either a plain or cord-wrapped dowel. Burlington was the predominant type of chert used, although some cherts from the western Shawnee may also have been present (i.e. Cobden). The paleoethnobotanical samples taken from feature contexts produced mostly nutshell (especially hickory and acorn) with very small amounts of maygrass and erect knotweed.

Wilderman Site

About 10 km northeast of Stonegate is another Patrick phase occupation known as the Wilderman site (11S729) (Wolforth 1989; Wolforth and Simon 1993). Located in the uplands close to Sugar Creek near the divide between Richland and Silver Creeks, the site encompassed about .40 ha (.96 acres). No radiocarbon dates were obtained for the Late Woodland component. Through a combination of hand excavations and mechanical stripping, four features were identified at the site (Wolforth 1989; Wolforth and Simon 1993). Of particular importance, in this regard, were the incomplete remains of a keyhole structure. This feature, which measured approximately 245 cm by 149 cm, had previously been truncated by past road construction. It had a depth of approximately 46 cm below surface near its center and 54 cm below surface along its perimeter.

The Wilderman artifact assemblage was typical of Patrick phase sites throughout the region. The ceramic assemblage at Wilderman consisted mostly of grit-tempered cordmarked jars with S-twist cordage. Wall thickness ranged from 4 to 7 mm. The only decoration within the assemblage was one jar that possessed interior notching. The lithic assemblage recovered from the site was dominated by the use of locally-available Burlington chert followed by minor amounts of Salem and Fern Glen cherts. Hafted bifaces included both single examples of Roxana and Koster, along with Early Woodland forms. The paleoethnobotanical assemblage was dominated by charred nutshell, including thick-shelled hickory, walnut, walnut family, and acorn. Wood charcoal included hickory, oak, ash, and elm. Only 19 seeds were identified—all were classified as maygrass (Wolforth and Simon 1993:223).

Northeastern Ozark Highlands of Missouri

Although the northeastern portion of the Ozark Highlands is outside of the current area, the Late Woodland of this area was included as to provide a regional perspective for this time period.

Maramec Spring phase (circa cal. A.D. 400–1400)

The Late Woodland subperiod in the northeastern Ozark Highlands is represented by a single archaeological manifestation, the Maramec Spring phase. This archaeological construct (formerly referred to as a focus) spans approximately 1,000 years from approximately A.D. 400 to 1400 (Chapman 1980; Reeder 1988). A recent revision by Reeder (2000a), however, placed this phase primarily between A.D. 600 and 1050, with the caveat that Maramec phase traits may continue in some areas into what is traditionally defined as the Mississippian

period. Originally identified as centering along the Maramec River, this phase is now known to extend throughout central Missouri south of the Missouri River and includes the Gasconade, Maramec, and Big Piney River drainages (McMillan 1965; Marshall 1958, 1965; Reeder 1988, 2000a). Much of what is known of the Maramec Spring phase has been the result of intensive investigations within the Gasconade River drainage (Reeder 1982, 1988, 2000a, 2000b) and at Fort Leonard Wood (Ahler et al. 1999; ICRMP 2003; Kreisa 2000; Kreisa et al. 1996; Kreisa et al. 2002; Markman 1993).

The Maramec Spring phase has been subdivided by some researchers into two divisions, an early and late subphase, on the basis of subtle temporal variations of material culture, particularly in the decorative elements of ceramic vessels and in the proportions of hafted biface types (Kreisa et al.2002; Reeder 1988). This proposed temporal division likely suggests that differences in Maramec Spring phase assemblages form a gradual continuum of change. While there appears to be a diachronic trend to more "Mississippian-like" traits in Maramec Spring phase assemblages (signified by the presence of some shell tempered sherds), it does not appear that a “Mississippianized” lifestyle was ever adopted by these Late Woodland populations. Reeder (2000a:199–200) has even stated that when Maramec Spring phase peoples disappeared, the region became abandoned or vacant.

Researchers in the region, however, still employ the binomial division as a heuristic device to discuss diachronic change during Late Woodland times (ICRMP 2003; Kreisa et al. 1996; Kreisa et al. 2002). It should be noted that with his redefinition of the Maramec Spring phase to A.D. 600 to 1050, Reeder (2000a) has since dropped the early and late subdivisions.

In a recent review of the Maramec Spring phase, Reeder (2000a:194–195) noted that the proposed settlement pattern includes three primary site types: [1] open-air habitation and procurement-processing location, [2] rockshelter or cave, and [3] cairn or mound. Open-air sites are the most numerous site types identified and include villages/hamlets, temporary campsites, and procurement/processing sites. Village sites are typically situated on terraces overlooking permanent streams; such is the case with Feeler (23MS12) (Reeder 1982), Dead Deer (23PH383) (Reeder 2000b), Kimberlin (23CR301) (Geier 1975), and Maramec Spring (23PH17) (Marshall 1965). Smaller, temporary habitation or procurement/processing sites, such as Hart (23PH234) (Cooley and Fuller 1977), Steelville Ford (23CR241/289) (Martin 1991), and 23PU731 (Kreisa 2000) typically occupied a variety of topographic settings.

Ongoing investigations at Fort Leonard Wood have led researchers to propose that particular Late Woodland site types may have been organized into discrete site complexes that include caves and rockshelters, cairns, and open-air procurement/processing sites along bluff top and alluvial settings (Kreisa et al. 2002). Petroglyphs appear to have been associated with at least two of these complexes, Lohraff (23PU721) (Kreisa 2000) and Miller Cave (23PU2) (Ahler et al. 1995; Markman 1993).

Rockshelters and caves, such as Miller Cave (23PU2) (Ahler et al. 1995; Markman 1993), Tick Cave (23PH145) (McMillan 1963; Roberts 1965), and 23PU739 (Kreisa 2000) are numerous throughout the Salem Plateau and were extensively utilized by Maramec Spring phase groups. Reeder (2000a:194) notes that rockshelters were likely used for temporary habitation rather than for more permanent residence. In addition, Maramec Spring phase people buried their dead at habitation sites and in rockshelters (Chapman 1980:105; Reeder 2000a).

Like the Ralls phase groups to the northeast, Maramec Spring phase people also constructed rock cairns and earthen mounds for the interment of the dead (Chapman 1980; Niquette 1986). The lack of primary burials (i.e., extended or flexed individuals) in these mortuary facilities suggests that the cairns were primarily used for the interment of

bundle burials and cremations (Niquette 1986; Niquette et al. 1983). These mortuary facilities may also have been used in the defleshing process prior to the transport of the remains.

Ceramic assemblages of the Maramec Spring phase, regardless of subphase designation, are typically dominated by conoidal to subconoidal ceramic jars, although a few bowls may occasionally be present in assemblages dating to the end of the phase. Most vessels are tempered with finely-crushed limestone or dolomite; however, minor amounts of other temper types, such as grit, grog, sand, and chert also occur with some regularity (Kreisa et al. 2002; Reeder 1988). Vessels typically have cordmarked exterior surfaces (Maramec Cord Marked, formerly Moreau Cord Marked) or are plain (Maramec Plain) (Chapman 1980:286; McMillan 1965; Marshall 1958). Analysis of cord impressions has determined that both S- and Z-twist were common during this time span, although there is a general trend towards Z-twist cordage during the latter portion of the phase (Chapman 1980; Kreisa et al. 2002; Reeder 2000a). Decoration of these Maramec Spring phase vessels, when present, is generally restricted to the neck and rim and consists of plain stick impressions along the interior or exterior lip, as well as infrequent occurrences of punctates, curvilinear- or straight-line incising, nodes, and lip lugs (Chapman 1980; Reeder 2000a:192).

The Maramec Spring phase groups made extensive use of the good- to high-quality lithic raw material resources, including the local Osagean cherts, in the manufacture of flaked stone tools (Ray 1984). Diagnostic hafted bifaces of this phase include both the large and small varieties that were typical of other Late Woodland groups throughout the region (Meinkoth et al. 2000; Reeder 2000a). The most diagnostic hafted biface forms identified in Maramec Spring phase lithic assemblages are the small flake points belonging to the Scallorn Cluster (Reeder 2000a:188). These expediently produced flake points occur in increasing frequency throughout the phase and become the dominant form in the latter portions. Medium-sized hafted bifaces of the Lowe Cluster are typically more common during the earlier segments of the time span.

Subsistence remains indicate that Maramec Spring phase groups extensively utilized a wide-array of plant and animal resources (Kreisa et al. 1996). Kreisa et al. (2002) noted that both the early and late subphases exhibit very similar suites of plant and animal remains. Botanical assemblages tend to be dominated by nuts, including hickory, walnut, and acorn. Starchy seeds are also present, although uncommon. Maize appears in both subphases rather consistently, although absolute counts are rather low—in six components from the Fort Leonard Wood region, no more than 20 maize fragments have been identified (Kreisa et al. 2002:126–127). The earliest evidence of maize at Fort Leonard Wood dates to approximately A.D. 1000 (ICRMP 2003).

Mammal remains dominate many of the faunal assemblages, although large and diverse fish and bird assemblages have been identified at certain sites (ICRMP 2003; Kreisa et al. 2002). Overall, the faunal data indicates that Maramec Spring phase people employed a diffuse strategy of faunal procurement and exploited a variety of resources and environmental zones (ICRMP 2003:2–43).

Early Maramec Spring subphase (circa cal. A.D. 400–900)

The early Maramec Spring subphase was originally defined by Reeder (1988:208) for those Late Woodland groups in the Gasconade drainage that possessed solely a Late Woodland material culture. Much of the material culture of the early subphase is similar to other early Late Woodland phases throughout the American midcontinent. Recent archaeological investigations in Fort Leonard Wood have produced 12 radiocarbon assays from 10 sites (23PU58, 23PU210, 23PU211, 23PU235, 23PU249, 23PU264, 23PU281, 23PU313, 23PU492, 23PU719) with early Maramec Spring phase components that securely places the subphase to the time

spanning circa A.D. 400–900 (Kreisa et al. 2002; ICRMP 2003).

Early Maramec ceramic assemblages are dominated by Maramec Plain and Maramec Cord Marked jars (Reeder 1988). While most of the vessels are tempered with either fine-grained limestone or dolomite, small amounts of grit, grog, sand, and chert have also been identified in these early subphase assemblages (Kreisa et al. 2002; Reeder 1982, 1988:208). Shell temper, while unusual for the early portion of the sequence, occurs infrequently throughout the uplands at three sites in Fort Leonard Wood (ICRMP 2003; Kreisa et al. 2002).

Diagnostic bifaces commonly recovered in early Maramec Spring phase assemblages are typical of other early Late Woodland groups throughout eastern Missouri and appear to form a continuum of Middle Woodland lithic technology. Larger corner- and side-notched specimens (e.g., Rice Side Notched and Kings Corner Notched) are commonly identified in early subphase assemblages. Smaller flake points, such as those of the Scallorn Cluster (i.e., Justice 1987), have also been identified infrequently. A few triangular points have also been recovered from this early Late Woodland subphase, although this point form is infrequently identified (Kreisa et al. 2002: Reeder 2000a, 2000b).

Late Maramec Spring subphase (circa cal. A.D. 900–1400)

Reeder (1988:208) had defined the late Maramec Spring subphase as encompassing those Late Woodland groups that possessed more Mississippian-like traits. Some researchers have suggested that late Maramec Spring groups were actively interacting with Terminal Late Woodland (Emergent Mississippian) groups to the east along and across the Mississippi River trench (Collins and Henning 1996). This scenario proposes that by circa A.D. 1050, eastern Maramec Spring people were being incorporated in an "Emergent Mississippian" world via exchange along the Maramec River (Collins and Henning 1996:82).

Six late Maramec Spring sites (23PU172, 23PU235, 23PU565, 23PU492, 23PU606, and 23PU719) in Fort Leonard Wood have produced seven radiocarbon dates that post-date A.D. 1040, suggesting the late temporal occurrence of this subphase (Kreisa et al. 2002:118). Ceramics from these late sites consist of numerous shell-tempered vessels, as well as several red-slipped sherds (ICRMP 2003).

Late Maramec Spring phase ceramic assemblages are still dominated by the Maramec series jars (including both plain and cordmarked specimens), although globular forms and perhaps a few bowls begin to appear. Shell-tempered vessels become more common during this subphase, occurring at six of eight late Maramec Spring phase components at Fort Leonard Wood (ICRMP 2003). Decoration of these vessels appears to have been limited to occasional punctates and incising, although a few instances of red-slipping knot- or fabric-impressed sherds have been recovered at Fort Leonard Wood (Kreisa et al. 2002).

Late Maramec Spring subphase lithic assemblages appear to form a continuum from the previous early subphase. Local lithic raw materials, including Burlington and Keokuk cherts, continued to be the dominant resources utilized by these peoples for the manufacture of flaked and groundstone tools.

Diagnostic hafted bifaces of the late Maramec Spring subphase are dominated by the small, expediently produced flake points (i.e., Scallorn Cluster) typical of the latter portions of the Late Woodland subperiod in eastern Missouri (Kreisa et al. 2002; Reeder 1988). These latter hafted biface types include the Reed Side Notched, Scallorn, and Sequoyah types. Medium-sized hafted bifaces, such as specimens in the Lowe Cluster, continued to be utilized during this subphase. Triangular points are also routinely identified from late subphase components.

Summary

When compared to the preceding subperiods, more is known of the subsistence

and settlement strategies and technological systems of the Late Woodland subperiod. Based on data obtained from a variety of sites throughout the American midcontinent, a number of generalized patterns concerning Late Woodland lifeways can be postulated. Population increases throughout the midcontinent can be proposed based on the number of known sites throughout the tri-state region. Evidence for more permanent or multi-season occupations becomes more evident during the Late Woodland at sites such as Range and Rench, among others. Alternatively, sites such as Range have been suggested to have been the result of multiple multi-season occupations (i.e., palimpsest) (i.e., Koldehoff and Galloy 2006).

The Late Woodland also saw a decrease in the exchange of the nonlocal or exotic trade goods that characterized the Middle Woodland subperiod. During the early segment of the Late Woodland, there is some evidence that nonlocal trade goods were still being exchanged.

In terms of lithic technology, the Late Woodland subperiod has been characterized as a time of increasing use of expedient technologies. During the early Late Woodland, lithic technology appears to form a continuum from the Middle Woodland as bifaces played an important role. Diagnostic hafted bifaces are typically classified as belonging to the Lowe Cluster, although in terms of technological attributes some early Late Woodland specimens appear similar to the earlier Snyders Cluster. During the latter portion of the Late Woodland, expedient flake technology became more prominent.

Ceramic assemblages during the Late Woodland subperiod show increasing regional variation that can be seen in ceramic styles (Hargrave et al. 1991). Late Woodland ceramic vessels display a limited variety of decorations, primarily consisting of nodes and interior and exterior lip impressions. In the northern reaches of the tri-state region, particularly in Iowa during the Cordage Horizon, corded designs play an increasingly important role in ceramic technology. Researchers have suggested that the rise in corded decorations on pottery reflects the prominence of women in Late Woodland societies (Benn and Green 2000).

Late Woodland subsistence has been portrayed as an economy based on hunting, gathering, and cultivating (Styles 1981, 2000; Simon 2000b). The procurement of faunal resources appears to have become even more localized than the preceding Middle Woodland subperiod. Starchy seeds, such as Chenopodium, maygrass, and erect knotweed, played an increasing role in subsistence practices during this time. During the Terminal Late Woodland, the cultivation of maize becomes more commonly identified. The procurement of faunal resources also indicates localizing behaviors (Styles 1981).

The above data can be used to formulate various hypotheses concerning Late Woodland occupations in Lewis and Clark Counties, Missouri. A variety of site types are well known from this time span and include small upland extractive, or special purpose, sites such as Alpha 3 or Stonegate, and larger floodplain sites, such as Range. The larger sites would have a large number of features, including food processing, storage, and thermal features, as well as residential structures. When compared to previous Middle Woodland assemblages, Late Woodland ceramics would exhibit less regionalization and, when present, decoration would typically consist of nodes/punctations and lip impressions. Diagnostic hafted bifaces would range from a series of medium-sized stemmed and notched specimens during the early Late Woodland to smaller, more expediently produced flake points in the latter segments of the Late Woodland. Subsistence resources, including both plant and faunal resources, would increasingly reflect localizing behaviors. Paleoethnobotanical resources would include increasing evidence for native cultigens, including both starchy and oily seeded plants. Maize cultivation becomes more widespread during the latter portion of the Late Woodland.

Late Prehistoric (A.D. 1000–1600)

The late prehistoric period was absent from the sites investigated for the Avenue of Saints project; therefore, only a short discussion of these cultural manifestations will be provided.

Mississippian Culture (A.D. 1000–1600)

A Mississippian lifestyle can first be seen in the archaeological record of the Midwest around A.D. 950 or so. A focal point of this timespan includes the American Bottom region in and around Cahokia (Milner 1998; Emerson 1997; Kelly 1990). Other areas of focus lie further to the north in the Spoon River locality and the Apple River locality (Emerson 1991; Harn 1991). What these various areas share in common, as do others throughout the region, is a Mississippian culture characterized by shell-tempered pottery, diverse vessel forms, maize agriculture, and a nucleated settlement pattern generally consisting of numerous communities arranged in a tiered or hierarchical order. Some communities were fortified with palisades and contained rectangular wall-trench houses, some of which were arranged around small plazas. Many Mississippian communities were highly ordered to the point of becoming fairly centralized chiefdoms, while others were only slightly more politically and economically complex than the preceding Late Woodland cultures had been.

The Mississippian culture continued in many places up to European contact. At this time, European diseases and warfare largely destroyed most remnants of the Mississippian lifestyle.

Evidence of Mississippi occupations in northeastern Missouri are largely lacking. Even Chapman (1980:161) was unable to identify substantive evidence for Mississippian occupation in this part of the state. Tiffany (1991:184) was also unable to locate any Mississippian occupations in southeast Iowa.

Oneota Culture (A.D. 1200–Historical Contact)

Jennifer M. Haney

The Oneota Culture is a second local, upper Midwestern cultural expression that is centered in Iowa and the surrounding states (Illinois, Wisconsin, Minnesota, Kansas, Missouri, Nebraska, and South Dakota) (Alex 2002). Currently, evidence for a site hierarchy settlement system, platform mounds, and central village plazas is lacking. Similar to the Mississippians, Oneota peoples also lived in large, permanent or semi-permanent, nucleated villages that were located near major stream channels. Smaller village sites have been documented; however, these sites are located in environs similar to those of the larger villages and do not appear to be playing a supporting sociopolitical role (Alex 2000; Morrow and Stephenson 2004:26-28). Similarly, these large villages are rarely fortified (Alex 2000; Henning 1998). Oneota village sites tend to be closely grouped and are therefore poorly represented in regional surveys, which has lead to speculation that these village clusters are surrounded by large areas of extractive hinterlands (Morrow and Stephenson 2004:26-28).

Chapman (1980:236) initially suggested that the Oneota peoples were more adapted to prairie environments, whereas Mississippians were more adapted to a riverine lifestyle. Ongoing research suggests that the subsistence patterns are far more complex and regionally specific (Alex 2000; Henning 1998). Chapman's assertion broadly states a fundamental generalization that differentiates Oneota from Mississippian subsistence patterns. While the Mississippians were largely agriculturalists who supplemented their diets by hunting and gathering, the Oneota cultures continued to hunt, gather, and garden in more equal proportions (King 1993b). Important crop plants included corn, beans, and tobacco, and to a lesser extent, squash, sunflower, little barley, and marsh elder. Bison, deer, and elk would have been commonly hunted, while birds, fish, turtle and wild nuts and seeds would have supplemented

the diet (Alex 2002; Morrow and Stephenson 2004:26-28). Later Oneota sites evidence higher densities of hunting tools and bison bones, which suggests that the importance of bison hunting increased through time (Alex 2002). This shift may be associated with European contact and an increase in the fur trade.

Oneota sites typically contain dense artifact assemblages. Perhaps most diagnostic of the cultural materials is the pottery, and the presence of red catlinite (pipestone). The pottery vessels are shell-tempered, globular jars with constricted necks and strap or loop handles. Incised or trailed decoration is commonly located on vessel shoulders (the most visible portion of the vessel). Catlinite was obtained from southwestern Minnesota and was frequently carved into pipes (Morrow and Stephenson 2004:26-28). Other lithic items include triangular projectile points, end scrapers, celts, manos, and metates. In northeastern Missouri and southeastern Iowa, the chipped stone assemblages are almost exclusively made from locally abundant Burlington/Keokuk cherts. This chert resource was also widely exchanged, appearing on Oneota sites in central and northeastern Iowa and southwestern Wisconsin (Morrow and Stephenson 2004:26-28). Bone implements are also common and include deer-mandible sickles and bison-scapula hoes.

In Missouri, four regions have been identified that contain Oneota sites. These include the Upper Osage River locality, the St. Joseph locality, the Chariton River region, and the Mississippi Alluvial Plain region (Henning 1998; O'Brien and Wood 1998). This last is closest to the current project area and encompasses over 25 identified Oneota sites in southeastern Iowa and several more on the Illinois side of the river (Henning 1998:374). Given that this cluster is concentrated on the Mississippi River, subsistence patterns suggest a heavy reliance on riverine resources and intensive horticulture. In Iowa, one of the Wever terrace sites (13LE110) is currently thought to represent the region's initial Oneota period of occupation at approximately A.D. 1300–1350 (Alex 2000; Henning 1998). The McKinney site (13LA1) likely represents the terminal end of the regional sequence at approximately A.D. 1450–1500 (Alex 2000; Henning 1998). The McKinney site has also been identified as a possible exchange center due to the recovery of such diverse materials as "a Madisonville-phase Fort Ancient rim sherd, a 'birdman'-incised tablet, catlinite, Excello chert (from Missouri), galena (eastern Iowa and Missouri), copper, Hixton silicified sandstone (Wisconsin), and Knife River Flint (North Dakota)" (Henning 1998:375).

Although most of the documented sites in the Mississippi Alluvial Plain region are located outside of Missouri's modern political boundaries, the occupational sequence may be generalized to include all of Missouri. Farther west, the initial occupation of the Chariton River region (Saline County) apparently also did not begin until approximately A.D. 1350 (O'Brien and Wood 1998:345). Early Oneota sites are not as well known as are the later Oneota and historic era (post A.D. 1650) villages (O'Brien and Wood 1998:345). While no Oneota sites or components were documented during the Lewis and Clark Counties portion of the Avenue of the Saints Project, local artifact collections suggest the presence of Oneota sites in the vicinity (Michael C. Meinkoth, personal communication 2008).

Protohistoric Period (post 1600)

Jennifer M. Haney

The protohistoric period is usually defined as beginning with the introduction of European goods into an area and ceasing with documented European contact. Consequently, demarcating the protohistoric period from earlier and later periods is regionally specific, since the movement of European goods and contact were time-transgressive events. This timespan is relatively short when compared to the previously defined cultural periods (i.e. Archaic period). Given this relatively short chronological period and the presence of early historic documentation, it might be logical to assume that events of the protohistoric period would be fairly easily deduced. In fact, it is

quite the opposite. Numerous factors contribute to this situation (Alex 2000). Alliances, trade pressures, and warfare often resulted in group migrations, as natives clashed over territory and resources. These migrations likely had a domino effect on neighboring groups. Native groups may have divided or united in response to changing pressures. When disease, warfare, and predation resulted in population losses, smaller groups would have been absorbed into larger social units. As access to European trade goods increased, the material culture of the native groups became more homogenized. The discontinuity of traditional manufacturing techniques meant that the material culture of historically documented groups could not be easily linked via the direct historical approach to that of their recent ancestors.

Compounding the above problems, the historical documentation itself is problematic. Group names recorded by Europeans often have little or no reference to native terminology. This lack of consistency makes association difficult. Further, organizational nomenclature (i.e. tribe) likely misrepresented the existing social ties. These historically derived classifications carried underlying assumptions that would plague political relations and anthropological research well into the twentieth century.

Comparatively few protohistoric period or historic Native-American sites have been documented in the states of Missouri, Iowa, and Illinois. One site close to the project area in Missouri, however, is the Haas-Hagerman site (23CK116) (Grantham 1993). Located on a terrace over looking the Des Moines River, this large site has been bisected by a small tributary drainage. Although large scale excavations have not been carried out at the site, investigations to date have produced Danner Ware pottery, Madison projectile points, metal objects (iron, silver, copper), and glass beads (Grantham 1993). While Danner Ware is also shell-tempered, paste characteristics and decorative techniques differentiate it from both Mississippian and Oneota wares. Danner vessels typically have large out-flaring rims with appliquéd strips and lug or strap handles. The bodies tend to be finely cordmarked. Two additional unnamed wares have also been recovered in lesser numbers at the site. Based on the recovered trade goods, the site is currently thought to predate 1680 (Grantham 1993). Based on historic descriptions and the occupation range, the Haas-Hagerman site is currently thought to be the Illini village visited by Marquette and Jolliet during their 1673 expedition (Grantham 1993). The documentation of the Haas-Hagerman site in the 1990s solidified the association between the Illini and the manufacture of Danner Ware vessels.

Northeast Missouri in Social Historic Context

Tanya A. Faberson, Jennifer L. Barber, and J. Eric Thomason

The history of Missouri can be viewed as a story of pioneer courage, fierce individualism, and prosperity. Missouri's history has also been punctuated by periods of social strife, political dissension, and violence. The social historic context presented here has been developed to illuminate some of the cultural, political, and economic changes that have occurred in Missouri over the last 300 years. Wherever possible, special attention has been paid to events that impacted northeast Missouri specifically. However, much of that region's history has paralleled the history of the state as a whole and is presented here as such.

The Historic Contact Period

As discussed previously in this chapter, little archaeological and archival evidence is available to fully document contact period Native-American groups in northeast Missouri. The evidence that is available suggests intrusive Native-American groups became allied with the Illini Confederacy, which had relocated to the western bank of the Mississippi River. This relocation had been the result of the Illini Confederacy engaging in warfare with other groups, who themselves were being pushed westward by French and English pioneers from the Great Lakes region

and along the eastern seaboard (i.e., the French and English colonial empires of the sixteenth and seventeenth centuries) (Casagrande and Shane 1983:259; Lanegran and Mosher-Sheridan 1983:3–14).

The displacement of the Illini Confederacy represents an example of an even larger series of events that left the broader region of the upper Midwest in a constant state of flux. A variety of forces caused the westward movement of Native-American tribes from the east into the Midwest, consequently causing the tribes established in that area to move further west. Also influencing this movement were paleoclimatic factors that affected horticulture and meat acquisition (Casagrande and Shane 1983:259–260).

The Iroquois presented a significant problem for the Illini Confederacy from 1655 to 1656, as the Iroquois sent war parties into the region (Richter 1983:538–541). In response, the subgroups of the Illini Confederacy fled and resettled in a safe haven west of the Mississippi. These groups included the Peoria, the Moingwena, the Tapouraro, the Coiracoentanon, and the Tamaroa, and they are generally accepted as the Indian groups present at the point of European contact. By 1677, hostilities with the Iroquois had decreased (largely due to decreases in Iroquois populations), and the Illini moved back into their lands east of the Mississippi River (Richter 1983:542). Their settlement along the east bank saw a brief respite until the eighteenth century when they were again pushed westward by competing claims in their home territory (Grantham 1993:14–16; Houck 1908:160; Wood et al. 1995:84).

Various other Native-American groups were also historically present in northeast Missouri and southern Iowa; however, their presence was much more ephemeral. These groups included the closely allied Sauk and Fox, present from approximately 1805 to 1836; the Kickapoo from Iowa, who were present throughout much of the late eighteenth century; and the Kickapoo and Miami, who were present circa 1813. By the end of the first quarter of the nineteenth century, these groups had ceded their treaty rights to the area and were relocated to reservations in Kansas and Oklahoma, effectively ending native occupation of the region (Blasingham et al. 1974; Jones 1973; Wood et al. 1995:86).

Early European Exploration

The earliest recorded European contact with Native-American groups living in northeast Missouri occurred in 1673 during the voyage of Louis Jolliet and Jesuit Father Jacques Marquette. The voyage began along the shores of Lake Michigan continuing south down the Mississippi River to the mouth of the Arkansas River, and it ended with a return voyage up the Illinois River. The voyage was halted at the mouth of the Arkansas River, and the Illinois River was selected for the return trip in order to avoid conflict with the Spanish further downstream in lower Louisiana (Erler 1983:140–142). Marquette and Jolliet's voyage had the dual purpose of helping to expand France's domain in the region by finding a route to the "South Seas" in advance of the Spanish as well as of performing missionary work amongst the native groups known to be living throughout the river valley. In the words of Louis Frontenac, governor of New France, "M. Talon [intendant of New France] has also judged it expedient for the service to send the sieur Jolliet for the discovery of the South Sea…and the great river which they call the Mississippi, which is believed to disembogue in the sea of California" (Steck 1928:147). The missionary purpose of the journey was espoused by Jolliet, who explained that Marquette was "sent by God to illumine [the native peoples] with the light of the holy Gospel" (Steck 1928:152).

Through their interaction with Illini groups living nearer Lake Michigan, the explorers had a vague knowledge of the river they were about to explore and anticipated the presence of native villages along the route (Houck 1908:159; Steck 1928:144–145, 154). On June 17, 1673, Marquette and Jolliet entered the Mississippi River near present day Prairie du Chien, Wisconsin. On June 25, the

party observed footprints on the river bank near present day Keokuk, Iowa. After subsequent investigation, Marquette and Jolliet encountered two large villages, one adjacent to the bank of an unnamed river and another farther away on top of a hill. Marquette and Jolliet's account of this encounter describes over 600 individuals living in these two large villages and thus helps to document the presence of late prehistoric groups in the area (Houck 1908:160–161; Grantham 1993:11–12; Severin 1968:94–96; Steck 1928:154–158).

The exact location of these villages is unfortunately unknown due to the loss of Jolliet's journals while traversing the rapids at the mouth of the Ottawa River, and to the loss of Marquette's journals in a fire several years later. The only surviving map of the expedition shows the location of the two villages near the confluence of the Des Moines and Mississippi Rivers near present day Keokuk, Iowa. With the identification of a large village site in 1984, later known as the Haas and Hagerman site (23CK116), and subsequent testing and mitigation, most of the doubt as to the actual location of Marquette and Jolliet's Illini villages has been cast aside. The presence of temporally diagnostic trade goods has further pinpointed this as the site of the Frenchmens' visit (Grantham 1993).

Beyond their initial excursion into the area of northeast Missouri, the French mostly confined their activities in North America to the Great Lakes region, the area near the mouth of the Kaskaskia River, and the Illinois River basin. There were, however, a number of French forts, settlements, and missions on the upper Mississippi and its tributaries throughout the seventeenth century. These small settlements were difficult to maintain due to a number of factors, including, but not limited to increased warfare between the French and the British and the involvement of various Native-American allies on both sides, the belief of the Jesuit priests that the fur trade was harmful to moral values, and European markets being flooded by North American furs, causing the commodities to be less desirable and less valuable (Lanegran and Mosher-Sheridan 1983:5–7).

By the 1690s, the French were, in essence, absent from affairs in the region and were instead focusing their attention on conflicts with native groups in the Great Lakes region. By 1696, fur licenses were revoked and a ban on trading in the upper Mississippi basin was imposed, essentially limiting the main purpose of French travel to the area: trading European goods for native furs collected by the local Native Americans (Lanegran and Mosher-Sheridan 1983:6). Two years later, there was a near exodus of French in the area as many of the French traders and settlers left for the northeast and, with the exception of many of the missionaries, abandoned the first settlements and trading posts (Lanegran and Mosher-Sheridan 1983:3–8).

Immigrant Settlement, 1700–1820

The eighteenth century saw the first true permanent French settlements emerge in the region. The ban on trading was lifted in 1714, and fur licenses were restored, primarily because of the resurgence in demand for North American fur pelts in France. French settlement in the region was highly encouraged in order to exploit the growing base of mineral wealth and to create a firmer grasp on land claimed by the Spanish and desired by the British (Ellis 1929:31). Growing from mission settlements, Kaskaskia and Cahokia were two of the earliest settlements that thrived during this period along with Ste. Genevieve and, briefly, Fort Orleans. While a land speculation scheme eventually cost France over $300 million, it also increased immigration through an influx of miners as well as farmers and traders (Lanegran and Mosher-Sheridan 1983:9–11; Violette 1957:1–12).

The French and Indian War (1754–1763), known as the Seven Years War in Europe, ended this period of French territory building. Following the war, French lands west of the Mississippi River were passed to Spain, and French territory east of the river was passed to

England, as both colonial powers sought to control the newly expanding territories (Violette 1957:2–3). French settlements had been small and isolated even before the war, and the burgeoning British westward expansion easily interrupted communications between them. In the end, British expansion overwhelmed the French settlements, diminishing, but not destroying, their cultural imprint on the frontier east of the Mississippi River.

The period of British control in the region caused many of the remaining French settlers to move west to Spanish territory (present day Missouri) to live under Catholic Spanish rule. Not only were many of them bitter at the loss of the French and Indian War to Great Britain, but most of the French settlers were themselves Catholic and preferred to live under Spanish rule rather than that of Protestant Britain (Lanegran and Mosher-Sheridan 1983:11). A result of this westward movement by the French was the establishment of the village of St. Louis in 1764 by merchants and traders from New Orleans. This settlement thrived because of its location near the confluence of the Missouri and Mississippi Rivers, providing access to the interior of Missouri for fur trapping. Even under Spanish rule, the culture on the west side of the Mississippi River was decidedly French, and very few Spaniards lived in Missouri at all. The population of St. Louis grew steadily from 1765 to 1770, as increasing numbers of French settlers abandoned their homes in Illinois country to make their home in the growing town (Violette 1957:18–19). There was also a small influx of British colonials from the Kentucky and Tennessee regions (Ellis 1929:71; Violette 1957:11–21).

The American Revolutionary War period drastically reduced westward exploration and settlement in Missouri (Lanegran and Mosher-Sheridan 1983:14–15). The British attempted to use the forts that were not destroyed during the French retreat to infiltrate and defeat the colonies from the west. The city of St. Louis was attacked in 1780 as part of this strategy because of its strategic location on the western bank of the Mississippi River. If St. Louis fell, the area between the Appalachian Mountains and the Mississippi River would have been up for grabs to obtain from the French, Spanish, and Americans (Lanegran and Mosher-Sheridan 1983:14–15).

The Continental Congress, however, had plans to control settlement west of the Appalachian Mountains that comprised the upper Mississippi River region, plans that had been developed even before the end of the war. Following the defeat of the British, these plans were carried out. The Land Ordinance of 1785 divided the territory using township and range system, which broke the land into large blocks that could be purchased, and it was hoped that this system would promote settlement (Lanegran and Mosher-Sheridan 1983:15). In 1787, the area was slated for division into states, a move that would politically unify the region under the American government. The creation of states produced a flood of migration, and by the first decade of the 1800s, American immigrants predominated over the French in the area for the first time. American settlement in Missouri resulted in the creation of a number of small towns along the Mississippi and Missouri Rivers, as well as a few of their tributaries (Lanegran and Mosher-Sheridan 1983:14–17; Violette 1957:22–39).

The Louisiana Purchase of 1803 included land encompassing present day Missouri, and a month after Spain officially returned the territory to France in that same year, the Louisiana Territory became part of the United States. In March 1804, Spain officially terminated its control over upper Louisiana (Foley 1989:135–146). Despite the changes in political control, immigrants continued to flood into Missouri for the same reasons they had been for decades: the mining industry, agriculture and land prospects, and fur trading, all of which were growing because of the area's access to riverways that connected it to established cities in the east.

Between 1807 and 1812, hostilities increased between Native-American groups, such as the Shawnee, and the American settlers in the western territories. The British

government at first secretly encouraged these hostilities, but as the War of 1812 approached, it became more blatant in pushing for an alliance between the British and the Native Americans (Horsman 1958:53–54, 62). The British, who competed with the Americans for territories in the northwest, wanted the alliance in order to stem the tide of American westward expansion, as well as to prohibit any possible American invasion of Upper Canada. Rumors circulating in 1808 that Napoleon intended to reestablish the French Empire in North America only served to increase British fears, especially in light of past French adeptness at making alliances with native groups (Horsman 1958:53–54).

To the people in the upper Louisiana Territory, the hostilities with the Native Americans and their British collaborators became significant enough to slow immigration. In order to deal with these problems, governing the Louisiana Territory became a central issue for the settlers of the region (Foley 1989:220–222). The settlers felt that if they had a stronger form of representation in the federal government, the problems of the western territories could no longer be ignored. In November 1811, Congress granted the Louisiana Territory status as a second-class government, and the bill was signed into law in June 1812 (Foley 1989:223). Included in this law was also a change of name from the Louisiana Territory to Missouri Territory, named after the Missouri River. As a side note, the state of Louisiana had been formed from the Orleans Territory several months prior in that same year.

While issues surrounding the advantages and disadvantages of forming a second-class government in upper Louisiana were considered in the second half of 1811, hostilities encountered with Native-American groups in the area increased to outright open warfare (Horsman 1958:62). Twelve days after the territory of Missouri was established, the United States declared war on Great Britain. While the need for agricultural land and hostilities with the British and Native-American alliance were factors in the declaration of war, other factors were also at play. These factors were not limited to but included the desire to defend the national honor, anger at British blockades and the conscription of American sailors into the British navy, competition over the North American fur trade, the South's desire to acquire Florida from Spain, and hatred of the British following the Revolutionary War (Goodman 1941:185–186; Hickey 1981:533). Although the declaration of war concerned many residents of the Missouri Territory, it was hoped that the war would end the hostilities with the Native Americans and lead to peace with the British (Foley 1989:223).

Life was difficult for the people of the Missouri Territory during the War of 1812. From 1812 to 1814, outbreaks of violence with Native Americans left the settlers in continual fear and war weary. In 1815 the war ended with the signing of the Treaty of Ghent. For many residents of the Missouri Territory, civilian and military alike, Article IX of the treaty, which returned pre-war rights and privileges to the Native Americans in the region, was an outrage (Foley 1989:232–233). In the minds of most Missourians, Native-American hostilities had caused residents in the remote parts of the territory to have to temporarily abandon their homesteads, and the fur trade and other businesses had also suffered as a result of the war (Foley 1989:234–235). Native Americans were equally angry at the truce, because the British had promised them that the American settlers would be driven east and the lands of the western territories returned to their original native inhabitants. These feelings on both sides led to continued conflicts and the need for mediation after the war (Foley 1989:234–235).

The War of 1812 and the events preceding it had slowed immigration into the region, but in 1815 Missouri's economy boomed as waves of new immigrants surged into the territory, and land prices began to rise. The new settlers could be classified into two groups: the more transient frontiersmen, hunters, and trappers; and the more sedentary farmers. The area was very attractive to both of these groups because

not only did the Missouri Territory have significant amounts of land available with untapped resources, but the soils and climate were familiar to both those emigrating from the southern states and those emigrating from the northeast (Ellis 1929:101). In addition, the region's position on slavery had not yet been politically established. Hence, enslaved African Americans could be used for labor on larger farms, if desired (Foley 1989:238–240).

Europeans, such as Germans, also began immigrating to the Missouri Territory at a significant rate after 1815, as they left economic and political problems in Europe and sought economic opportunities in the New World (Burnett and Luebbering 1996:1–2). Many of the Germans who made the Missouri Territory their home were craftsmen, merchants, and professionals. The Missouri Territory became such a popular destination for German immigrants that even today many cities in Missouri still have German names. In northeast Missouri, Bethel, Emden, and Frankford are three examples of cities that originated as nineteenth-century German settlements (Burnett and Luebbering 1996:2–3, 2005:5–8).

In the mid-1810s, the population of the Missouri Territory totaled 20,845, with 17,227 (82.6 percent) whites, 607 (2.9 percent) free African Americans, and 3,011 (14.5 percent) enslaved African Americans. By 1820, the population had risen to 66,557, with 55,988 (84.1 percent) whites, 347 (.5 percent) free African Americans, and 10,222 (15.4 percent) enslaved African Americans (Ellis 1929:101; Foley 1989:238). While the percentage of whites and enslaved African Americans remained generally unchanged from 1815 to 1820, the percentage of free African Americans dropped by more than 2 percent in those five years. This decrease in the number of free African Americans in the Missouri Territory appears to be the result of the territorial legislature taking measures to prohibit the immigration of free African Americans and those of mixed African-American and European-American descent (i.e., people who at one time in American history were commonly labeled "mulattoes") (Williams 1913:152).

Statehood to the Civil War, 1821–1860

The State of Missouri was admitted to the Union in 1821 after months of indecision in Congress due to debates over slavery. The territorial legislature had petitioned the federal government for admission to the Union in 1818; however, whether Missouri should be admitted as a slave state or as a free state became a central point of contention for the United States government. This issue was especially salient because the decision would impact the whole of the Louisiana Purchase territory north of the state of Louisiana (Williams 1913:152). Not surprisingly, representatives and senators of the northern states wanted Missouri added to the Union as a free state, and southern states were in favor of Missouri being admitted to the Union as a slave state. For the South, the admission of Missouri as a slave state was critical, because it would add two slave-state senators to the Senate (Williams 1913:152).

While these issues were debated at the federal legislative level, the people of Missouri expressed chagrin over what they considered an attempt by the United States Congress to dictate their affairs. Many of the immigrants settling in the Missouri Territory during this period were natives of Kentucky, Tennessee, Virginia, and North Carolina (i.e., the upland South), all of which were slave states, and many of these immigrants accepted the institution of slavery (Hurt 1992:6). Nevertheless, before slavery became a statehood issue, several counties in the west-central portion of the Missouri Territory, such as St. Charles, Jefferson, and Washington Counties, were overtly anti-slavery. However, following the federal government's involvement in Missouri's affairs, the territory generally united under a banner of pro-slavery (Williams 1913:153). Missouri was subsequently admitted to the Union as a slave state on August 10, 1821.

The 1820s through the 1840s were decades of growth for the new state. Easy credit and obtainable fertile land encouraged new waves of immigrants, primarily farmers from the upland South, to make Missouri their home (Ferguson and O'Brien 1984:163). German immigrants from the eastern part of the United States as well as Irish immigrants also migrated to Missouri (Burnett and Luebbering 1996:31–36; Johnson 1951:11; McCandless 1972:40). While many of the settlers traveled to the state in search of productive farmland, other settlers, such as merchants and craftsmen, clustered together, creating townships that would later grow into bustling cities (Mason 1982:137). At first, immigration was concentrated in the central river corridors, which included the Mississippi and Missouri Rivers and their tributaries. However, by the 1830s immigration had pushed away from the central river corridors and began filling in more remote regions of the state. Northeast Missouri, part of Missouri's northern plains, was one of these remote regions that was settled, as many new residents were attracted to the region's rolling hills and shallow valleys, as well as the soils, which were suitable for growing cereals and grasses (McCandless 1972:32, 36).

In 1837, an economic depression struck the United States, and land prices and sales decreased exponentially. Missouri, like many other states, suffered from the effects of the Panic of 1837, and land prices remained low well into the 1840s (Hurt 1992:58). Nevertheless, in spite of these economic challenges, the state population continued to grow. In fact, certain regions of the state, such as the northeast, became so popular that by 1851, all of the counties in the northern plains had their present boundaries, with only two exceptions (McCandless 1972:36). Only the Ozark region, the area southeast of the Missouri River, witnessed very little growth. The poor, rocky soils in this region offered few economic resources to new settlers (McCandless 1972:36–37).

By 1840, the population of Missouri totaled 383,702, and in 1850, the population had soared to over half a million (Violette 1957:287; Williams 1913:155). For the most part, the log cabins of the pioneer days were gone by that year, having been replaced by farm houses. For their part, cities had developed from what once had been small townships. River trade increased, and St. Louis became the largest city in what was known then as the Middle West (Williams 1913:159). By the early 1850s, transcontinental railroad construction was inaugurated (Violette 1957:236). Railroad construction was very slow, however, and by 1860, only one railroad, the Hannibal & St. Joseph, had reached completion across the state (Williams 1913:160).

One constant during this period of change in Missouri was the institution of slavery, although, as seen below, this issue became heavily contested in the state as well as the rest of the United States with the dawn of the Civil War. From 1840 to 1850, the enslaved African-American population in Missouri increased from 57,891 to 87,422 (Violette 1957:287). By 1860, the enslaved population totaled 114,931 individuals. The slave population was not evenly distributed across the state, however. Between 1850 and 1860, slavery actually declined along the Mississippi River south of the mouth of the Missouri River and west to Cole and Callaway Counties (Violette 1957:288). At the same time, counties farther up the Missouri River and in the western part of the state actually had an increase in the number of enslaved persons. This increase can be attributed to these areas being richer and better adapted to the cultivation of hemp (Hurt 1992:218). For example, nearly 30 percent of Clay County in western Missouri consisted of enslaved African Americans. In northeast Missouri, the slave population was not as pronounced. The counties in this region (e.g., Lewis, Marion, and Pike Counties) had slave populations that approximated between 10 and 24 percent of the white populations (Hurt 1992:xii; Violette 1957:289).

While the institution of slavery maintained its significance to the state's labor supply, it should be noted that differences existed between slavery in Missouri in comparison

with the South. Since Missouri did not have large plantations centered on staple crop agriculture (except perhaps in the counties where hemp production dominated), the gang labor system did not prevail as it did in the Deep South (Hurt 1992:215; Violette 1957:289). Instead of focusing on cash cropping, the majority of farmers in Missouri engaged in general farming; therefore, slaves were typically utilized as general field hands. This is in contrast to the Deep South, where slaves were organized into task systems on plantations for picking cotton or harvesting tobacco (Violette 1957:289). In urban areas, slavery took similar forms in both Missouri and the South. In both regions, urban slave owners frequently retained only one or two enslaved individuals for domestic duties (Ellis 1929:107).

The Civil War Years, 1861–1865

In 1860, the election of Abraham Lincoln brought the issue of slavery in Missouri to the forefront of political affairs. However, in December 1861, the state was faced with an even tougher issue: whether to immediately secede from the Union and join several of the southern states which had done so already. Although Missouri continued to sympathize with the South and itself had slaves, the economic interests of the state were primarily western (Williams 1913:160). And although the state did have a moderately large number of slaves, slave labor was not the crux of the state's economic system, and it never had been. At the heart of this issue of secession for Missourians, then, was not whether the institution of slavery was morally valid but whether the federal government should respect the rights of the individual states. Since its establishment as a state, Missouri generally had leaned on the side of states' rights. Nevertheless, the people of Missouri also had to consider that if it joined the Confederacy the state would be surrounded by three Union states, which could doom not only trade to and from the state, but also the practice of slavery altogether (Violette 1957).

The issue of whether Missouri would stay in the Union or secede and join the Confederacy was also a major issue for the governmental powers in the North and the South. Missouri's control of the Missouri River, its position at the center of trade in the northwest, and its control of the transcontinental routes were major concerns for both sides (Williams 1913:160). In addition, Missouri had the largest population of eligible fighting men. If the South could convince Missouri to join the Confederacy, then the Confederate armies could rely on the state for badly needed manpower (Williams 1913:160).

An election of delegates was held in Missouri on February 18, 1861, for a convention scheduled for February 28, that would decide what relationship the state would have with the Union: namely, whether the state would side with the South or with the North. The results of the election surprised many of the Southern sympathizers, but out of 99 members elected to the convention, none were in favor of immediately seceding from the Union (Violette 1957:327–329; Williams 1913:161). Hence, Missouri remained part of the Union, but throughout the next four years, the state struggled with dissension stemming from its military commitments to the Union and sympathies for the Southern cause (Violette 1957:335).

During the first two years of the war, violence and unrest swept the state. When Lincoln requested that Missouri furnish troops for the Union cause following the attack on Fort Sumter, the governor of Missouri, Claiborne F. Jackson, who was a firm supporter of the South, refused to provide the troops (Violette 1957:335–336; Williams 1913:162). In response, Union-supporting Congressman Frank P. Blair of Missouri offered the volunteer services of military club members, typically called "wide awakes," to the Union cause. A majority of the wide awakes were German immigrants, many of whom believed in the ideals of individual liberty and found the practice of slavery distasteful (Burnett and Luebbering 1996:69). As tensions increased over Missouri's participation in the war, Governor Jackson escalated tensions further by having the

Missouri militia seize federal arsenals within the state. He even requested munitions and guns from the Confederate president, Jefferson Davis. As a result, skirmishes erupted between Confederate-supporting Missouri militia and Union troops, and Governor Jackson and his supporters were forced to flee to the southwestern region of the state (Violette 1957:336–339; Williams 1913:163).

Civilians also became involved in the violence. Railroads and public property were destroyed, and federal detachments were cut off by armed Confederate-sympathizing bands, many of whom were engaged in recruitment expeditions (Violette 1957:379; Williams 1913:163). Union troops were frequently preoccupied with trying to stave off hostilities with these groups of Confederate sympathizers. Violence also erupted in the western part of the state between marauding bands of outlaws from Kansas and Missouri (Violette 1957:376, 381). As a result of these escalating hostilities, the state was put under martial law by federal army commanders. However, instead of stifling hostilities, martial law only served to increase anti-Union sentiments in the state (Burnett and Luebbering 2005:81; Williams 1913:163).

By the war's end, Missouri had volunteered the largest number of men to fight in the war compared to any other state. Approximately 140,000 men joined the war effort, with 109,000 fighting for the Union and 30,000 joining the cause of the Confederacy (Burnett and Luebbering 2005:79). Slavery had become increasingly unpopular during the war, and it had become nearly impossible to recover runaway slaves (Williams 1913:164). Finally, in 1865, the Drake Convention was held in order to draw up a new constitution for the state. The new constitution abolished slavery (this occurred before it was abolished on the national scale) and required that all potential voters had to swear an oath that they had not shown sympathy to the Confederacy in any way. Although this constitution was ratified, the voting provisions in the constitution were generally not adopted (Violette 1957:405; Williams 1913:165).

The Late Nineteenth Century, 1866–1900

One positive event during the Civil War years was the implementation of the Homestead Act in 1862. This law was enacted by the federal government to secure homesteads for settlers on the public domain, thus it stimulated western migration (Ellis 1929:142). As long as a person was a United States citizen or had the intention of becoming a citizen, was at least 22 years old or the head of a family, and had never shown disloyalty to the government, directly or indirectly, they were qualified to purchase 65 ha (160 acres) or less of unreserved public domain land for a reduced cost. By the end of the Civil War, approximately 2,832,804 ha (7,000,000 acres) of land were available for purchase in the western states and territories (Ellis 1929:142).

The war had restricted immigration to Missouri, but the post-war years witnessed a massive surge in immigration, at times prompted by the benefits of the Homestead Act (Ellis 1929:142–143). It should be noted, however, that in Missouri, public lands were located in the Ozarks region and not dispersed throughout the state (Hart 1972:263). In other parts of Missouri such as the northeast, public domain lands were still available, but not to the degree that they were in the southern part of the state. Nevertheless, the high agricultural potential of privately owned land for sale still drew increasing numbers of migrants. Furthermore, many rural Missourians, with the exception of the wealthier farmers, were generally highly mobile, migrating from one place to another within the state in search of better land and opportunities. Many also migrated to other states and territories, usually westward (Gregson 1997:87, 100).

Many new immigrants in Missouri after the war were ex-Union soldiers from the east who had been there during the war and had been impressed with the land. Less significant were the numbers of ex-Confederates who made Missouri their new home after the war. The state was generally not hospitable to newcomers who had been supportive of

slavery and secession; hence, fewer ex-Confederate soldiers migrated there after the war (Ellis 1929:145–146). Between 1860 and 1870, 193,728 American-born individuals from out of state migrated to Missouri, resulting in a 31 percent increase of this demographic. Before the war, the majority of native-born immigrants were from the upland South: namely, Kentucky, Tennessee, Virginia and North Carolina. Following the war, the greatest numbers of American-born immigrants were from Illinois, Indiana, Ohio, Pennsylvania, and New York (Ellis 1929:150).

Foreign immigrants were also attracted to Missouri's bountiful acreage. In 1860, 160,541 foreign-born individuals resided in the state. By 1870, 222,267 people in Missouri had been born overseas, which was an increase of 27 percent (Ellis 1929:149). The majority of these new foreign-born immigrants were from Germany. However, unlike years previous to the war, these families did not limit themselves to living near the Missouri and Mississippi Rivers, instead dispersing throughout the state. Irish immigrants also had an increased presence in the state after the Civil War, but their numbers were about half that of the German immigrants (Burnett and Luebbering 2005:89). English, French, Swiss, Scottish, and Canadian immigrants also made Missouri their home, but to a minor degree in comparison with the German and Irish immigrants (Ellis 1929:152–154). On a national scale, foreign immigration declined after 1872, as economic conditions in Europe improved. A new surge of immigration to the United States arose at the turn of the twentieth century, but these immigrants were mostly from eastern and southern Europe (Hart 1972:264).

Bountiful farmland was not the only benefit of moving to Missouri. Technological advances after the Civil War and subsequent industrialization created jobs, which in turn increased the populations of towns and cities where these industries were located (Crozier 1983:516). The most substantial population growth after the Civil War occurred in river towns. Most of these towns were German in origin. However, new railway lines laid after the war set the path for urbanization in more remote areas, leading to increasing cultural diversity (Burnett and Luebbering 2005:103; Crozier 1983:525).

While the end of the war brought land and opportunity for many families who made Missouri their home, the opportunities were generally limited to European Americans. Class and cultural differences did limit the realization of these opportunities for many whites, but generally, African Americans faced greater challenges in the realization of these dreams (Barnett and Luebbering 2005:120). Racial hostility was rampant in the post-war years. Without the institution of slavery, many whites felt threatened by African Americans, and racial tensions frequently erupted into open hostilities (Hurt 1992:301–302). The Ku Klux Klan was organized in Missouri in 1868 and was very active in the southeastern region of the state in the 1870s (Meyer 1963:507). Although Klan activities declined somewhat after that decade (only to resurge again in the 1920s), racial violence continued throughout the late nineteenth century and was eventually structurally reinforced by Jim Crow laws beginning in the 1890s (Meyer 1963:511, 595).

In 1873, a severe economic depression impacted the United States. At the same time, Germany also fell into a depression, followed quickly by France, Belgium, Great Britain, and ultimately, the rest of the world. That spring, the United States government decided to implement the fourth Coinage Act, which embraced the value of gold and devalued silver (Anderson 1939:308–309). Those who supported the use of silver currency, especially silver miners in the West, were strongly opposed to the bill. Nevertheless, the United States switched to the gold standard, and inflation grew rampantly. Inflation, combined with excessive railroad construction without solid financial backing, overtrading in the stock market, widespread corruption, and lavish lifestyles, resulted in a stock market crash in September 1873 (Caldwell 1932:303).

The Panic of 1873 had widespread effects, and the people of Missouri were not excluded from its impacts. Building of railroads was suspended, resulting in the shutting down of machine shops, mills, and foundries that were dependent on them (Caldwell 1932:304). Farmers could no longer transport their crops to nonlocal markets, and ranchers had increased difficulties transporting cattle (Christensen and Kremer 1997:28). Thousands of people throughout the United States were unemployed as a result of the Panic, and bread lines and requests for relief became common features of urban landscapes. The economic depression continued until the summer of 1878, when demands for American products and crops increased overseas due to European crop failures (Caldwell 1932:304).

As Americans regained their jobs and farmers were no longer left with surplus crops that they could not transport or sell, the economy eventually regained its footing. While industries expanded with the help of the rail lines and technological improvements, agricultural ventures also increased significantly. Norman J. Coleman, an agricultural reformer who had been appointed to the Missouri State Board of Agriculture in 1867, urged better transportation and more scientific agriculture. Unused and marginal lands were brought into production, and as a result, markets expanded. In 1870, Missouri had 148,328 farms and 3,695,034 ha (9,130,615 acres) under cultivation. A decade later, under the guidance of Coleman, Missouri farms increased in number to 215,575, with 6,776,484 ha (16,745,031 acres) under cultivation (Christensen and Kremer 1997:32–33).

Economic change also prompted significant social and cultural changes. One of these changes concerned the education of the state's children. While curriculum and academic standards were established at the local level, on a state level, approximately 250 school districts were established each year throughout the state in the late 1870s (Christensen and Kremer 1997:54–55). In 1870, less than half of Missouri's school-age children attended school. Ten years later, 65 percent of school-age children actually attended school. It should be noted, however, that educational opportunities were primarily reserved for white children. While state laws were established in 1865 to provide equal educational opportunities for African-American children, these laws were frequently not enforced (Savage 1931:309). Even with the development of racially segregated schools, by 1890 only 4 percent of all school children in the state were black (Christensen and Kremer 1997:55).

Between 1880 and 1890, the population of Missouri skyrocketed from 2,168,000 to 3,106,665 individuals. Like other areas in the United States, Missouri's residents increasingly participated in consumerism, and manufactured goods were available to an extent never before seen (Christensen and Kremer 1997:79–80). Other significant social changes in the late nineteenth century included entertainment and the rise of popular sports. With an increase in access to railways, individuals and families could visit new forms of entertainment, such as minstrel shows, and nonlocal entertainers could travel to various faraway towns that they could not easily visit before (Christensen and Kremer 1997:63). Some sports that had been developed in previous decades, such as baseball, gained national fame and prompted the various communities to form baseball clubs, and in large cities to form leagues and professional baseball teams, such as the St. Louis Brown Stockings (Christensen and Kremer 1997:66). Circuses, horse racing, political debates, and, more gruesomely, lynchings also became popular pastimes.

The Twentieth Century

At the turn of the twentieth century, Missouri's economy revolved around industry and advances in agricultural technology. Natural resources in the state, such as timber, lead, copper, zinc, barite, coal, iron ore, clay, and shale deposits, were important to local areas because these resources provided jobs, and hence, they were also a significant part of the state's economy (Christensen and Kremer 1997:84–85; Rafferty 1982:Maps 78–85).

Timber was typically acquired from the southeastern region of the state, and minerals, such as lead, copper, and zinc, were mined in the southeast and the southwest. Barite, which was used for oil drilling operations to hold gas pressure, was exploited in the central part of Missouri, and the coal fields stretched from the southwestern region to the northeast part of the state. Iron ore was primarily located in the central and southeastern regions, and clay and shale were mined in the northern half of the state (Rafferty 1982:Maps 78–85). Other industries, such as flour milling, breweries, food processing, clothing manufacture, construction, slaughterhouses, and machinery production, were also integral to Missouri's economy at the turn of the twentieth century (Christensen and Kremer 1997:86; Meyer 1963:444).

Agriculture remained the backbone of the Missouri economy as the new century dawned. By 1900, the state had 284,886 farms, an increase of approximately 47,000 farms since 1890. Interestingly, 170,994.5 ha (422,536 acres) of public domain land remained available in 1903, but all of this land lay south of the Missouri River (Christensen and Kremer 1997:100). In 1900, more than two-thirds of Missouri residents were engaged in agriculture as their occupation, and it is interesting to note that 31 percent of these farmers were tenants (Christensen and Kremer 1997:101). High interest farm loans, high taxes, and subsequent foreclosures in the 1890s likely contributed to the high rate of farm tenancy in the state during this time (Christensen and Kremer 1997:106). Approximately half of the total farm acreage in the state was devoted to growing corn, and one-fifth was dedicated to wheat production. Oats were also an important crop (Meyer 1963:459). Cattle raising and hog production also consumed a large portion of agriculture in the state, and Missouri ranked first in the raising of mules (Christensen and Kremer 1997:101–103; Meyer 1963:456).

In the early twentieth century, immigrants again poured into Missouri. The majority of these immigrants were from southern and eastern Europe, and many of them were Jewish (Burnett and Luebbering 2005:126). In Missouri cities, such as St. Louis, these new immigrants typically formed ethnic enclaves, and by 1916, neighborhoods of Austrians, Hungarians, Bohemians, Italians, Poles, Russians, Jews, Spaniards, Croats, Syrians, and Romanians were scattered throughout the cityscape (Burnett and Luebbering 2005:128). Urban poverty greeted many of these new immigrants, and like previous waves of newcomers, they also struggled against cultural stereotypes.

The social, economic, and political challenges of the new century prompted progressives in Missouri to try to enact reforms. Bribery and corruption had run rampantly throughout the state's legislative and executive branches in the late nineteenth century. Prostitution and gambling became public issues of morality, poverty in urban areas was an increasing problem due to dramatic population influxes, and public health had become a dire concern. These issues were also present on a national scale (McReynolds 1962:316–321). Middle-class and upper-class reformers pushed for new legislation in states such as Missouri, and over time, corrupt officials were ousted from office, local ordinances regarding public health and sanitation were initiated, and laws were enacted to prevent prostitution and gambling (McReynolds 1962:320).

World War I erupted in August 1914. Although the United States did not officially join the war until 1917, the nation supported the Allies—namely Great Britain, France, and Russia and their associated empires and dependencies—through investments in war materials (McReynolds 1962:328–329). The Great War, as it was called, brought difficult times to the United States, and Missouri, in particular, struggled with what the war meant to the numerous immigrant groups who had made the state their home. Approximately 80,000 Missouri residents had been born in Germany, and at least 280,000 residents had German-born parents (Christensen and Kremer 1997:200). These German immigrants and descendents did not want the United States to become involved in the war, as many

felt loyal to the United States as well as Germany. Irish immigrants in Missouri also supported neutrality for the United States, because many of them had little use for the causes of England and France (Burnett and Luebbering 1996:104; Christensen and Kremer 1997:200).

Nevertheless, the United States did enter the war, and as a result, German immigrants in Missouri faced hostilities regarding their language and customs. The German language was banned in schools, churches, and other public buildings, and German clubs and organizations were urged to swear oaths of loyalty proving their allegiance to the United States (Burnett and Luebbering 1996:104–105). German families and businesses also bore threats and incidents of violence. In spite of these social conflicts, many German immigrants joined the war effort, and war rallies and bond drives were held throughout the state (Christensen and Kremer 1997:212–213; Meyer 1963:571).

Although the First World War caused social conflicts within Missouri, it also benefited the many farmers who lived there. Farm values inflated, submarginal land was cultivated, and small-grain production, such as wheat, exceeded the production of corn and cattle (Work Projects Administration 1986:69). Since so many Missouri men had joined the American military and were overseas on the front, the Missouri Council of Defense created a volunteer movement whereby townspeople traveled to the countryside to assist in the harvesting of wheat (Christensen and Kremer 1997:220). Together with localized efforts to provide goods and knitted items for the troops, these efforts by the Missouri people created a sense of community and purpose not seen in previous years (Meyer 1963:572). By the end of the war, 156,232 Missouri residents had served in the armed forces. Of the total number that served, 11,172 were casualties (approximately 7 percent) (Christensen and Kremer 1997:240).

The decade following World War I has often been called the Roaring Twenties. This was a time of urban growth, extravagant speculation, and superficial industrial and commercial prosperity based upon credit. It was also the time when the automobile replaced the horse and buggy for many Missouri residents, and modern conveniences became a regular part of most Missourians' everyday lives (Meyer 1963:596). However, the prosperity of the 1920s was not experienced by all. Anti-foreign sentiments helped bring about an isolationist movement in the United States (McReynolds 1962:336). The Russian Revolution and socialist sentiments throughout various parts of the world prompted many to be suspicious of foreigners, and as a result, the United States government enacted legislation restricting new immigration in the 1920s (Burnett and Luebbering 2005:132). Immigrants were not trusted, and often, they were marginalized and disenfranchised.

Farmers in Missouri in the 1920s had to deal with diminishing farm income and a continual increase in consumer items. The price of crops and commodities fell, and at the same time, taxes were increased (Meyer 1963:598). As the values of farms and the incomes of farmers decreased, bank failures rose. Many farm owners who lost their land holdings were forced to make the decision between farm tenancy or share cropping, or abandoning farming altogether and seeking employment in towns and cities (Work Projects Administration 1986:84).

The stock market crashed in October 1929, and Missouri residents, along with the rest of the nation, were thrown into an economic depression. Within four years of the crash, industrial production fell to less than half of what it had been when the crash occurred, and factories and manufacturing plants closed everywhere, leading to massive unemployment (Work Projects Administration 1986:84). Even though Missouri did not suffer the extensive unemployment rates seen in more industrialized areas, 51.2 percent of Missourians lived in cities and were dependent on wages to purchase food, clothing, and other necessities (Meyer 1963:624). When the banks failed, many people lost their savings. Without

jobs, many homes, cars, and even furniture purchased on credit before the crash were frequently repossessed.

After Franklin Roosevelt was elected president in 1932, he immediately introduced his New Deal to improve the economy and bring relief to those who were financially struggling. As a result, by 1935 employment conditions in urban areas began improving (Meyer 1963:626–627; Work Projects Administration 1986:93). Farmers, who on average were only receiving 56 percent of their former incomes before the war or were forced off their land by debt or drought, were also given some relief as the federal government initiated measures to increase the value of land and purchased surplus crops to raise the prices of these commodities (Meyer 1963:634). Agriculture did not improve to the extent that industries did from the New Deal, but a small measure of relief was experienced by many Missouri farmers.

Missouri did not have rapid social and economic developments in the late 1930s, but opportunities for entertainment became more numerous for all Missourians thanks to the New Deal. New Deal agencies provided various programs and policies that allowed people access to a variety of places of amusement, such as zoos (Kirkendall 1986:233). Professional baseball remained a prominent pastime, and football was also very popular. Music, literature, and films on the big screen became increasingly accessible for people in urban areas, as well rural areas.

While these social improvements were taking place, the Second World War broke out in Europe and the Pacific, and between 1941 and 1945, the state provided 450,000 men and women to the armed services (McReynolds 1962:396). The war also provided a large boost to Missouri's economy. Unemployment rapidly disappeared, and in spite of a sharp drop in the farm population, many farmers reaped financial benefits (Kirkendall 1986:256, 258). The financial gains that many farmers made as a result of the war allowed farmers to purchase technologically advanced equipment, improve their handling of livestock, and introduce electric machinery to their agricultural practices (Kirkendall 1986:258–259). Farm tenancy, which had been as high as 75 percent in some regions of Missouri before the war, had significantly decreased in most areas by the war's end. Northeast Missouri had rates as low as 0–20 percent, while the southeast region maintained the highest rates from 10 to over 60 percent (Johnson et al. 1950:280).

By the mid-twentieth century, Missouri had fully modernized. Advances in agriculture, such as the use of complex farm machinery, had replaced the use of humans and animals in crop production, and many farmers only farmed part time while working at a second career (Meyer 1963:718). While industries such as mining and lumber had merely maintained themselves through two world wars, a renewed interest in these industries began in the 1960s (Meyer 1963:725). The state also had new industries develop at mid-century; namely, the manufacture of spacecraft and rocket engines.

In the last half of the twentieth century, Missouri endured floods, contaminated waste sites, struggles for equal rights, desegregation, and a variety of other challenges that at times tested the tenacity and patience of the state's residents (Larsen 2004:155). In spite of sometimes seemingly overwhelming odds, Missouri continued to progress and work through divisive issues. Many of the large issues that Missourians face today are the same ones that face the rest of the nation (Larsen 2004:155). Missouri has had a rich and colorful history, and through it all, the state remains strong in its Show Me State traditions.

Chapter 6. Field and Laboratory Methods

This chapter provides a description of the field and laboratory methods used during the AOS project. Specifics of the individual artifact analysis methods (e.g., prehistoric ceramics, lithics, historic artifacts) were included in Chapter 2.

Field methods employed during the AOS project varied, depending on the level of investigation conducted (utility corridor or data recovery) and the type of site being excavated. Specific methods used on individual sites are discussed in the individual site volumes. The following provides a discussion of the methods employed throughout the project.

Field Methods

During the utility corridor investigations, hydraulic cores, trackhoe trenches, and test units were employed to better determine the vertical and horizontal limits of the sites. In addition, soil information derived from cores and trenches was used to provide information concerning landform evolution and to aid in determining the potential for intact, buried archaeological deposits. Excavation units were placed on the sides of trenches to sample the various deposits encountered and provide information concerning the cultural deposits encountered. The utility corridor investigations were designed to provide the information needed to supplement previous work at the sites (Markman et al. 1996, 1997; Snow 2000) and provide information that could be used to make informed decisions concerning additional work at the sites.

As noted in Chapter 1, the archaeological investigations conducted in conjunction with the AOS project were designed to recover data from significant archaeological components within the ROW. By significant components, we refer to those strata that contained artifacts, features, or ecofacts with good spatial and temporal integrity that could be used to address questions of local and regional importance as specified in the research design (see Chapter 2).

The level of data recovery conducted at NRHP eligible sites was determined by the type of impact expected. Two types of project impacts were recognized: near surface impacts and subsurface impacts. Near surface impacts were those that would result from grading, rutting, and compaction to create a stable surface for the placement of fill. Archaeological materials or features in the plow zone and at the base of the plow zone would be impacted by such activities. Subsurface impacts were those that would disturb more deeply buried deposits. Ditch construction and the flattening of high spots in some areas would remove up to 2 m of sediments and impact more deeply buried archaeological components.

The staged approach to data recovery was employed for two primary reasons. First, the nature, extent, and integrity of the archaeological components within all, or portions of, the impact area(s) were not established during prior work at most of the sites. The second reason was that at some sites an initial stage of additional exploratory excavations was conducted so that the remaining data recovery effort could target the portion(s) of the site or site components that had the potential to yield the greatest information return. The additional exploratory excavations aided in determining the nature, extent, and integrity of the deposits and also provided the data needed to target significant deposits. In all cases, information gleaned from earlier stages of investigation, including previous phase I and II investigations (Markman et al. 1996, 1997; Snow 2000), was used to guide the latter stages of investigation at a site. Data recovery at each site was conducted in sequential stages. The number of stages and the extent of the work conducted at each stage depended upon project impacts and research goals for each site.

Data recovery methods varied at sites and depended on the nature of the significant deposits that were to be impacted by highway construction. At some sites, this entailed plow zone removal in large strip blocks to expose cultural features at the base of the plow zone. On other sites, the significant deposits to be impacted were more deeply buried. In these cases, blocks were hand-excavated to sample these deep deposits. In cases were sterile deposits overlay the significant deposits, the overlaying deposits were removed with a trackhoe prior to hand excavation of units. The specific methods used at each site are summarized in Chapter 7 and presented in more detail in the individual site volumes.

Initially, in Lewis County these investigations were limited to a 2 m wide area along the proposed utility corridor. This corridor ran the entire length of the project area. Later, in selected areas where trenching was difficult or impossible due to a high water table, additional areas were sampled. In these cases, trenches were placed in areas outside the utility corridor but within the right-of-way that had not been sampled during previous investigations. During the utility corridor investigations in Clark County, investigations were concentrated within the 2 m wide utility corridor, though some excavations took place outside of this corridor. All of these investigations were within the construction ROW.

Trench and Core Excavation

The following paragraphs detail specific field methods that were used for the excavation of hydraulic cores and trenches.

Intact 5.08–7.62 cm (2–3 in) diameter cores averaging 2–3 m in length were taken using a hydraulic drill (Figure 6.1). All hydraulic cores were wrapped, boxed, and transported to Iowa City for description and analysis by E. Arthur Bettis, Ph.D.

A trackhoe with a 1.51 m (5 ft) wide (Figure 6.2), toothless bucket was used to excavate trenches. All soil was removed in a controlled manner. An archaeologist continually monitored the trackhoe operation and inspected the back dirt after it was excavated.

At least one long wall of each trench was trowel scraped and inspected for cultural remains.

Any archaeological materials or ecofacts identified in the trench walls were labeled and keyed to the trench profile with a written description, and all archaeological material recovered from the investigation was bagged by provenience (e.g., trench, depth).

Figure 6.1. Hydraulic coring near Station 177.

Figure 6.2. Excavation of Trench 45-I during the utility corridor investigations.

A portion (typically 3 to 4 m in length) of each trench wall was recorded using one or all of the following forms of documentation: a profile drawing, photograph, and written description.

Detailed soil descriptions were presented for each natural horizon and keyed to each trench profile drawing.

The location of all trenches was recorded using a total station transit or high-precision global positioning system (GPS) receiver approximately 1 m accuracy), with each trench shown on an overall plan map.

Excavation units were placed to sample sediments observed in trench walls (Figure 6.3). Units were excavated in systematic levels, and sediments from them were screened through .64 cm mesh hardware cloth. Units placed to sample deeper deposits were typically placed on the step of a larger trench (approximately 150 cm below surface [cmbs]).

Upon completion of trench recording and unit excavation, each trench was backfilled.

Trench excavation was conducted systematically across the project area in areas deemed likely to have buried cultural deposits. Depths of the trenches depended upon the stability of the soils and the focus of the sampling. Trenches excavated deeper than 1.5 m were stepped or sloped in compliance with the United States Department of Labor, Occupational Safety and Health Administrations Standards for Excavating Trenches (OSHA 2002, 29 CFR 1926.650, .651, .652).

During the data recovery investigations, additional trenches were excavated and cores taken to supplement the ones taken during the utility corridor investigations. The additional core samples were taken to more fully document the stratigraphy in relation to significant archaeological horizons being excavated. Trenching was conducted to provide greater exposures in mapping out the various landforms on which the sites were located. The same protocols used during the utility corridor investigations were used in the excavation of cores and trenches during the data recovery investigations.

Figure 6.3. Excavating units within a trench during the utility corridor investigations.

Unit Excavation

The basic excavation unit employed for data collection during all excavations measured either 1-x-1 m or 50-x-50 cm in size. During the utility corridor investigations, each unit was identified by the trench in which it was excavated. In addition, each unit was identified by a unit number (e.g., 1, 2, 3) that was assigned sequentially by trench. In most cases, a 1 liter constant volume sample (CVS, see discussion below) was taken from one corner of every unit level for soil analysis in the laboratory.

During the data recovery investigations, units were 1-x-1 m in size. Units were assigned sequentially by site and identified by a unit number (e.g., 1, 2, 3) and by grid coordinates. Initial units were often excavated at sites to better determine the vertical and horizontal dimensions of significant deposits within cut areas at these sites. Data derived from these units was used to better determine the placement and number of additional units, if needed, at a site. CVS and flotation samples were taken from select units.

For all units, the surface (or beginning) elevation of at least the southwest corner of the unit was recorded using the total station transit or laser level. A log of all units was maintained for each site. Each unit was excavated by removing the plow zone (in cases where it had not been mechanically removed) and then removing 10 cm arbitrary levels within natural strata. Level depths were recorded as elevation AMSL.

Sediments from units not saved for flotation or CVS were passed through traditional .64 cm (.25 in) mesh hardware cloth. Unit forms were used to record location data, dates of excavation, excavator(s), nature of the sediments, features identified, piece plotted artifacts, and material recovered from screening. Flake debris, tools, ceramics, faunal materials, and other cultural materials recovered from the screen were bagged as a lot by individual unit and level. Each bag was labeled with the appropriate site and location information and assigned a bag number. A bag log was maintained for each site, listing location information and contents by bag number. All rough rock was examined in the

field for any human modification (i.e., flaking, pecking, grinding). Non-modified rough rocks were weighed (total grams by unit and level) and discarded in the field.

Feature Excavation

When cultural features were encountered, their surface dimensions were measured, drawn to scale, and photographed. Each feature was assigned a number (sequential for the site) that was recorded along with pertinent location data on a site feature log. A datum point and a bisect point were then placed to bisect the feature along its longest axis. Both of these points were shot in with the transit along with the center point of the feature. The feature was then cross-sectioned using a trowel or shovel and exposing the profile along the longest axis of the feature. The profile was drawn to scale and photographed. The second half of the feature was then excavated. A flotation sample(s) of at least 10 liters was recovered from the second half of the feature. If the feature fill was stratified, each zone was excavated separately and a flotation sample was extracted from each stratum. For features deeper than 30 cm that exhibited one zone, flotation samples were taken in 10 cm levels from the feature. Each flotation sample was recorded on a site flotation log and assigned a flotation sample number. A standardized feature form was completed for each feature excavated. The form was used to record metric and morphological attributes, location data, weight of rock (natural and FCR weighed separately), artifacts recovered, and samples extracted. The feature was photographed at the conclusion of the excavation. The portion of the fill not saved for flotation was dry screened (.64 cm mesh). Feature location was designated as the grid coordinates of its center point. The top and bottom elevations were measured using the total station transit.

Mechanical Plow Zone Removal

On several sites, the plow zone was systematically removed to expose features below the base of the plow zone. During the utility corridor investigations or early stages of the data recovery, this entailed the removal of the plow zone in 1.52 m (5 ft) wide strips across the site. During the later stages of data recovery investigations, larger areas were stripped in order to fully expose features within the ROW. Often these larger strip blocks were in areas where features had been identified in the earlier stages of work.

Plow zone removal was conducted using a trackhoe with a smooth bucket. Typically, the trackhoe would take shallow (5–10 cm) cuts until the base of the plow zone was encountered. All stripping was monitored by an archaeologist. When patterns of soil anomalies became apparent, and so to better control soil removal, mechanical excavation was replaced with shovel skimming until all anomalies within each block were defined. All soil anomalies identified during stripping were flagged, covered with plastic, and investigated later as potential features.

Vertical and Horizontal Control

To provide horizontal and vertical control during the investigations, a datum point was established prior to the beginning of fieldwork at each site. The site datum was assigned a horizontal grid reference designation as meters north and meters east (e.g., 500 N/500 E) and elevation AMSL. The objective was to keep all horizontal measurements to meters north and east of an arbitrary zero/zero point. All site datum were tied into the highway station stakes. This was to allow for all archaeological data to be easily related to the project impact maps.

A site grid system was projected across the site with the datum as the apex of north–south and east–west baselines. During data recovery investigations, a Topcon total station transit (and data collector) was used to survey in all grid reference points and elevations. Grid reference points required for mapping, back sighting, or test unit and excavation block layout were staked and marked with the appropriate grid coordinates and elevations using the Topcon in the stake-out mode.

A rotating laser level was used to maintain vertical control during the excavation of units

on sites where block excavation took place. The rotating level was placed at the same point every day and leveled. This insured consistency in the recording of elevations.

All elevations were recorded as meters above mean sea level (AMSL). The site datum and rotating level stakes were all related to AMSL. All location data for features, artifacts, units, trenches, and other proveniences was recorded in this manner. The total station transit or a rotating laser level was used to maintain vertical control during the excavation of units and excavation blocks.

Electronic Field Forms

In addition to paper copies of unit, feature, and bag forms, an Access database was setup for entering the data into database tables. All forms (unit, feature, bag log) were entered into the database on laptop computers in the field. This allowed for the checking of forms on a regular basis and for the project archaeologist to have immediate access to the data. Each database was backed up at the end of the day and a copy retained on the laboratory desktop computers.

The bag log and unit forms were linked through a variety of queries. This allowed the project archaeologist to, for example, determine the density of artifacts recovered from various units/levels on site. By having immediate access to these data, the project archaeologist was able to make more informed decisions concerning the excavations. This database was maintained during the laboratory processing of materials. Additional tables were created for the various artifact classes (e.g., flake debris, prehistoric ceramics, historic materials) and were all tied back to the original database tables.

Small-scale Remains Sampling

Sediment samples (constant volume samples, CVS) were collected during the data recovery excavations from selected contexts for fine-screen and flotation recovery of small-scale remains (smaller than .25 in). In addition, CVS columns were recovered from most of the units excavated during the utility corridor investigations. Two methods of sampling were employed. The first consisted of sampling in association with features. In this scheme, a CVS sample (20-x-20-x-10 cm) is collected at a distance of 1 m in each cardinal direction (where possible, north, south, east, and west) from the feature. In addition to the feature focused sampling, CVS samples were collected opportunistically from units exhibiting relatively high charcoal content.

The second sampling method was used to collect microscopic pollen and phytolith remains. These samples were collected from features, as well as from stratigraphic zones from block and trench walls. In collecting samples from block or trench walls, a column sample was obtained. This entailed 1) preparing a clean surface on the wall of the trench or block; 2) preparing a clean surface at the top of the column; 3) cleaning the trowel with distilled water; 4) taking a 1 liter soil sample from a 2 cm thick cut; and 5) bagging the sample and labeling it. This process was repeated until stratigraphic zones had been sampled. Samples were only taken from sub-plow zone context.

Pollen and phytolith samples were also collected from representative feature types. The major difference with feature sampling was that phytolith samples were not taken as a column. These samples were taken from different zones within features and—to sample possible associated living surfaces—from the non-feature context directly adjacent to features.

Absolute Dating

All carbon samples were cleaned using water separation techniques and identified by the project paleoethnobotanist prior to being submitted for dating. All samples to be radiocarbon dated were processed by Beta Analytic, Inc., or the Keck Carbon Cycle AMS facility at the University of California, Irvine.

Daily Records Check

The site supervisors and each crew member kept detailed field records of the investigation to fully document the techniques, methods, observations, and results of fieldwork. The supervisors were responsible for checking the accuracy of all maps, profiles, level and feature forms, and for checking that notes were completed properly. They also checked every bag containing artifacts, soil, or other samples at the end of each day to insure that these were properly labeled and entered into the bag inventory. All materials were turned into the field laboratory at the end of each work day. Each bag was checked against the bag form as it entered the laboratory. Errors or inconsistencies were remedied the next day.

This daily check has been shown to prevent many potential problems caused by an accidentally mislabeled or lost bag. In addition, a laptop computer was used in the field to allow basic data from the excavations to be entered into a database (see Electronic Field Forms section). This enabled the site supervisor to conduct initial analyses of the recovered data, such as the plotting of artifact distribution maps. In doing so, the site supervisor was able to make more informed decisions concerning the ongoing excavations.

Laboratory Methods

All cultural material recovered from the project was transported to Cultural Resources Analysts, Inc., for processing and analysis. Processing and analysis of artifacts was conducted in both a field lab and CRAI headquarters. Initial processing of the recovered artifacts was conducted at the field laboratory in the project area. This initial processing involved washing all artifacts and sorting the artifacts into the major material classes (i.e., ceramics, faunal, historic, and lithic) for further analysis. All materials, with the exception of human remains, were returned to CRAI's main office in Lexington for further analysis. Human remains were only analyzed in the field lab.

All cultural materials, soil samples, and other samples were transported to CRAI for temporary storage and analysis. Upon completion of artifact analyses, catalog numbers were assigned for each diagnostic specimen or provenience lot. Catalog numbers consisted of the site number and a unique number for each diagnostic specimen recovered. Each modified implement (e.g., biface, uniface) received its own unique artifact number. Flake debris was cataloged by provenience lot, and all flakes received the same number. Specifics of each of the specialized analyses were presented in the previous section of this report.

In accordance with the Protocol for the Treatment of Human Remains provided by MoDOT, no human remains recovered from the AOS project left the state of Missouri. This protocol was developed through consultation with participating agencies and tribes. All human skeletal analysis was conducted in the field laboratory. Human remains were treated respectfully at all times. All human remains were stored together in a portion of the laboratory separate from the remaining laboratory. This was to insure that they would not be visible to the public or media, who occasionally visited the laboratory. All human remains were turned over to MoDOT archaeologists at the completion of the fieldwork.

Feature flotation and CVS samples were processed using the Flote-Tech machine-assisted flotation system manufactured by R. J. Dausman Technical Services (see Hunter and Gassner 1998 for an evaluation of the system). Flotation samples were processed at the Cultural Resource Analysts, Inc., field laboratory. Micro-recovery of cultural material and subsistence data was accomplished by processing flotation samples through a water-separation tank. These tanks are capable of generating a light, medium, and heavy fraction. All fractions were collected in fine-weave cloths. The light and medium fractions were combined, while the heavy fraction remained separate. Each light and heavy fraction was individually labeled and remained in the fine-weave cloth until dry. The Flote-

Tech flotation system continuously recycled the same water. In order to reduce the risk of cross contamination, the tanks were completely drained and cleaned prior to processing different sites and components of sites. Moreover, agitation of the sediment samples was completed by water flow and air bubbles. The operator can control water and air flow. The floated heavy fraction remains were size graded prior to the removal of artifacts. Artifacts that measured less than 2 mm were not removed for analysis. Artifacts that measured greater than 2 mm were sorted into the various artifact categories.

Following the initial processing of artifacts, subsequent analysis was undertaken. The methods and specifics of these analyses were discussed in Chapter 2. The results of these analyses are presented in various volumes of this report. All field notes, records, and site photographs will be curated with the Missouri Department of Transportation.

Core and unit CVS soil samples were stored at CRAI, Lexington, or the University of Iowa laboratory in preparation for specialized soil analyses (see Chapter 2).

Curation

Artifacts and attendant data generated from this investigation will be curated in accordance with federal guidelines. The materials will be curated at the Missouri Department of Natural Resources' curation center at Rock Bridge State Park. The materials will be delivered to the repository within 90 days of submitting the final report.

Chapter 7. Site Summaries

This section provides a brief summary of the sites investigated, the work conducted at each site, and the results of the investigations. The Avenue of the Saints highway improvement consisted of the upgrading of approximately 26.39 km (16.4 linear mi) of two-lane highway to a four-lane divided highway within Lewis (12.07 km [7.5 linear mi]) and Clark (12.87 km [8.0 linear mi]) Counties. Following the construction sequencing, archaeological work began with the utility corridor in Lewis County (November–December 2004), followed by investigations in the highway right-of-way in Lewis County (May–Sept 2005). Utility corridor investigations in Clark County (June–August 2005) were conducted concurrently with the final Lewis County investigations. The final investigations within the right-of-way in Clark County (August–December 2005 and March–August 2006) completed the archaeological investigations within the project area. In total, 54 sites were investigated within the two counties. Figures 7.1 and 7.2 show the location of the sites on the topographic quadrangle maps.

Prior phase I and phase II archaeological investigations in Lewis and Clark Counties associated with the AOS project documented numerous sites containing prehistoric components buried in Holocene alluvial and colluvial deposits (Markman et al. 1996, 1997; Snow 2000). In places, archaeological remains were documented to depths of over 2 m below the current ground surface. This prior work revealed the presence of many, apparently significant, buried archaeological deposits. However, at most sites the work did not fully determine the horizontal and vertical extent of the occupations, the number of components present, the character of the occupations, nor their integrity. Therefore, additional archaeological and geomorphological investigations were determined necessary to adequately evaluate the sites' NRHP eligibility.

The geoarchaeological work conducted by CRAI in the Lewis and Clark utility corridors consisted of an integrated program employing coring, trenching, and hand-excavated test pits targeting the previously identified sites and landforms with the potential to contain previously unidentified sites. Specifically, the goals of the work were to:

- determine the general stratigraphic and sedimentological framework of site areas along the corridor,
- determine if additional buried sites were located in the corridor, and then by extrapolation the planned highway right-of-way,
- provide information needed to determine site boundaries (horizontal and vertical),
- evaluate site integrity and function,
- relate the corridor's archaeological record to the regional paleoenvironmental framework,
- determine the number of site components, and
- determine the age and character of site components.

In general, this work provided a better understanding of the relationship between the natural and archaeological deposits in the Route 61 corridor. These data along with the previous phase I, phase II, and geoarcheological investigations allowed the development of data recovery measures for significant sites within the planned highway right-of-way.

Following the utility corridor investigations, a staged data recovery plan was implemented within the right-of-way (ROW) at each site determined NRHP eligible. The first stage of data recovery at the sites consisted of additional mechanical and hand excavations to determine the location and extent of the significant archaeological deposits and determine the appropriate method and level of data recovery. The second stage targeted only those sites, or portions of sites, that would be directly impacted by construction activities. In most cases, this work was conducted in areas where construction activities would remove sediments (cut areas) from the site area. In other cases, sites were to be buried by construction activities, as sediments were to be deposited on top of the existing sediments (fill areas). The exception to this was in cases where the archaeological deposits were contained directly below the base of the plow zone, as these deposits would be impacted by highway preparation activities. Plow zone stripping was conducted at the latter areas of sites, and any features that occurred at the base of the plow zone were recorded and excavated. In some cases, the only work conducted by CRAI at a site was the utility corridor investigation. The lack of additional work at these sites was due to either a site being determined not NRHP eligible, or the proposed road construction not impacting significant deposits at the site.

Summaries of the utility corridor investigations and the data recovery investigations were initially provided in summary reports that documented the investigations immediately after the fieldwork was completed (Bradbury 2005; Bradbury and Martin 2005; Martin 2005, 2006). The discussions below incorporate the information provided in the summary reports and subsequent analyses. This provides all of the relevant site data in one location. In cases where only limited investigations were conducted by CRAI at a site, the following represents the full documentation of that site. For sites that underwent additional excavations, more detailed information is provided in subsequent volumes. In all cases, it is noted whether additional information is available for a specific site or not and which volume additional information may be found in.

Lewis County Sites

Andrew P. Bradbury, Andrew V. Martin, Jennifer L. Barber, Paul D. Bundy, Brian G. DelCastello, and Richard L. Herndon

The Avenue of the Saints project covered approximately 7.5 linear mi within Lewis County, Missouri. Archaeological and geoarchaeological investigations in Lewis County were conducted within the utility corridor on 17 previously recorded sites and 1 newly recorded site in the fall of 2004 (Bradbury and Martin 2005). Landowner access was denied at 4 sites (23LE365, 23LE366, 23LE367, and 23LE41) during the utility corridor investigations. In addition, a high water table in the fall of 2004 prevented trenching at Sites 23LE178/357 and 23LE320. Two of the sites (23LE41 and 23LE365) where landowner access was denied during the utility corridor investigations were investigated during data recovery excavations. Data recovery work was conducted at 9 of the Lewis County sites (23LE178/357, 23LE342, 23LE174, 23LE327, 23LE346, 23LE348, 23LE365, 23LE369, and 23LE41) between May 13 and September 24, 2005. A summary of the sites and components represented are provided in Tables 7.1 and 7.2. A summary of the materials recovered from the AOS investigations is provided in Table 7.3.

Site summaries are provided below for each of the sites investigated within the Lewis County portion of the project area. Details of the excavations, analyses, and results are provided in the individual volumes that make up the AOS report series. In the case of a couple of sites (23LE366 and 23LE367), CRAI was not granted access during the initial utility corridor work, and the significant deposits at the sites were situated in fill areas. In these cases, the summaries provided below represent the results of previous investigations of the site. These sites are included so that all sites located in the Route 61 project area could be discussed in one place. The sites that were not investigated by CRAI are not presented in other volumes of this series.

Table 7.1. Summary of Investigated Sites within the Lewis and Clark County Portions of the AOS Project.

Site	Investigated During utility corridor Investigations	Conducted Phase III investigations	Information Provided in Volume	Components Investigated by CRAI
23LE041	Yes	Yes	Volume IV	Early Archaic
23LE044/319	Yes	No	Volume III	Unidentified Prehistoric
23LE045	Yes	No	Volume III	Historic, Unidentified Prehistoric
23LE168 and 23LE169 vicinity	Yes	No	Volume III	Unidentified Prehistoric
23LE170	Yes	No	Volume III	Unidentified Prehistoric
23LE174	Yes	Yes	Volume V	Middle Archaic, Late Woodland
23LE178/357	Yes	Yes	Volume VII	Late Woodland
23LE320	Yes	No	This Volume	Unidentified Prehistoric
23LE327	Yes	Yes	Volume III	Unidentified Prehistoric
23LE342	Yes	Yes	Volume III	Unidentified Prehistoric
23LE346	Yes	Yes	Volume III	Late Archaic, Late Woodland
23LE348	Yes	Yes	Volume VI	Late Archaic, Middle Woodland, Late Woodland, Historic
23LE365	No	Yes	Volume III	Unidentified Prehistoric
23LE366	No	No	This Volume	N/A
23LE367	No	No	This Volume	N/A
23LE369	Yes	No	Volume III	Unidentified Prehistoric
23LE371	Yes	No	Volume III	Unidentified Prehistoric
23LE372	No	No	Volume I	N/A
23LE373	Yes	No	Volume III	Unidentified Prehistoric
23LE378	Yes	No	Volume III	Unidentified Prehistoric
23CK57	Yes	Yes	Volume VIII	Late Woodland
23CK59	Yes	Yes	Volume IV	Early Archaic
23CK64	No	Yes	Volume III	Unidentified Prehistoric
23CK66	No	Yes	Volume III	Unidentified Prehistoric
23CK243	Yes	Yes	Volume III	Unidentified Prehistoric
23CK244	Yes	Yes	Volume III	Unidentified Prehistoric
23CK267	Yes	Yes	Volume III	Unidentified Prehistoric
23CK273	Yes	Yes	Volume III	Unidentified Prehistoric
23CK274	Yes	Yes	Volume III	Unidentified Prehistoric
23CK280	Yes	Yes	Volume III	Unidentified Prehistoric
23CK281	Yes	Yes	Volume III	Unidentified Prehistoric
23CK286	Yes	Yes	Volume III	Unidentified Prehistoric
23CK299	Yes	Yes	Volume III	Early Woodland
23CK302	Yes	Yes	Volume V	Late Archaic, Late Woodland
23CK308	Yes	Yes	Volume III	Unidentified Prehistoric
23CK310	Yes	Yes	Volume IX	Middle/Late Woodland, Historic
23CK312	No	Yes	Volume III	Unidentified Prehistoric

Table 7.2. Summary of Component Information for Sites Investigated During the AOS Project. Data is Based on CRAI and Earlier Investigations.

Site	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Woodland	Mississippian/Oneota	Historic
23LE041			Sub-plow zone						Scatter
23LE044/319									
23LE045	Surface		Surface	Surface	Surface	Surface			Feature
23LE168									
23LE169									
23LE170	Surface		Surface			Sub-plow zone			
23LE174		Buried	?			Sub-plow zone/features			Feature
23LE178/357			Surface			Features			
23LE320									
23LE327					Surface	Surface			Scatter
23LE342	Plow zone					Plow zone/Buried		Surface	Scatter
23LE346			Buried		Sub-plow zone	Sub-plow zone			Scatter
23LE348	Surface		Surface, sub-plow zone	Surface	Features	Features			Features
23LE365							Sub-plow zone		
23LE366				Sub-plow zone					
23LE367							Sub-plow zone		
23LE369	Plow zone		Sub-plow zone		Surface				
23LE371									
23LE373							Surface		
23LE378									
23CK057					Buried	Features			Scatter
23CK059	Buried								Scatter
23CK064									Scatter
23CK066									Scatter
23CK243							Sub-plow zone		Scatter
23CK244									Scatter
23CK267						Features			Scatter
23CK273							Sub-plow zone		Surface
23CK274							Buried		Feature
23CK280									Scatter
23CK281									
23CK286							Surface		Scatter
23CK299			Surface	Surface/Buried	Surface	Surface			Scatter
23CK302			Buried				sub plow zone		Scatter
23CK308						Sub-plow zone			Scatter
23CK310				Sub-plow zone					Features
23CK312						Plow zone			Scatter

Table 7.3. Summary of Materials Recovered by CRAI from Sites Investigated During the AOS Project.

Site	Flakes	Cores	Tools	Ceramics[1]	Historic	Faunal	Archao-Botanical	Human Skeletal
23LE041	4471	30	29		3	No	Yes	No
23LE044/319	5	0	1	0	0	No	No	No
23LE045	73	1	2	0	1	No	No	No
23LE168	0	0	0	0	0	No	No	No
23LE169	0	0	0	0	0	No	No	No
23LE170	18	1	1	0	0	No	No	No
23LE174	1874	37	42	241	2	Yes	Yes	No
23LE178/357	24,712	144	172	6,006	0	Yes	Yes	No
23LE320	0	0	0	0	0	No	No	No
23LE327	514	3	0	8	17	Yes	No	No
23LE342	56	1	1	1	1	No	No	No
23LE346	4517	5	12	2	1	No	No	No
23LE348	72,653	265	476	5,029	3178	Yes	Yes	Yes
23LE365	43	0	1	0	0	No	No	No
23LE366	0	0	0	0	0	No	No	No
23LE367	0	0	0	0	0	No	No	No
23LE369	545	2	0	0	0	No	No	No
23LE371	0	0	0	0	0	No	No	No
23LE373	229	0	1	0	0	No	No	No
23LE378	164	3	0	0	0	No	No	No
23CK054	3	0	0	0	0	No	No	No
23CK057	5096	79	105	2851	11	Yes	Yes	Yes
23CK059	2314	9	47	2	8	No	Yes	No
23CK060	3	0	0	0	0	No	No	No
23CK064	134	0	7	0	106	Yes	No	No
23CK066	113	3	1	0	1	No	Yes	No
23CK243	172	1	3	11	5	No	No	No
23CK244	55	0	1	0	1	No	No	No
23CK245	7	0	0	0	0	No	No	No
23CK246	36	0	0	0	0	No	No	No
23CK267	83	1	0	2	2	No	No	No
23CK273	87	0	2	1	17	No	No	No
23CK274	192	0	2	2	34	Yes	No	No
23CK280	2	0	0	0	2	No	No	No
23CK281	1	0	0	0	0	No	No	No
23CK286	27	0	0	0	5	No	No	No
23CK299	332	1	7	14	2	Yes	No	No
23CK302	1750	7	21	21	5	Yes	Yes	No
23CK308	84	0	1	9	2	No	No	No
23CK310	2194	15	36	30	3766	Yes	Yes	Yes
23CK312	7	0	0	1	12	No	No	No

**These counts include all body sherds larger than 2 cm, all rims, all bases, and all necks. Counts may vary in later volumes based on the refit analysis which had not been completed by the time Volume 1 was completed.*

Site 23LE320

This site is located in the southern part of the Lewis County project area along Route B and south of an unnamed tributary of Artesian Branch between ROW station numbers 295 and 305 (Figure 7.3). Elevations within the site boundary range from about 149.3 to 152.4 m (490 to 500 ft) AMSL. Previous cores and trenches were placed at the location of 23LE320, which is located on a proximal portion of an alluvial fan (Hajic et al. 1996). An alluvial fan sequence extended to at least 2.9 m below surface, with sand and gravel identified below this depth. A low density of archaeological material was recovered from the phase II investigations at the site (Markman et al. 1997). Most material was found in the plow zone and just below the plow zone. No diagnostic material or features were found, and the archaeological testing was limited to the area surrounding the initial geoarchaeological investigation. Because of the low density of material recovered from the site, primarily from the plow zone, the site was determined to be not eligible for the NRHP, and no further work was recommended here.

Based on the previous coring, it was thought that deeper deposits could contain intact archaeological deposits. Therefore, one hydraulic core was placed within the site boundary during the utility corridor investigations. It was located on the proximal portion of the fan, north of where the previous work was conducted. The results of this core were similar to the previous geoarchaeological work, with at least two paleosols identified at approximately 45 and 100 cmbs. Sands were encountered below 300 cm. Additional testing of the site would have been preferred, but it was largely inaccessible because of high water during the fall of 2004. The site is located within a fill area; therefore, no additional work beyond the utility corridor investigations was conducted at the site. With the exception of the hydraulic core that will be discussed in Volume II, this site is not documented in further volumes.

Site 23LE178/357 (Artesian Branch Site)

The Artesian Branch site is located approximately 4 km (2.5 mi) north of the town of Canton, Missouri, between ROW station numbers 280 and 290. The site is situated at the base of a roughly north–south trending bluff line located about 0.8 km (.5 mi) west of the Mississippi River (T62N, R6W, Section 14). This site is mainly located on the east side of Route 61 between Artesian Branch to the south and an unnamed tributary of that same stream to the north (Figure 7.4). A small sliver of the site, however, does extend west of Route 61 at the south end of the site near Artesian Branch. Elevations within the site boundary range from about 150 to 154.5 m (492 to 507 ft) AMSL. Located just to the northwest is Site 23LE342 and a little further to the south is Site 23LE320, each of which was investigated by CRAI during data recovery.

The Artesian Branch site was first recorded by John Tandarich in 1979 based on informant data from Wayne Nichols. At this time, the site was assigned number 23LE178. According to the site form, it was never field verified as to location or boundaries. A re-recording of the site occurred in 1995 by Crothers and Cain for an area that was located within the existing boundaries of 23LE178. This “new” site was assigned number 23LE357. It is currently unknown why two separate site numbers were given to the same site. For convenience of discussion and to avoid potential confusion, Markman et al. (1997), and consequently all CRAI documentation, refer to this site as 23LE178/357, since both site numbers represent the same site.

Based on all investigations to date, the Artesian Branch site is roughly 160 m east–west and 310 m north–south, encompassing about 4 ha (9.8 acres). The southern part of the site is bisected by Route 61. The original construction of Route 61 likely destroyed a portion of the site.

Phase I and II investigations indicated that one alluvial fan sequence is represented with depths possibly exceeding 2.3 m bgs, but no cultural horizons were identified. Archaeological material recovered from the phase II investigations by Markman et al. (1997) were found in the plow zone and just below the plow zone. Diagnostic material and features included a Late Archaic diagnostic hafted biface (Nebo Hill Cluster) found on the surface, a shell-filled midden found just below the plow zone (17 cm bgs), and two Late Woodland pit features located below the plow zone (21 and 32 cm bgs). Archaeological testing was limited to the area surrounding the initial geoarchaeological investigation. Based on these results, the site was considered eligible for the National Register of Historic Places. Due to a high water table during the utility corridor investigations, only one core was placed at the site by CRAI during fall of 2004.

Although much of the site was located in a fill area for the proposed road construction (meaning cultural remains would not have been impacted), ROW preparation and ditch excavation was going to adversely impact intact near surface deposits. For this reason, phase III investigations were conducted at the site and focused on these near surface deposits. These excavations were carried out in three stages during the summer of 2005. Stage I investigations consisted of plow zone removal in a series of trackhoe strips on both the east and west sides of Route 61 within the ROW. On the west side of the road, two 2-m wide strips were excavated. Fourteen soil anomalies were identified within these strips. All were concentrated in the southern portion of the site adjacent to a tree line overlooking Artesian Branch. Five strips, at 20-m intervals, were excavated on the east side of Route 61. Seventy soil anomalies were identified within four of these strips. The eastern most strip contained no features.

Stage II investigations consisted of plow zone removal in two block areas at the locations of features identified during the Stage I investigations. An additional 20 soil anomalies were identified within the block on the west side of Route 61 (Figure 7.5). Approximately 437 additional soil anomalies were identified within the block area on the east side of Route 61 (Figure 7.6). Stage III investigations at the site involved the excavation of two backhoe trenches to determine the potential for more deeply buried deposits. Soils in the two trenches indicate that these sediments represented a Pleistocene terrace. These soils were deemed too old to contain cultural material.

Taken together, approximately 574 soil anomalies were identified and investigated during data recovery, with 26 being on the west side of the road and the remaining 548 located on the east side. The majority of the anomalies (N = 419) were cultural in origin. These included large storage pits, earth ovens, shallow basins, rock-lined hearths, and processing pits.

Figure 7.5. Overview of feature excavation on the west side of Route 61 at Site 23LE178/357; view is looking southwest.

Figure 7.6. Overview of feature excavation on the east side of Route 61 at Site 23LE178/357; view is looking south toward Artesian Branch.

Ceramics were common in the features and indicate a Late Woodland occupation. Based on surface treatment, temper type, decoration, and radiocarbon dates, it appears that these Late Woodland features can be assigned to different occupations. For example, net-impressed, sand tempered pottery, with Havana-like decorations in some cases (South Branch), generally did not co-occur with grit-tempered, cord-marked pottery exhibiting few decorations. Lowe Cluster hafted bifaces were associated with the net-impressed ceramics, while Scallorn Cluster hafted bifaces were associated with the cord-marked pottery.

The majority of the features that could be reasonably assigned to a particular component fall within the South Branch occupation. Of note is that few of these features were superimposed. When present, most of the superimposed pits were on the north end of the site (east side of Route 61) and appear to represent paired pits. In addition, there appears to be some coherent spatial arrangements to the features. That is, similar sized/shaped pits, which were perhaps functionally equivalent, appear in the same areas of the site and are spaced at equal distances from each other. No post holes were identified at the site, despite several attempts to locate such pits.

Materials recovered from the investigations at the Artesian Branch site consisted of lithic artifacts, ceramics, and faunal and botanical remains. More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume VII of this series.

Site 23LE342

This site is located near an intermittent drainage on an alluvial/colluvial fan in the southern part of the Lewis County project area between ROW station numbers 275 and 280 (Figure 7.7). The site is located just to the north of 23LE178/357 and occupies part of the same landform. During the phase II work, Woodland ceramics were identified within the plow zone and to a maximum depth of about 100 cmbgs. A possible feature (rock cluster) was identified at the base of the plow zone (Snow 2000). A variety of Early Archaic through Late Woodland diagnostic hafted bifaces were found in the plow zone. The majority of the excavation units were placed on the west side of Route 61. Excavation units and augers were excavated to a maximum depth of 135 cmbgs. The site was considered eligible for the National Register of Historic Places (Snow 2000).

During the utility corridor investigation by CRAI (Figure 7.8), three shallow trenches, three excavation units, and three cores were placed within the boundary of Site 23LE342 to sample different portions of the landform at the site (Bradbury and Martin 2005). Hand excavated units were placed only on the east side of Route 61, as the west side of the site was investigated during the previous phase II at the site. The utility corridor investigations here indicated shallow deposits on the east side of Route 61 close to the road. The shallow deposits may explain the variety of hafted bifaces found in the plow zone during the original survey. Further to the east, on the edge of the bedrock bench, deposits were deeper. Two buried paleosols with buried A horizons were identified in this area. The density of cultural material was light within these deposits. A trench excavated on the west side of Route 61 indicated a truncated A horizon just below the plow zone with charcoal present throughout it. This suggests that a cultural zone is present here and is consistent with the survey results. Deeper sediments were not sampled, and the likelihood for intact archaeological deposits to at least 100 cm bgs was not assessed.

The east portion of the site, where the deeper deposits were identified, was situated within a fill area. As this area would not be impacted by construction, no additional work was recommended. Since right-of-way preparation and ditch construction on the west side of the road would impact near surface deposits, it was recommended that data recovery initially focus on the Woodland component identified at the base of the plow zone (Bradbury and Martin 2005).

Phase III investigations at 23LE342 were conducted in the summer of 2005 (Figure 7.9). These investigations were conducted in three stages. Stage I entailed the removal of the plow zone in a series of backhoe strips across the site on the west side of Route 61 to located sub-plow zone features. In some portions of the site, the upper 80 cm was fill/plow zone, as indicated by plow scars at 80 cm below surface. Several anomalies thought to be cultural features were identified and investigated at this depth.

Figure 7.8. Overview of Site 23LE342 during utility corridor investigations, looking southwest.

Figure 7.9. Overview of 23LE342 during Stage I investigations, looking south. Site 23LE178/357 is located at the tree line in the background.

Stage II investigations consisted of excavating a 4-x-4-m block with the trackhoe around the anomalies noted in Stage I to identify other associated features. No such features were identified. In addition, the original anomalies were determined to be non-cultural (tree roots) during excavation.

Stage III investigations consisted of the excavation of two deep trenches and hand excavation of units on the side of these trenches. Three possible features were identified approximately 1 m below surface. All three were small, circular, basin shaped pits that contained charcoal and minor amounts of calcined bone. Few other artifacts were recovered with these features. During excavation, it was determined that the anomalies represented non-cultural bioturbation. A unit was excavated off the trench in the area of the features at the same depth. A light density of flakes (2–4 per level) was recovered from this unit. No diagnostic artifacts were recovered from the buried deposits on the west side of the road that would indicate a temporal affiliation.

Based on the low density of materials from units and the lack of cultural features, no additional work was recommended for the site. MoDOT concurred with this recommendation, and Stage IV investigations were not conducted at the site, as had been originally planned.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Site 23LE44/319

This site is located approximately 150 meters to the north of Site 23LE342 in the Lewis County portion of the project area between ROW station numbers 255 and 270. The site is situated on a broad alluvial fan/colluvial slope to the south of a broad swale (Figures 7.10 and 7.11). It is bounded by a tributary of Artesian Branch. Sites 23LE44 and 23LE319 were originally defined as separate sites. Further testing at the site suggested, however, that there was no drop in artifact density between the two sites; therefore, they were combined as one site for further investigations. The only work conducted by CRAI at the site was done during the utility corridor investigations.

Figure 7.11. Overview of north half of Site 23LE44/319, looking north.

Previous cores and trenches were placed in the central (Site 23LE319) and southern (Site 23LE44) portions of the site area (Hajic et al. 1996). At least two cultural horizons may be represented within the upper 2.5 m of sediments, as indicated by charcoal fragments recovered from hydraulic core samples. Archaeological material recovered from the phase II investigations (Markman et al. 1997) was found in at least four cultural horizons occurring at various depths: plow zone (0 to 25 cmbs), 25 to 50 cmbs, 110 to 130 cmbs, and 190 to 210 cmbs. No diagnostic material was recovered from any of these horizons. This archaeological testing was limited to areas surrounding the geoarchaeological investigations in the southern and central parts of the site. The deeply buried materials were recovered in the central part of the site. Archaeological deposits were not identified below 49 cmbgs in the southern part of the site. The site was considered eligible for the National Register of Historic Places.

The utility corridor work at the site by CRAI consisted of four shallow trenches, two excavation units, and four cores (Bradbury and Martin 2005). The trenches and cores were used to sample different portions of the landforms represented at the site. Two of the trenches filled with water immediately after excavation and were backfilled without conducting further work. Hand excavated units were placed at two trenches.

One unit was placed at the side of Trench 44/319-A. Four levels were excavated from surface to 59 cmbs. Material density was light and consisted of five flakes: three (two smaller than .25 in) from Level 2 and two (one smaller than .25 in) from Level 3. One biface was also recovered from the surface in the area of Trench 44/319-A. Level 4 (59–69 cmbgs) was sterile. The water table was encountered at about 59 cmbgs and precluded further excavation.

Trench 44/319-C was placed in the northern part of the site and a buried A horizon was observed below surface at approximately 125 cmbgs. An excavation unit was attempted to sample the buried A horizon here but was terminated after the first level due to difficulty in screening frozen sediment. Previous investigators identified a buried cultural zone (five flakes) between 190 and 210 cmbgs in a nearby unit.

Another trench (Trench 44/319-D) was placed in the central part of this site but was shallow to bedrock, and no units were attempted there.

Site 23LE44/319 was situated within a fill area for highway construction; therefore, data recovery excavations were not conducted at the

site. The utility corridor investigations represented the only work conducted by CRAI at the site. More detailed discussions concerning this site are provide in Volume III of this series.

Site 23LE174 (Berhorst Site)

This site is located approximately 450 m north of Site 23LE44/319, on an alluvial/collovial fan south of a small tributary stream of Buck Run between ROW station numbers 230 and 240 (Figure 7.12). Previous cores and trenches were placed in the central portions of the site (Hajic et al. 1996). An intact A horizon was identified below the plow zone and yielded ceramics and prehistoric lithics. A buried A horizon was also identified at about 72 cmbgs in a core, but the archaeological testing was limited to areas surrounding the geoarchaeological investigations, and only one excavation unit sampled sediments below 70 cm (Markman et al. 1997). Late Woodland ceramics were recovered from the plow zone and the truncated A horizon from 21 to 38 cmbs. A light density of flakes was recovered to 65 cmbgs in one unit. Because of the limited number of materials found in good context, the site was not considered eligible for the National Register of Historic Places, and no additional work was originally recommended for this site (Markman et al. 1997:117).

Site 23LE174 (Figure 7.13) was investigated by CRAI during the utility corridor investigations because it was situated on a landform similar to others in the project area that contained significant archaeological deposits (Bradbury and Martin 2005). Two shallow trenches (OS-R and OS-Q), three excavation units, and one core were placed at the site to sample different portions of the landform during the utility corridor investigations. Two buried A horizons were observed in Trench OS-R. Cultural material (flakes) and charcoal was observed in both of the A horizons. In addition, an upper A had been truncated by the plow zone. Several Woodland ceramics were observed in the trench wall within the truncated A horizon. Material density picked up below 90 cm (buried A horizon) in the unit placed here. Increased charcoal associated with this horizon was observed, further suggesting the presence of archaeological deposits. Trench OS-Q, excavated on the edge of the rise, exhibited sediments, indicating that they were related to the intermittent stream near the site. Several truncated paleosols were identified in the profile, but very few flakes were found associated with them.

Based on the results of the utility corridor excavations, additional work was recommended (Bradbury and Martin 2005). Phase III excavations at the site concentrated on recovering data from the buried component, since the near surface remains were previously determined not eligible.

Stage I investigations at the site consisted of the excavation of six 1-x-1-m units across the eastern portion of the ROW within the cut area. A buried A horizon was noted at the northern portion of the site approximately 90 cm below surface. Material density was moderate within this deposit. This deposit was thought to be Archaic in age, based on the lack of ceramic artifacts. In addition to this buried A, three Late Woodland features were identified towards the base of a truncated A horizon. This latter deposit was situated within undisturbed, buried deposits. One historic feature was also identified within these trenches towards the top of the truncated A horizon.

Based on the results of the Stage I investigations, two blocks (Stage II) were set up at the site. The first (Block A) was excavated to sample the Late Woodland materials on top of the fan (Figure 7.14). This block was set up adjacent to the Trench A that was excavated during Stage I. A Late Woodland feature was identified and excavated in this trench. A trackhoe was used to remove the plow zone from the block area (6-x-6 m) prior to hand excavation of units. No additional features were identified within this block. However, flakes, ceramics, FCR, burnt clay, and charcoal were recovered from all of the units. The recovered ceramics indicated a Late Woodland affiliation. Two possible Middle Woodland sherds were also recovered: netler stamped and dentate stamped sherds. The remainder of the sherds exhibited net-impressed surface treatments, indicating an early Late Woodland affiliation.

Figure 7.13. Overview of the Berhorst site. View is looking north. Block A was excavated on the high part of this rise.

Figure 7.14. Berhorst Site, Block A (Late Woodland) during excavation. View is looking south.

The second block (Block B) was set up to sample possible Archaic occupations on the northern side of the fan deposit (Figure 7.15). The upper 45 cm of sediments were removed with a trackhoe prior to hand excavation of units. The trackhoe removed the sediments in thin cuts to search for features as the block was being excavated. No features were identified. Hand excavation of the block continued until the water table was encountered (approximately 150 cm below surface). Flake debris, cores, FCR, charcoal flecking, several biface fragments, and hafted bifaces were recovered from the block. A Middle Archaic side-notched hafted biface was recovered from the deeper deposits within the block, indicating a Middle Archaic affiliation.

Stage III investigations consisted of plow zone stripping in the area of Block A in an effort to locate additional features associated with the Late Woodland occupation. No additional features were identified. Scattered artifacts were observed (ceramics, flakes, FCR) within the trenches similar to that seen in the Block A excavation.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume V of this series.

Site 23LE170

This site is located on a prominent ridge approximately 175 m to the north of Site 23LE174 between ROW station numbers 210 and 225 (Figures 7.16 and 7.17). Site 23LE170 is situated at the bluff base on a colluvial slope along the north border of an intermittent stream. The only work conducted by CRAI at this site was done during the utility corridor investigations.

Previous coring and trenches were placed in the central and northern portions of the site (Hajic et al. 1996). The maximum extent of Holocene sediments was determined to be about 2.4 m in the center portion of the site near an intermittent stream. In the north part of the site, a truncated paleosol was identified to a depth of 2 m, and charcoal was found throughout the paleosol. Archaeological material recovered from the phase II investigations (Markman et al. 1997) included Early Archaic and Late Archaic diagnostic hafted bifaces found on the ground surface. A Late Woodland cultural zone was identified just below the plow zone (22–41 cmbgs) in the northern portion of the site, where the majority of the testing was conducted. The site was considered eligible for the National Register of Historic Places (Markman et. al. 1997).

Figure 7.15. Berhorst Site, Block B (Archaic) during excavation. View is looking south. Block A is in the background at the top of the rise.

Figure 7.17. Overview of Site 23LE170, looking south.

The utility corridor investigations at the site consisted of two shallow trenches and three test units (Bradbury and Martin 2005). Also, one additional trench (Trench OS-P) and associated test unit was placed in an off-site area to the north of Site 23LE170.

Material density was light at the site. In addition, materials were restricted to the plow zone and first two levels below the plow zone. Our geoarchaeological investigations indicated that the material below the plow zone was the result of bioturbation. The site has little research potential and is not considered eligible for the National Register. No further work was being recommended at 23LE170. No additional work beyond the utility corridor investigations was conducted at the site. More detailed information concerning this site is provided in Volume III of this series.

Sites 23LE168 and 23LE169 Vicinity

These sites were previously recorded to the north of 23LE170 and represented small lithic scatters (one and four flakes respectively) between ROW station numbers 190 and 195. They were recorded during the phase I survey (Markman et al. 1996) and, due to low densities of archaeological material from the plow zone, were not considered eligible for the National Register of Historic Places. However, considering the landforms (alluvial fans) that are present near these site locations, additional coring and trenching was considered to test deeper deposits here (Bradbury and Martin 2005). During the utility corridor investigations, three trenches, one excavation unit, and five cores were placed near these previously recorded site locations (Figures 7.18 and 7.19). No cultural materials were recovered from these investigations. The utility corridor investigations represent the only work that CRAI conducted at these sites.

Given the lack of cultural material recovered in these locations, no additional archaeological work was recommended for these sites. No additional work beyond the utility corridor investigations was conducted at the sites. More detailed discussions of this site can be found in Volume III of this series.

Site 23LE327

This site is located on two fans divided by an unnamed tributary stream between ROW station numbers 145 and 170 (Figures 7.19 and 7.20). Previous coring and trenches were placed in the central and southern portions of the site (Hajic et al. 1996). In the central part of the site, charcoal fragments were found between 35 and 65 cmbgs and a buried A horizon was identified at approximately 125 cmbs. In the southern part of the site, burnt earth was discovered between 220 and 243 cmbs, but no buried A horizons were noted. Archaeological material recovered from the phase II investigations (Markman et al. 1997) included Middle Woodland (Stueben Expanding Stemmed) and Late Woodland (Madison) diagnostic hafted bifaces and Middle Woodland ceramics found on the ground surface. Few artifacts were found below the ground surface (n = 6). Only two units were excavated at the site. These were only excavated to a maximum depth of 90 cmbs. The site was not considered eligible for the National Register of Historic Places and was not recommended for additional work (Markman et al. 1997).

The topography of this area was similar to that of other sites with identified buried deposits; therefore, this area was investigated as an off-site area during the utility corridor investigations conducted by CRAI (Bradbury and Martin 2005). Five trenches, five excavation units, and three cores were placed within this site location during the utility corridor work. The unit placed off of Trench OS-E yielded the highest density of artifacts, with buried archaeological deposits identified in a sub-plow zone, truncated A horizon to approximately 70 cmbgs. At Trench OS-H archaeological material was found in the plow zone and two paleosols to approximately 155 cmbgs. The sub-plow zone component at Trench OS-E appears to be separate from the deeper component observed in Trench OS-H. The remaining units were either sterile or had light density of material from them. Archaeological deposits were identified to at least 130 cmbgs in one trench (OS-G).

Further work was recommended for a small fan landform in the central part of the site, near Trenches OS-E and OS-H (Bradbury and Martin 2005). This portion of the site was within a cut area. The remaining site area does not appear to be threatened by project impacts.

Phase III excavations at 23LE327 were conducted in two stages. Stage I consisted of the excavation of eight 1-x-1-m units on the top of the landform to obtain a better sample of the materials and to determine the extent of the intact deposits present at this location. These units were spaced at 20-m intervals across the site within the cut area. Based on the results of these initial units, it was decided to concentrate excavations on the northern portion of the site, particularly on top of the rise, where material density was highest (15–30 flakes per unit). In the area of Unit 5, two peaks in artifact counts were noted: one in Level 3, the other in Level 5.

Stage II investigations consisted of the excavation of units in a block area (6-x-6 m). Several initial units were excavated at the corners and center of the block to obtain a more clear picture of the deposits in this area. These excavations revealed a light density of flake debris below the base of the plow zone. The same artifact peaks observed in Unit 5 were noted in the block units. No diagnostic artifacts were recovered from the initial six units. Due to the lack of temporal diagnostics, the low density of materials, and the lack of cultural features, it was recommended that work at the site cease. MoDOT concurred with this recommendation, and work was halted at the site.

Materials recovered from the phase III investigations consisted of prehistoric ceramics (n = 8), faunal specimens (n = 7), historic artifacts (n = 17), and lithic artifacts (n = 517). More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Site 23LE45

This site is located approximately 100 m to the north of Site 23LE327 across a series of alluvial fans and colluvial slopes between ROW station numbers 105 and 140 (Figures 7.21 and 7.22). The site is situated along the bluff base above the Mississippi River Valley. An intermittent stream bisects the site from east to west in the southern portion of the site. The only work conducted by CRAI at the site was completed during the utility corridor investigations.

Previous cores and trenches were placed in the central and northern portions of the site (Hajic et al. 1996). The maximum extent of Holocene sediments was determined to be approximately 2.4 m in the center portion of the site near an intermittent stream. In the north part of the site, a truncated paleosol was identified to a depth of 2 m and charcoal was found throughout it. Archaeological material recovered from the phase II investigations (Markman et al. 1997) indicated cultural components within the plow zone and just below the plow zone (40–50 cmbgs). Ceramics and a corner-notched hafted biface indicated a Woodland component. Test excavations were limited to the northern and central portions of the site.

The utility corridor investigations at the site consisted of five shallow trenches, four deep trenches, eight test units, and three cores (Bradbury and Martin 2005). Material density was very light across the site. Of interest at the site was a circular feature (Feature 1), approximately 2.1 m (6.9 ft) in diameter identified while stripping the plow zone from Trench 45-I. The feature was identified from the presence of dark staining following mechanical removal of the plow zone. Excavation of the feature was started in the southwest quarter but was terminated after excavating to a depth of 90 cm, at which point a shingling axe was recovered, and the feature was determined to be historic. Analysis of the pit and associated materials indicates that it represents a deep unlined pit. Additional archival research was undertaken in an attempt to determine if the deep unlined pit was associated with a residence or other structure within close proximity to the feature. No such structures were located, though a school (alternately referred to as School #6 and Hardin School [Anonymous 1878; Anonymous 1916]) was noted 450 m from the feature area. The school is most likely not associated with the feature due to its distance from the feature.

Figure 7.20. Site 23LE327 overview shot during Stage II investigations. View is looking north.

Figure 7.22. Overview of Site 23LE45, looking north. The historic feature was located to the east of the large tree in the middle of the photo.

Materials at this site were sparse and widely scattered. In addition, materials were mostly restricted to the plow zone and first two levels below the plow zone. Our geoarchaeological investigations indicated that the material below the plow zone was the result of bioturbation. The site has little research potential and was not considered eligible for the National Register of Historic Places. No further work was recommended at Site 23LE45. No additional work beyond the utility corridor investigations was conducted at the site. Additional information concerning this site is provided in Volume III.

Site 23LE378

This is a site identified during the utility corridor investigations (Bradbury and Martin 2005). It is located approximately 100 m north of Site 23LE45 on two alluvial fans divided by an unnamed tributary stream between ROW station numbers 100 and 105 (Figures 7.23 and 7.24). Although a phase I survey was completed for this area (Markman et al. 1996), no deep testing was previously completed here. Since the topography of this area was similar to that of other sites with buried deposits, it was investigated as an off-site area during the utility corridor investigations. The only work conducted by CRAI at this site was done during the utility corridor investigations.

Three trenches were placed to sample a broad alluvial fan/ colluvial slope area that had no previous archaeological or geoarchaeological testing. The utility corridor investigations consisted of two shallow trenches, one deep trench, and three excavation units. Flake debris and cores were recovered from the site; however, no diagnostic materials were recovered.

Based on the depth of deposits and stratigraphy, the three paleosols with artifacts represented in these trenches all appear to be related to a single archaeological component.

This area is situated within a fill area. Given that the potentially significant components are located well below the surface, the site will not be impacted by construction activities. No additional investigations were recommended. This site is discussed further in Volume III

Figure 7.24. Overview of Site 23LE378, looking south.

Site 23LE346

This site is located on a prominent alluvial/colluvial fan approximately 200 m to the north of Site 23LE378 between ROW station numbers 85 and 90 (Figures 7.25 and 7.26). Previous coring and trenches at the site indicated that at least two buried cultural horizons are present in the upper 2 m of sediments (Hajic et al. 1996). In the southern part of the site, a buried A horizon is intact. This horizon was absent in the northern portion of the site. Cultural material recovered from the phase II investigations (Markman et al. 1997) indicated three cultural components of the site occurring at various depths: plow zone, 60–70 cm, and 138–148 cm. A Late Archaic hafted biface (Matanzas Cluster) was found in the component between 60 and 70 cmbgs. Flakes and FCR were found to a depth of 180 cm from a single screened excavation unit at the site. This site was determined to be eligible for the National Register of Historic Places.

The utility corridor investigations at the site consisted of four shallow trenches, one deep trench, four test units, and three cores. These excavations further investigated the buried A horizons noted in previous excavations. Cultural material was recovered from the surface to approximately 190 cmbs. However, these deposits were not continuous across the entire site. The majority of the recovered materials were from the upper 30 cm of this deposit. Material density appeared to be greatest on the top of the fan, tapering off on the sideslopes. Materials below 60 cmbgs are likely Archaic in age. Ceramics were recovered from the plow zone and first level below the plow zone, suggesting a Woodland affiliation for the upper portions of the deposit. Portions of the site were within a cut area, and phase III excavations were recommended (Bradbury and Martin 2005).

Figure 7.26. Overview of Site 23LE346 during utility corridor Investigations, looking north.

Phase III investigations at this site (Figure 7.27) were conducted in two stages. Stage I investigations consisted of the excavation of five 1-x-2-m units and two 1-x-1-m units across the cut area. During the excavation of the 1-x-2-m units, extensive colluvial gravels (up to 130 kg of rock per 10 cm level in a 1-x-1-m unit) were encountered to approximately 1 m below surface. Cultural materials contained within these gravels were determined to be in poor context. To further investigate the deposits at the site, a backhoe was used to strip off the colluvial gravels in order to determine the nature of these gravels, the extent of the gravels, provide a larger exposure of the deposits, and allow for sampling deposits below these gravels (Figure 7.28). The removal of the colluvial gravels indicated the presence of a buried A horizon approximately 130 cm below surface. Two units were excavated into this buried A. Material density was moderate within this A horizon (60–80 flakes per level in a 1-x-1-m unit). The A horizon was approximately 25–30 cm thick. Colluvial gravels were encountered at the base of the A horizon. A deeper A horizon was encountered and sampled around 280 cm below surface.

Material density in the lowest horizon was light (2–3 flakes per level in a 1-x-1-m unit). Based on the recovery of a Matanzas hafted biface between 60 and 70 cm below surface during phase II excavations at the site and the recovery of Woodland ceramics and a Snyders hafted biface in the upper levels during the current investigations, these A horizons were thought to be Archaic in age.

Originally, Stage II investigations at the site called for the hand excavation of an 8-x-8-m block from ground surface to 150 cm below surface. However, due to the presence of extensive colluvial gravels, the lack of good context for materials contained within these gravels, the presence of two utility lines in the cut area of the site, and the presence of class C soils in the area of the block, the original plan was modified through consultation with MoDOT. The block was modified so that it would safely fit between the two utility lines and meet OSHA specifications (i.e., sides were sloped rather than stepped). During the stripping of the block area, the A horizon was encountered at approximately the same depth as during Stage I. However, in portions of the block, colluvial gravels truncate the A horizon. Due to the presence of these gravels and the lack of context for materials within these gravels, units were hand excavated into the block in areas where the A horizon was preserved in order to sample this deposit.

Figure 7.27. Overview of 23LE346 during Stage II investigations. View is to the southwest.

Figure 7.28. Profile of trackhoe block and unit showing extensive colluvial gravels at 23LE346. The unit was excavated into a buried A horizon.

Nine units were excavated in the block area. Material density was relatively high in the units. This material consisted of flake debris (50–230/unit/level), several cores, and bifaces. No diagnostic artifacts were recovered. Investigations at the site were terminated after completion of the nine units, and no additional work was recommended for the site within the cut area. Significant archaeological deposits are likely contained at this site to the east of the cut area and are within a fill area. More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Site 23LE348 (Carskadon Site)

The Carskadon site (T63N, R6W, Section 26) is situated at the base of a roughly north–south trending bluff line located approximately 2.25 km (1.4 mi) west of the Mississippi River between ROW station numbers 60 and 80. The site is situated on a series of alluvial fans and colluvial slopes immediately adjacent to an unnamed tributary of Buck Run (Figure 7.29). This tributary marks the southern boundary of the site. The northern boundary of the site ends just south of County Road 494 that runs east from Route 61 and ends on the levee of the Mississippi River. The eastern boundary of the site extends outside the project ROW and, as such, could not be investigated and defined. The western edge of the site rests along the bluff line. Based on the boundaries noted above, the Carskadon site measures approximately 705 m north–south and 333 m east–west, encompassing 19 ha (47 acres). In sum, the majority of the site is located east of Route 61, although a small portion of the site is found on the west side of Route 61 near County Road 490.

As noted by Markman et al. (1997:3-176), it is highly likely that the site has been disturbed to some extent by previous road construction along its western edge by Route 61 and possibly at the south end of the site on the west side of Route 61 by County Road 490. A gravel road, which was located in the middle portion of the site, began at Route 61 and ended at a grain silo on the eastern margin of the site. It is also possible that this unimproved road may have partially disturbed this portion of the site as well.

Previous coring and trenching indicated that at least two buried cultural horizons were present in the upper 2 m of sediments at the site (Hajic et al. 1996). Also, it was noted that bedrock is shallower in the upslope (westerly) direction, and the surface A horizon becomes thicker in the downslope (easterly) direction. On the eastern part of the site, the fan deposits appear to overlie early to middle Holocene deposits, represented by stratified loam.

Archaeological material recovered from the phase II investigations (Markman et al. 1997) indicated two cultural components, one in the plow zone and the other just below the plow zone to a depth of about 70 cmbs. Late Archaic and Early Woodland diagnostic material was found on the ground surface and in the plow zone. A significantly larger Middle Woodland component was represented in the plow zone and was suggested to be intact to 70 cmbs. Several features were associated with the Middle Woodland component. Burials were also reported to have been found at the site during nearby historic cellar excavations (Michael Meinkoth, personal communication 2004). The site was considered eligible for the National Register of Historic Places (Markman et al. 1997).

CRAI fieldwork at the Carskadon site began with investigations for the proposed utility corridor along the eastern edge of the ROW. These investigations consisted of the excavation of four long but shallow trenches, four 1-x-1-m test units, and four cores. Since previous work at the site identified both features and midden, CRAI investigations first began with the excavation of the test units and trenching in order to confirm or expand on phase II results. Also, given the near lack of phase II investigations at the north end of the site (see Markman et al. 1997), the utility corridor investigations provided an opportunity to better delineate the nature and extent of archaeological deposits in this area.

The utility corridor investigations confirmed the presence of 11 Middle Woodland features in the southern portion of the site. The features were situated below the plow zone within a truncated A horizon at approximately 25 cmbgs. The features contained abundant ceramics and lithic and faunal remains. Cultural material was also present within the underlying B horizon in this area of the site. In the northern portion of the site no features were identified, but intact archaeological deposits, without ceramics, were found to a depth of 125 cmbs.

Phase III investigations at the site focused on its southern and northern portions. While these areas were originally considered as part of the same site, results of the utility corridor investigations suggested that they represented two different entities. For ease of discussion, the site is split into southern (23LE348-south) and northern (23LE348-north) portions for all remaining discussions. These two areas are discussed separately below.

Although, a very light density of cultural material was recovered from the area between the northern and southern portions of the site, it was by no means insignificant. Two very low earthen mounds were located in this area of the site (Figure 7.30). The mounds were documented during the project and will be preserved in place.

Site 23LE348 – South

Phase III investigations within the ROW on the south end of 23LE348 (Figure 7.31) were conducted in three stages. All three involved the removal of plow zone or A horizon to expose subsurface features. Stage I consisted of the initial stripping of the plow zone in a block area adjacent to the previously mentioned utility corridor where features were observed. This work was conducted on the east side of Route 61 (Figure 7.32). Approximately 219 features were identified and excavated during this stage.

Stage II took place after the original features were excavated. This consisted of the mechanical removal of the truncated A horizon from the block area to expose any features that were missed during the first stage of investigations. This was conducted because the truncated A horizon was similar in color to feature fill, making the definition of features somewhat difficult at times. An additional 7 features were identified and excavated during this stage.

Stage III consisted of mechanical plow zone removal and feature excavation within the ROW on the west side of Route 61. Thirty-four features were identified, recorded, and excavated in this area of the site.

As a result of the investigations at the site, approximately 260 features (storage pits, hearths, earth ovens, refuse pits) were identified and excavated. Many of these features were superimposed. In some cases, five or six pits overlapped each other (Figure 7.33). The feature data suggest some reoccupation of the site. In addition to these features, numerous post holes were excavated. Many of the postholes appear to belong to a probable structure.

The majority of the features and postmolds (on both the east and west sides of Route 61) date to the Middle Woodland period, as indicated by the recovery of Havana-Hopewell ceramics and Snyders Cluster hafted bifaces. Several features in the southwestern portion of the block on the east side of Route 61, however, contained thinner walled, cordmarked ceramics indicative of a Late Woodland affiliation.

Hafted bifaces belonged mostly to the Snyders or Dickson Clusters and largely consisted of variants of Burlington cherts. In terms of pottery surface treatment, most Middle Woodland vessels were either plain or cordmarked on the exterior surface, although some vessels were highly decorated. Decoration, when present, consisted of dentate stamping with some stamping that formed zones or stylized motifs of birds, particularly the spoonbill bird. Other decorations included interior punched nodes in a horizontal band below the rim, interior or exterior notching along the rim, and punctations.

Figure 7.30. Mound between 23LE348 South and 23LE348 North.

Figure 7.31. Overview of Site 23LE348-south, looking northwest at the southern part of the site.

Figure 7.32. Overview of Site 23LE348-south during Stage I feature excavation on the east side of Route 61. View is looking northwest.

Figure 7.33. Feature excavation on Site 23LE348-south showing superimposed features.

Animal bones collected from prehistoric features indicate that fish, reptiles, turtles, and snake were widely eaten at this time, as were the usual deer and turkey. Fish bones included gar, drum, catfish, and buffalo among others. Although not analyzed yet, it is expected that both cultivated and wild plants will be present within the seed assemblage collected from the features. Typical species include maygrass, goosefoot, knotweed, squash/gourd, marsh elder, and grapes/berries. A moderate density of nutshell is also present.

In addition to the above features, one prehistoric burial was documented. Excavation of this feature took place after an onsite meeting with representatives from MoDOT, the SHPO office, FHWA, and two tribal representatives. All parties agreed on how the burial excavations should take place and how the human remains should be re-interred. Excavation of the feature resulted in the identification of five individuals, at least four of which appeared to be primary, articulated interments. None of these remains left the state of Missouri, and all remains were handed over to MoDOT after completion of the investigations at 23LE348.

Several scattered features on the east side of Route 61 contained historic materials. In addition to these, a house cellar, cistern, and several features on the west side of Route 61 contained historic materials.

The historic materials from these features were indicative of a residence utilized most intensively during the second half of the nineteenth century and possibly into the very early twentieth century. Approximately 65 percent of the artifacts recovered were architectural and indicate that a structure(s) was likely built during the nineteenth century, as evidenced by the large number of cut nails, and consequently maintained and utilized into the late nineteenth and possibly the very early twentieth century, as demonstrated by the presence of a smaller wire nail assemblage. The window glass shows that the peak period of occupation of the site was after circa 1845 into the early twentieth century.

The domestic group artifacts indicate that the site was occupied as a residence. Ceramics, canning jars, and utensils recovered—indicative of food preparation, storage, and consumption—date throughout the entire nineteenth century. A wide variety of refined wares (pearlware, whiteware, ironstone) and utilitarian wares (coarse redware, stoneware, yellowware) examined, in conjunction with the large blown in mold container glass assemblage and the near absence of machine-made container glass, supports the architectural artifacts in determining that the site was primarily occupied during the nineteenth century. An assortment of other artifacts, including glass tableware, sewing items, clothing artifacts, writing utensils, furnishings, smoking pipes, dolls, and coins, all support the residential function of the site. Similarly, hardware and farming artifacts recovered are consistent with items used for both agricultural and home maintenance purposes.

Site 23LE348 – North

Excavations at the northern end of 23LE348 (Figure 7.34) were conducted in two stages. Stage I investigations entailed the excavation of six 1-x-1-m units. Cultural material (flake debris, cores) was recovered from all of the units to approximately 70 cm below ground surface. All of the units were terminated once heavy colluvial gravels were encountered. Artifact density peaked in the level just above the gravels. One small feature was identified in a unit within a truncated A horizon. The unit was expanded to a 1-x-2-m unit to allow for excavation of the feature.

Stage II investigations at 23LE348 N initially consisted of the hand excavation of a 6-x-6-m block. This block encompassed two of the initial test units that encountered the prehistoric feature. The block was then expanded both to the northeast and southwest to examine the subsurface deposits and further delineate the prehistoric component at the site.

Figure 7.34. Block excavation at Site 23LE348-north during Stage II investigations. View is looking northeast.

The plow zone was removed from the block area with a trackhoe prior to hand excavation of the block. The subsurface topography of the colluvial gravels and bedrock was slightly more complex than expected, based on previous work at the site. Thick deposits of colluvial gravels were encountered in each of the test units at fairly shallow depths ranging from 20 to 30 cm below the stripped surface of the excavation block. In addition, two of the test units along the eastern edge of the block were terminated when either regolith or bedrock was encountered at approximately 60–70 cm below the stripped surface of the block.

Based on the results of the test units, it is apparent that the sediments overlying the colluvial gravels thicken downslope towards the east. As a result, the test units along the eastern edge of the block were slightly deeper than those along the western edge. Given the context and the subsurface topography of the colluvial gravels identified during the investigations, excavations were terminated at the top of the gravels. It was felt that this procedure was justified, since these gravels represent secondary deposits in which in situ cultural deposits were unlikely.

A moderate amount of cultural materials were recovered from each of the units. Most of this material was flake debris, though several multidirectional cores and core fragments, and several bifaces and hafted bifaces were also recovered.

Low densities of crushed rock tempered sherds (one cord marked) were recovered from the uppermost levels in several of the test units just below the base of the plow zone, suggesting a Middle Woodland affiliation. Several diagnostic lithic artifacts suggesting a Late Archaic component were recovered in deposits directly underlying the Woodland component. These consist of an Etley-like (Stone Square Stemmed?) hafted biface, a Nebo Hill Cluster hafted biface, a Wadlow-like biface fragment, and a complete ovate biface. When combined, these lithic artifacts are quite similar to other Late Archaic tool kits commonly recovered throughout the project area and within the region.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume VI of this series.

Site 23LE365

Site 23LE365 is located on an alluvial/colluvial fan north of 23LE348 N along the east side of Route 61 around ROW station number 55 (Figures 7.35 and 7.36). The site is bounded to the south by the previously demolished Shiloh Church.

Previous work at the site documented a dense lithic scatter tentatively assigned to the Woodland period on the basis of grit tempered ceramics (Snow 2000). The artifacts were recovered from a maximum depth of approximately 50 cmbgs. Augers (n = 17) and test units (n = 3) were both excavated at the site, some of which reached maximum depths of approximately 90 cmbgs. Most of the augers, however, were only excavated to a depth of approximately 20 cmbgs due to the presence of thick gravel deposits. Cultural materials were only identified in the upper 50 cmbgs of the test units (Snow 2000). A single stratified thermal feature was identified in TU 2 at a depth ranging from 25 to 50 cmbgs and was associated with a Woodland period component (Snow 2000:48). Grit- and sand-tempered ceramics were also recovered from the feature. A radiocarbon assay from the feature was obtained, although the date was considered to be inconsistent with the recovered cultural materials and was not reported (Snow 2000:95). The test units produced a large quantity of cultural materials, consisting of primarily flake debris, although Woodland period ceramic sherds and burned limestone and other rock were also recovered from the site. A Late Prehistoric hafted biface was also recovered from Test Unit 1 (Snow 2000:95). Based on the OSA investigations, it was determined that the site location represented a lithic procurement site associated with neighboring Sites 23LE366 and 23LE367. The site was considered eligible for the National Register of Historic Places (Snow 2000:95).

During the utility corridor investigations, the landowner denied access to the site. Phase III investigations proceeded at 23LE365 based solely on the recommendations from OSA's previous work (Snow 2000). The CRAI phase III investigations were conducted in two stages.

The stage I investigations consisted of the mechanical removal of the plow zone in a series of shallow trenches to ascertain the presence of sub-plow zone cultural deposits and the anticipated features. Stripping was conducted in both the cut and fill areas of the site. Three shallow trenches were excavated throughout the site boundaries. No cultural features were identified in these trenches.

The stage II investigations were focused on the possibility of buried cultural deposits within the cut areas of the site. Stage II investigations were focused within the cut areas, since these areas would be impacted by the proposed construction activities. Stage II investigations consisted of the excavation of two deep trenches and hand excavated test units on the side of these trenches. No cultural features were identified during the stage II investigations. The results of the stage II investigations indicated that there was a light density of cultural materials within these units.

Both test units contained abundant colluvial gravels, consisting of both limestone and chert. The chert was commonly fragmented and at first appearance was considered knapping debris. Upon further examination in the field lab, the vast majority of this debris was obviously related to the colluvial deposits present at the site and was considered non-cultural. A single diagnostic hafted biface (Late Archaic) was recovered during the stage II investigations. Based on our investigations at the site, no further work was recommended there.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Figure 7.36. Overview of Site 23LE365. View is looking south across Trench 365-D.

Site 23LE366

Site 23LE366 is located across the drainage to the south of 23LE367 on an alluvial/colluvial fan around ROW station number 50 (Figure 7.37). It is bounded by a small intermittent drainage to the south. Woodland ceramics were identified within the plow zone and to a maximum depth of about 100 cmbgs during the archaeological testing (Snow 2000). A dense lithic scatter was also associated with this site. Diagnostic Early Woodland ceramics (Sisters Creek Punctuate and Marion Thick) were found at various depths (30–40 cmbgs in Test Units 1 and 4; 90–100 cmbgs in Test Unit 2), suggesting a different paleotopography. An increase in gravels was noted in the upper soil horizons, apparently sealing the cultural zones beneath it. Gravel lenses were noted in other units, suggesting increased fluvial or colluvial processes during various times at the site. Cultural zones appear to get shallower in the southern portions of the site.

The landowner denied access to the site area during the utility corridor investigations conducted by CRAI. The site was situated in a fill area and therefore would not be impacted by highway construction activities. No data recovery work was conducted at the site by CRAI. All information regarding the site is based on previous investigations there. No additional information regarding this site is provided in further volumes.

Site 23LE367

Site 23LE367 is located on an alluvial fan on the foot slopes of the uplands between two small intermittent drainages (Figure 7.38). The site is located between ROW station numbers 40 and 50. Previous investigations indicated the presence of one component at the site (Morrow 1997). A dense lithic scatter and general Woodland ceramics were found throughout the upper 80 cm at the site, but artifacts were generally concentrated between 25–50 cmbgs. The northern and central portions of the site were explored with systematic excavation units, and both areas revealed similar results. The maximum depth reached during the previous investigation was approximately 80 cmbgs.

The landowner denied access to the site area during the utility corridor investigations by CRAI. The site is situated within a fill area and will not be impacted by construction activities. In addition, significant cultural material is buried at depths great enough not to be impacted by construction activities. No further work is recommended for this site. All information regarding this site was based on previous investigations there. No additional information regarding this site is provided in further volumes.

Site 23LE41 (Baxter Lake Site)

Site 23LE41 is located just across the stream to the north of Site 23LE367 between ROW station numbers 25 and 35 (Figures 7.39 and 7.40). This site is located on an alluvial fan adjacent to the small intermittent drainage. Previous coring and trenching at the site indicated that at least two buried, but truncated, paleosols are present in the upper 5 m of sediments (Hajic et al. 1996). Also, it was noted that bedrock is shallower in the upslope (westerly) direction and the A horizon becomes thicker in the downslope direction. On the eastern part of the site, the fan deposits appear to overlie early to middle Holocene Mississippi River deposits represented by stratified coarse sands and loams interbedded with reddish brown clays. Archaeological material recovered from the phase II investigations (Markman et al. 1997) indicated two cultural components at the site: one in the plow zone and the other just below the plow zone to a depth of approximately 65 cmbgs. A Late Archaic (Nebo Hill Cluster) hafted biface was found on the ground surface. Subsurface investigations were limited to the western portions of the site. Based on the results of the phase II investigation, the site was recommended as eligible for the National Register of Historic Places.

Due to denied access to the site by the landowner, CRAI did not work there during the utility corridor investigations. Phase III investigations at the site were based on the previous work conducted by Markman et al. (1997).

Data recovery investigations at the site were conducted in three stages. Stage I investigations consisted of the excavation of three backhoe trenches and associated units on the side of these trenches. Two trenches were excavated on the rise, while the third was excavated on the side of the rise. The trenches on the rise contained cultural material to approximately 90 cm below surface. Colluvial gravels were encountered at the base of one unit. A peak in artifact count was noted just above these gravels. One sherd was recovered from two levels above the colluvium, suggesting a Woodland affiliation. The other unit exhibited a peak in artifact counts between 45 and 65 cm below surface. No diagnostics were recovered from this unit. Based on the Stage I investigations, it was felt that intact, buried archaeological deposits were represented in multiple areas of the site. Therefore, two hand excavation blocks were excavated during the next stage of investigations.

Stage II investigations consisted of the hand excavation of two block areas. One sampled a component just below the base of the plow zone, the other a more deeply buried component. In both cases, the upper deposits (plow zone and non-cultural sediments) were removed with a backhoe prior to hand excavation. The deeper block was located close to an intermittent stream. The block was stripped down to 70 cm below surface. At this level, several areas of colluvial gravels were seen in the floor of the block. Unit excavation concentrated on sampling units devoid of the gravels, since such gravel zones likely truncated any cultural component(s). Excavation of this block revealed that much of this area had been impacted by colluvium and that intact cultural material was unlikely. For this reason, the block was terminated without completing all of the scheduled units.

The second block was excavated on the high point of the site (Figure 7.41). Excavations here detected the presence of intact deposits just below the base of the plow zone. Four diagnostic hafted bifaces (Hardin Barbed Cluster) were recovered from the block and indicated an Early Archaic affiliation for these occupations. A relatively large number of bifacial cores were recovered from the units in addition to several multidirectional cores and bifaces. Flake density was moderate over much of the block, though the density varied from unit to unit.

Stage III investigations consisted of the removal of the plow zone within several backhoe trenches in an effort to identify cultural features below the base of the plow zone. Trenches were extended from the hand excavation block across the rise. No cultural features were identified in any of the trenches.

Figure 7.40. Overview of 23LE41 during Stage I work. View is to the south showing the locations of Trench B and C (indicated by the orange safety fencing).

Figure 7.41. Overview of Block A during Stage II excavation at 23LE41, taken facing south.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume IV of this series.

Sites 23LE369 and 23LE371

Site 23LE369 is located north of 23LE41 near the border between Lewis and Clark Counties and is situated on an alluvial fan. Site 23LE369 is located between ROA station numbers 15 and 25 (Figures 7.42 and 7.43).

Previous investigations at the site defined three prehistoric components at various depths: plow zone, 35–50 cmbgs, and 80–90 cmbgs (Snow 2000). Additionally, sparse cultural materials were also identified to depths of approximately 210 cmbgs (Snow 2000:97).

The plow zone component was assigned to the Woodland period due to the presence of diagnostic ceramics. Woodland sherds, however, were also recovered at depths to approximately 100–160 cmbgs (Snow 2000:81). In addition, two temporally diagnostic hafted bifaces were also recovered from plow zone contexts throughout the site. These included a Middle Woodland Snyders Clusters specimen recovered from the plow zone and an Agate Basin recovered from the ground surface.

The second component (35–50 cmbgs) is represented by an increase in cultural materials in the test units that included a Late Archaic or Early Woodland stemmed hafted biface recovered from 30–40 cmbgs (Snow 2000). The third component 80–90 cmbgs corresponds to a buried A horizon, although no artifacts were directly attributable to the buried A horizon. The fourth component was identified in several bucket augers as a slight peak in lithic materials to a depth of approximately 190 cmbgs, suggesting the presence of an earlier component(s).

The upper two components appear to date from the Late Archaic to Woodland time periods. The lower component was considered unidentified. The site was determined eligible for the National Register of Historic Places (Snow 2000).

Materials found during the utility corridor investigation were similar to the previous results, with Woodland ceramics found just below the plow zone and unidentified earlier components associated with material recovered to a depth of 110 cmbgs (Bradbury and Martin 2005). The highest density of materials recovered at the site during the utility corridor investigations was in the south-center portion of the site in the area of Trench 369-B. This corresponds to the eastern edge of a low rise.

Site 23LE371 is located just to the north of 23LE369 on the sideslopes and swale adjacent to the unnamed tributary stream and within the project area. The site was discovered during the phase I investigation (Markman et al. 1996) and yielded a low density lithic scatter primarily from the plow zone. Site 23LE371 was considered not eligible for the National Register of Historic Places. Given that its topographic situation was similar to that of other AOS sites with buried deposits, it was investigated during the utility corridor investigations. Due to the proximity of this site to 23LE369, these investigations were combined with those conducted at 23LE369.

Since the southwestern portion of the site was located within a cut area, phase III investigations were focused in this portion of the site. This area had not been previously examined during the prior investigations.

Only one stage of investigation was conducted within the ROW at this site during data recovery. The investigations in the cut area at 23LE369 consisted of the excavation of two deep backhoe trenches and test units on the sides of these trenches. Material density in these units was very sparse. Based on these investigations, it was concluded that significant archaeological deposits were not located within the cut area. Deposits in the southeastern portion of the site (around the location of Trench B from the utility corridor investigations) represent the best archaeological deposits at the site. These

deposits are within a fill area and will not be impacted by the proposed construction activities. No additional work at this site was recommended for the portion of the site situated within the cut area.

Additional information regarding this site is provided in Volume III of this series.

Site 23LE373

This site is located on an alluvial/colluvial fan right at the shared Lewis and Clark County line between ROW station numbers 0 and 5 (Figure 7.44 and 7.45). Previous investigations at the site (Snow 2000) recovered a number of artifacts from surface collection. The highest density of materials was recovered from the southern portion of the site. Diagnostic artifacts consisted of two sand tempered sherds. In addition, a light scatter of historic artifacts was recovered from the surface. A bucket auger at the site produced a flake at 40–50 cmbgs, suggesting some sub-plow zone materials were also present. Test units excavated at the site confirmed the presence of sub-plow zone materials. Artifact density was highest in the plow zone. Another peak in artifact counts occurred around 50–60 cmbgs. A few flakes were also recovered in test units around 120–130 cmbgs.

The utility corridor work at the site consisted of one shallow trench, one core, and one test unit (Bradbury and Martin 2000). The trench (373-A) and core were placed in the project area within, or near, the boundary of Site 23LE373, close to the line between Lewis and Clark Counties. In addition, Trench OS-L was excavated on the same landform just to the south of Trench 373-A and was later considered to be within the boundary of Site 23LE373.

The site was situated within a fill area; therefore, construction activities would not impact archaeological deposits at the site. No additional work was recommended for the site. Additional information concerning this site is provided in Volume III of this series.

Clark County Sites

Andrew V. Martin, Jennifer M. Haney, Jennifer L. Barber, Alexandra D. Bybee, and Todd D. McCurdy

The Avenue of the Saints project included approximately 12.87 km (8 mi) of proposed new right-of-way (ROW) in Clark County, Missouri (Figure 7.2). Thirty-seven archaeological site locations occur within this portion of the ROW (Table 7.3). Investigations at these sites included geoarchaeological survey, National Register of Historic Places (NRHP) evaluations, and data recovery at NRHP eligible sites that would be affected by project implementation.

Initially, in the summer of 2005, CRAI conducted utility corridor investigations and NRHP evaluations at, or in the vicinity of, 24 previously recorded sites (23CK22, 23CK57, 23CK243, 23CK244, 23CK266, 23CK267, 23CK269, 23CK270, 23CK273–23CK275, 23CK280, 23CK281, 23CK286, 23CK291, 23CK298, 23CK299, and 23CK302–23CK308) (Martin 2005). Eight of these sites were recommended as eligible for the NRHP (23CK57, 23CK243, 23CK267, 23CK273, 23CK274, 23CK299, 23CK302, and 23CK308) and data recovery was initiated at them (Martin 2006a).

Also at that time, landowner access was denied at several areas in the northern part of the project area near the Fox River. After state acquisition of the previously denied properties occurred, utility corridor investigations and NRHP evaluations were completed at, or in the vicinity of, 13 additional sites (23CK59, 23CK60, 23CK61, 23CK63–23CK66, 23CK239, 23CK245, 23CK246, and 23CK310–23CK312). Three of these sites were recommended as eligible for the NRHP (23CK59, 23CK66, 23CK310), and data recovery was initiated at them (Martin 2006b).

Figure 7.43. Trench excavation at 23LE369 during Stage I investigations. View is looking North from Trench 369-F.

In total, 11 sites in Clark County were recommended as eligible for the NRHP, and data recovery was performed at them. The remaining 26 archaeological sites recorded in the project area were determined to be not eligible for the NRHP, or no archaeological deposits were found at them. A summary of all the sites investigated and components at these sites are provided in Tables 7.1 and 7.2. A summary of the materials recovered from the investigations of these sites is provided in Table 7.3. The locations of all Clark County archaeological sites within the project area are shown on the topographic quadrangles in Figure 7.2. Details of the excavations, analyses, and results from all sites where archaeological deposits were identified are provided in the individual volumes that make up the AOS report series.

A discussion of each site identified is provided below and is listed by location, from south to north, in the county.

Site 23CK22

This site was located in southern Clark County, approximately 350 m (1148 ft) south of Doe Run roughly between ROW station numbers 810 and 815 (Markman et al. 1996) (Figure 7.2). The site was reported as an area where six plowed-down mounds may be located, "just north of the Lewis County line, 300 yards south of Doe Run" (Markman et al. 1996:3-2). However, it was determined that this site was within a fill area and that no impacts would occur to deep, sub-plow zone deposits. Furthermore, no indication of the mounds was found during the initial phase I survey or during CRAI's utility corridor investigation (Markman et al. 1996; Martin 2005). Therefore, no further archaeological investigations were conducted at Site 23CK22 for this project. No further discussion of this site is provided in any other report volume.

Site 23CK243

This site is located on an alluvial fan and floodplain south of Doe Run between ROW station numbers 795 and 810 (Figures 7.46 and 7.47). Elevations at the site within the project boundary ranged from approximately 152.4 to 154.2 m (500 to 506 ft) AMSL. Geomorphological landforms at the site were associated with a bedrock bench in the southern part of the site above 153.3 m (503 ft) AMSL and relatively deep tributary alluvium in the northern part of the site along Doe Run.

Figure 7.45. Overview of Site 23LE373, looking south.

Figure 7.46. Overview of Site 23CK243 during the utility corridor investigation, looking north,.

The site was recorded as a Late Woodland lithic and pottery scatter (Markman et al. 1996, 1997). The initial phase II archaeological work conducted at Site 23CK243 consisted of one excavation unit, one trench, and one core. At that time, Late Woodland period diagnostic artifacts (e.g., plain, thin-walled, grit-tempered pottery) were recovered from the plow zone and the truncated A-horizon directly below the plow zone (0–54 cm [0–17.7 in] bgs). A prehistoric lithic scatter found between 54 and 84 cm (17.7 and 27.5 in) bgs was speculated to represent another component (Markman et al. 1996, 1997).

CRAI's utility corridor investigation and archaeological testing at Site 23CK243 sampled site landforms within the project area (Martin 2005). On the bedrock bench, lithics and Woodland pottery were identified within a preserved A-horizon between 20 and 40 cm (7.87 and 15.74 in) bgs (just above the Bt-horizon), suggesting a late Holocene sediment aggregation here similar to that seen on bedrock benches at the archaeological sites investigated for this project in Lewis County (e.g., 23LE348 and 23LE178/357 [Bradbury and Martin 2005, Hajic et al. 1996]). Prehistoric lithic and pottery artifacts found in the upper 65–75 cm (19.8–22.8 in) of the Doe Run alluvial landforms suggest that they are related to an intact late Holocene archaeological deposit. Additional lithic artifacts were recovered to a depth of 105 cm (34.44 in) bgs on the Doe Run floodplain, just above the contact with till. Finally, a nearby suspected mound was located on the northern site boundary, adjacent to Doe Run and the project area. The mound consists of a low (approximately .6–.91 m [2–3 ft] high) pile of rock.

These results indicated that buried and apparently intact archaeological deposits were found on both landforms at the site. Woodland deposits were noted as more deeply buried in the northern parts of the site area, a likely effect of increased overbank flood deposition closer to Doe Run. There were shallower Woodland deposits associated with the colluvial slope and bedrock bench in the southern part of the site. Prehistoric lithic artifacts recovered from between 75 and 105 cm bgs on the floodplain suggest an earlier component represented in that part of the site. The presence of stratified, intact archaeological deposits at Site 23CK243 indicated that significant data regarding the Woodland, and possibly earlier, time periods could be obtained from the site. As such, the site was recommended as eligible for the NRHP under Criterion D (Martin 2005).

Data recovery at Site 23CK243 was conducted in the fall of 2005 (Martin 2006a). Since Site 23CK243 was entirely within a fill area, it was determined that sub-plow zone deposits at the site would not be impacted. Therefore, the data recovery at Site 23CK243 focused on the archaeological deposits directly below the plow zone. This investigation consisted of the removal of the plow zone in a series of eight strip blocks across the site to expose features anticipated at the base of the plow zone within the project area. As a result, approximately 1,400 sq m (15,069.4 sq ft) of plow zone was removed at the site. Several dark anomalies were observed across the blocks. These were bisected and screened. No artifacts, FCR, or charcoal concentrations were found in any of the anomalies, and all were determined to be natural disturbances, such as tree roots and rodent burrows.

A geophysical survey conducted over the mound provided no evidence regarding its function or structure. Nevertheless, considering the near-surface Woodland assemblage at this site, as well as the close proximity to a Woodland mound complex (Sites 23CK1/2), this small mound may also be Woodland in age. However, only the excavation of the mound could provide any confirmation. Ultimately, it was determined that the mound would not be impacted by project construction.

Based on these results, the data recovery of the archaeological deposits directly below the plow zone at Site 23CK243 was complete, and no further field work was conducted or recommended at the site. Also, no further work has been conducted at the suspected

mound near the site. But, to insure that no damage is done to the mound during road construction, a professional archaeologist monitored the construction work near the mound (Michael Mienkoth, personal communication 2005).

A more detailed discussion of the results of the archaeological investigations at Site 23CK243 is documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK244

This site is located on the proximal portion of a broad colluvial slope and floodplain north of Doe Run in southern Clark County between ROW station numbers 786 and 794 (Figures 7.48 and 7.49). Elevations within the site boundary ranged between 152.4 and 154.2 m (500 and 506 ft) AMSL. Approximately 228.6 m (750 ft) of utility corridor were within the site boundary. Geomorphological landforms at the site were associated with a bedrock bench in the northern part of the site above approximately 153.01 m (502 ft) AMSL and tributary alluvium in the southern part of the site along Doe Run.

The site was recorded as an indeterminate prehistoric artifact scatter that was found on the ground surface (Markman et al 1996). A Phase II NRHP evaluation had been recommended to determine the extent and integrity of the prehistoric component(s) at this site but could not be conducted due to landowner denial. Some geoarchaeological coring was previously performed here, revealing at least 2.2 m (7.2 ft) of weakly developed, stratified sand, gravel, and loamy sand (Hajic et al. 1996). The cores indicated that alluvium had truncated a paleosol at approximately 110 cm (33.5 in) bgs, with another paleosol occurring at approximately 150 cm (45.7 in) bgs. Possible buried archaeological evidence found during the coring consisted of large wood charcoal fragments found between 1.15 and 1.16 m (3.7 and 3.8 ft) bgs in the upper paleosol. Considering the weakly developed and stratified bedding, the uppermost alluvium was considered likely very recent (late Holocene or historic) in age (Hajic et al. 1996).

Figure 7.48. Overview of Site 23CK244, looking south.

CRAI's utility corridor investigation and archaeological testing at Site 23CK244 sampled site landforms within the project area (Martin 2005). One trench was placed on the Doe Run floodplain at the site and, like the previous core here, revealed stratified sands, gravels, and clays to at least 150 cm (45.7 in) bgs. Two soil sequences were noted. The first consisted of recent sandy clay loam overlying bedded sands and gravels to approximately 60 cm (18.2 in) bgs and likely corresponds to the upper sequence observed in the previous core. The lower sequence likely represents the previously identified upper paleosol, which was truncated by the gravels and consisted of sandy loam above matrix supported cobbles to approximately 150 cm (45.7 in) bgs. These stratified sands and gravels represent high-energy alluvium most likely associated with an old stream channel. Like the previous cores, poor soil development and distinct horizonation of these sediments indicate a likely late Holocene or historic age. Ultimately, no archaeological deposits were identified in the trench. Furthermore, given the recent, high-energy depositional environment (i.e., bedded sand and gravel), it was determined that there was little potential for intact archaeological deposits.

On the bedrock bench in the northern part of the site, glacial till underlies a thin mantel of finer grained tributary alluvium, alluvial fan, or colluvial slope sediments. Rounded gravels and cobbles (30 to 60 cm [9.1 to 18.2 in] diameter) that were found below 70 cm (21.3 in) bgs were representative of the glacial till. Prehistoric lithic artifacts and historic materials recovered from units placed on this landform were sparse and largely found in a plow zone or redeposited context.

Ultimately, no significant, intact archaeological deposits were identified at Site 23CK244, and it was not recommended as eligible for the NRHP. Therefore, no data recovery was conducted at Site 23CK244. A more detailed discussion of the results of the archaeological investigations at Site 23CK244 is documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK273

This site is located south of Buck Run Creek, north of Site 23CK244, and directly east of the Boulware Mound Group (Site 23CK1/2), between ROW station numbers 750 and 775 (Figures 7.50 and 7.51). Elevations within the site boundary ranged from approximately 155.4 to 158.5 m (510 to 520 ft) AMSL. Geomorphological landforms at the site were associated with a bedrock bench in the southern part of the site, above approximately 153.01 m (502 ft) AMSL, and tributary alluvium in the northern part of the site along Buck Run.

Figure 7.50. Overview of Site 23CK273 during the utility corridor investigation, looking north,.

The site was recorded as a prehistoric artifact scatter of an undetermined age found on the ground surface (Morrow 1997). Furthermore, six mounds are shown on a historic map of the Boulware Mound Group (Thomas 1985 [1894]) on the east side of the road, in the site's vicinity. Therefore, a phase II NRHP evaluation was recommended to determine the extent and integrity of the prehistoric components at this site; however, the NRHP evaluation was not conducted, due to landowner denial (Snow 2000). Additionally, no previous geoarchaeological work occurred at this site.

CRAI's utility corridor investigation and archaeological testing at the site was conducted in the summer of 2005 (Martin 2005). Four trenches were placed in the center and southern portions of the site, perpendicular across the colluvial slope, and east of the Boulware Mound Group within the project area. Deposits similar to those observed on the slope at Site 23CK244 were observed here; however, a shallow plow zone was observed overlying a thin intact A-horizon in the southernmost trenches. Beneath the A-horizon, residuum and colluvium increases with depth. Ultimately, these deposits represent the extension of the bedrock bench observed at Site 23CK244. The deepest deposits on the bedrock bench were in the southern and upslope directions but only extended a maximum of 90 cm (27.4 in) bgs before limestone bedrock was reached.

Another trench was placed in the northern part of the site, near Buck Run. This trench revealed approximately 120 cm (36.5 in) of fine grained sediments likely associated with over-bank alluvium from Buck Run. A buried A-horizon was noted at 68 cm (20.7 in) and extended to 110 cm (33.5 in) before encountering residuum above bedrock at 120 cm (36.5 in) bgs.

Seventeen hand-excavated auger cores were placed north–south across the site to delineate the extent of the alluvium and colluvium/bedrock bench. The auger cores closest to Buck Run revealed approximately 170 cm (51.8 in) of alluvium overlying bedrock. This bedrock bench was also identified approximately 45 m (147.6 ft) south of Buck Run, and the gravelly slope deposits ranged from approximately 30 to 70 cm (9.1 to 21.3 in) bgs above it.

Ultimately, the trenches and auger cores revealed a small lithic artifact scatter within, and just below, the plow zone on the bedrock bench. These deposits were not determined to be significant (Martin 2005). However, the possibility for plowed-down mounds to be found here was not discounted. Also, archaeological deposits (lithics and Woodland pottery) were found below the plow zone in the alluvium near Buck Run. These buried deposits were judged as representative of a significant, stratified, and likely intact archaeological component of the site. The presence of stratified, intact archaeological deposits at Site 23CK273 indicated that significant data regarding the Woodland, and possibly earlier, time periods could be obtained from the site. Further contributing to the site's possible significance was its close proximity to Site 23CK1/2 and the possibility for mounds to be found. As such, the site was recommended eligible for the NRHP (Martin 2005).

Data recovery work at Site 23CK273 was conducted in September of 2005 (Martin 2006a). Since Site 23CK273 was entirely within a fill area, it was suggested that any deep, sub-plow zone, archaeological deposits at the site would not be impacted by project construction. Therefore, the data recovery at Site 23CK273 focused on identifying any features, especially any evidence of mounds, within the near-surface deposits directly below the plow zone. First, a geophysical survey was also performed across the site. This survey revealed several magnetic anomalies that were thought to be possible thermal features associated with plowed-down mounds. Excavation consisted of the removal of the plow zone in a series of four strip blocks to expose anticipated features at the base of the plow zone. The plow zone strip blocks specifically focused on the magnetic anomalies. As a result, approximately 1,030 sq m (11,086.8 sq ft) of plow zone was removed

at the site. No features were observed across the blocks. The strip blocks revealed several areas of coarse colluvium across the slope increasing in thickness down slope. These gravel fans were found in similar locations to the magnetic anomalies identified during the geophysical survey. In fact, several rock samples were tested using a hand operated magnetic susceptibility device (KT-6 kappameter), revealing that the gravels contained highly magnetic materials and were most likely the "anomalies" identified during the geophysical survey. Ultimately, no cultural features were identified during the data recovery, and the near-surface deposits were not eligible for the NRHP.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Site 23CK274

This site is located north of Buck Run and northeast of the Boulware Mound Group (Site 23CK1/2) between ROW station numbers 740 and 747 (Figures 7.52 and 7.53). Elevations within the site boundary range between 153.9 and 155.4 m (505 and 510 ft) AMSL. Geomorphological landforms at the site include the proximal portion of a broad alluvial/colluvial slope and portions of the Buck Run floodplain.

Previously, 9 excavation units and 30 hand-excavated auger cores were used to sample the archaeological deposits at the site (Snow 2000). Two components were identified at the site: the first was associated with the plow zone and the second was a sub-plow zone horizon that apparently gets deeper further east, downslope, and off the landform. Shallow bedrock and recent flood scouring were noted as reasons for the lack of intact archaeological deposits in the western part of the site. Two possible post holes and a high density of sub-plow zone artifacts were recovered to a depth of 150 cm bgs. Based on these results, the site was recommended as eligible for the NRHP. However, a majority of the significant deposits were found along the eastern edge of the site, which was outside the final project corridor.

Figure 7.52. Overview of plow zone removal at Site 23CK274 during the utility corridor investigation, looking north at exposed limestone piers.

During CRAI's utility corridor investigation and archaeological testing at the site, 1 hydraulic core, 3 trenches, 3 excavation units, and 1 plow zone strip block were used to sample site landforms within the project area (Martin 2005). The hydraulic core was placed at the southern boundary of the site, near Buck Run, and revealed shallow stratified sands and gravels interpreted as historic alluvium. The trenches were placed further north on the landform and revealed finer grained sediments likely associated with older alluvium. Trenches and units at the site also revealed a thick plow zone above a sub-plow zone A-horizon between 35 to 61 cm bgs, which is associated with the finer grained older alluvium. In the northern part of the site, at least 137.1 m (450 ft) north of Buck Run, the sub-plow zone A-horizon becomes thinner, and a bedrock bench is present at approximately 100 cm bgs. Also, like the deposits on the bedrock bench at sites 23CK243, 23CK244, and 23CK273, rounded till was present in varying degrees of frequency and size just above the bedrock.

Data from the utility corridor excavations confirmed the presence of a shallow Woodland archaeological deposit within the intact A-horizon just below the plow zone (approximately 20 to 70 cm [7.8 to 27.5 in] below ground surface). However, no prehistoric features were found associated with this deposit, although a series of 16 limestone cobble foundation piers were identified within an approximately 15.2 m (49.9 ft) by 12.9 m (42.3 ft) rectangular area just below the plow zone in the northern part of the site, representing a historic structure foundation. Considering the apparent intact sub-plow zone Woodland deposits, as well as the presence of a historic feature, the site was recommended as eligible for the NRHP under Criterion D (Martin 2005).

Data recovery work at Site 23CK274 was conducted in September of 2005. Site 23CK274 was entirely within a fill area, and as a result, it was determined that sub-plow zone deposits at the site would not be impacted. Therefore, the data recovery at Site 23CK274 focused on the near-surface archaeological deposits found directly below the plow zone. This investigation consisted of the removal of the plow zone from the remaining site area within the ROW to expose features that were anticipated at the base of the plow zone. As a result, approximately 1,010 sq m (10,871.5 sq ft) of plow zone were removed at the site. No features were identified in the block. Some historic disturbance was noted in the southern part of the site near Buck Run. The disturbance consisted of a scatter of brick and glass above sands and gravels (high-energy alluvium) with no associated features. Also, no further features or historic archaeological deposits were found associated with the previously identified limestone piers. It was judged that the foundation likely represents the remains of an early- to late-nineteenth-century outbuilding, most likely a barn. However, no written or oral histories have been found. Ultimately, no significant archaeological deposits were identified directly below the plow zone during the data recovery.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK275

This site was previously located approximately 50 m north of Site 23CK274, between ROW station numbers 735 and 740 (Figure 7.2). The site was reported as a small lithic scatter mixed in a poor depositional context. The site was not recommended eligible for the NRHP. However, the site was on a landform that was believed to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing at the site, three trenches were used to sample site landforms within the project area (Martin 2005). No archaeological deposits were found

in these trenches, and considering the similar previous results, no further work was recommended for the site. Since no archaeological deposits were discovered, no further discussion of this site is provided.

Site 23CK280

This site was previously recorded approximately 500 m northwest of Site 23CK275 between ROW station numbers 715 and 730 (Figure 7.2 and 7.54). The site was reported as a small lithic scatter outside the previous project area, and the NRHP status of the site was not determined at that time (Morrow 1997). Since the site area was located within the final project corridor, its eligibility for listing in the NRHP was evaluated.

During CRAI's utility corridor investigation and archaeological testing at the site, three trenches, one excavation unit, one hydraulic core, and two auger cores were used to sample site landforms within the project area (Martin 2005). One flake and one metal nail were recovered from the plow zone, and one flake was recovered from approximately 60 cm (18.2 in) bgs in the excavation unit. In addition, the location of a hog lot was identified in the site area and was determined to be associated with the historic farmstead on the Craw property (personal communication, Lucretia Craw 2005). The remains of this farm outbuilding consisted of a well and water trough, as well as a concrete pad. The remains of the hog lot were photographed and pedestrian surveyed, but no artifacts were found, and the area was not judged to be a significant site component. Furthermore, the current geomorphological assessment suggests that this area represents an old, sealed-off meander bend of the Mississippi River, which would have been a wetland throughout much of prehistory. Considering the lack of significant archaeological deposits found, the site was recommended as not eligible for the NRHP (Martin 2005).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK281

This site was located approximately 100 m north of Site 23CK280, between ROW station numbers 705 and 710 (Morrow 1997) (Figure 7.2 and 7.55). The site was recorded as a small lithic scatter outside the previous project area, and the NRHP status of the site was not determined at that time. However, the final project ROW encompassed the site area, and during CRAI's utility corridor investigation and archaeological testing at the site, one trench, one excavation unit, and two hydraulic cores were used to sample the site setting within the project area (Martin 2005). Only one flake was recovered from the plow zone of the excavation unit during this investigation. Furthermore, considering the geomorphological context of the site area, as discussed with Site 23CK280, this area would have been a wetland throughout much of prehistory with low potential for significant archaeological deposits. Therefore, considering the lack of significant archaeological deposits found, the site was recommended as not eligible for the NRHP (Martin 2005).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK286

This site is located near the intersection of Gravel Hill School Road and U.S. 61 between ROW station numbers 672 and 681 (Figures 7.56 and 7.57). Elevations within the site boundary range between 151.8 and 153.6 m (498 and 504 ft) AMSL. Geomorphological landforms at the site include the proximal and medial portions of an alluvial fan.

Figure 7.56. Overview of Site 23CK286, looking north.

Previously, two excavation units and four hand-excavated auger cores were used to sample the archaeological deposits at Site 23CK286 (Snow 2000). A light scatter of artifacts was found in the plow zone, and a dramatic increase in artifact counts was noted between 40 and 60 cm (12.1 and 18.2 in) bgs at the site. A higher density of sand and grit tempered Woodland period pottery (N = 100) was recovered from the buried component. Thermally shattered chert and fire-cracked rock was also found associated with this cultural zone, indicating that features may be present. Excavation units were stopped at approximately 70 cm (21.3 in) bgs. One auger core yielded two flakes and FCR from below 120 cm (36.5 in) bgs, suggesting that another deeper cultural zone is present at the site. Based on these results, the site was recommended as eligible for the NRHP. However, much of the previously investigated site area was outside the current project area.

During CRAI's utility corridor investigation and archaeological testing at the site, three hydraulic cores, two trenches, one deep trench, and four excavation units were placed to sample different portions of the site landforms within the project area (Martin 2005). The hydraulic cores revealed relatively shallow (1–2 m thick) alluvial/colluvial fan deposits overlying Mississippi River alluvium. The trenches were placed primarily along the utility corridor and revealed heavily mottled and gleyed sub-plow zone soil horizons, further suggesting a poorly drained setting. A relatively intact sub-plow zone A-horizon was observed on portions of the landform. Cultural material recovered from the units placed at the site was sparse and included prehistoric and historic artifacts primarily from plow zone contexts (Martin 2005). Considering the poor depositional context, the site area within the project corridor was not recommended as eligible for the NRHP, and no further archaeological work was conducted here (Martin 2005).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK266

This site was previously recorded on the floodplain south of Honey Creek between ROW station numbers 626 and 645 (Snow 2000) (Figure 7.2). Surface collection, 2 excavation units and 22 hand-excavated auger cores were used to sample the archaeological deposits at Site 23CK266 (Snow 2000:33). A light scatter of prehistoric lithic artifacts was found in the plow zone, and an increase in natural gravels was noted below approximately 50 cm bgs. At that time, the site was not recommended eligible for the NRHP. However, the site was on a landform that was judged to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, three hydraulic cores, two shallow trenches, and one excavation unit were used to sample landforms in the site vicinity within the project area. No cultural material was recovered from these investigations, and the presence of shallow (approximately 40–70 cm thick) loamy sediment over pre-Illinoisan glacial till or a bedrock bench suggested a low potential for intact sub-plow zone archaeological deposits. It was speculated that this floodplain had been historically utilized as a borrow area during the construction of U.S. 61. Ultimately, no significant archaeological deposits were found in the site vicinity, and no further archaeological work was recommended here for the AOS project.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity are further discussed in Volume II.

Site 23CK291

This site was previously recorded on a low alluvial/colluvial fan, approximately 50 m south of Site 23CK291 between ROW station numbers 626 and 640 (Snow 2000) (Figure 7.2). Previously, surface collection and two auger cores were used to sample the archaeological deposits at Site 23CK291 (Snow 2000:38). A light scatter of prehistoric lithic artifacts was found on the ground surface and an increase in natural gravels was noted at approximately 1 m bgs. At that time, the site was not recommended as eligible for the NRHP. However, the site was on a landform that was believed to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, one hydraulic core sampled the landform in the site vicinity within the project area. This core revealed shallow (approximately 80–100 cm thick) alluvial/colluvial fan deposits over glacial till and a bedrock bench at approximately 150 cm bgs. Ultimately, this core confirmed the previous investigation's results, and it was determined that this was a poor depositional context for finding significant archaeological deposits. Ultimately, no archaeological deposits were identified during this investigation. Therefore, no further archaeological work was recommended here for the AOS project.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic core in the site vicinity is further discussed in Volume II.

Site 23CK267

This site is located approximately 975 m north of Honey Creek between ROW station numbers 582 and 588 (Figures 7.58 and 7.59). Elevations within the site boundary range between 153.9 and 155.4 m (505 and 510 ft) AMSL. Geomorphologically, the site is located on the apex of an alluvial/colluvial fan.

Figure 7.58 Overview of Site 23CK267, looking southeast.

Previously, 6 excavation units and 36 hand-excavated auger cores were used to sample the archaeological deposits at the site (Snow 2000). Late Woodland pottery was recovered from both plow zone and sub-plow zone deposits. Six features and 5 possible post holes were identified in 3 of the units on the western edge of the site. Auger cores and test units at the site recovered artifacts from a maximum depth of 90 cm (27.4 in) bgs. Based on these results, the site was recommended as eligible for the NRHP.

During CRAI's utility corridor investigation and archaeological testing at the site, 1 hydraulic core, 2 trenches, and 5 excavation units were used to sample site landforms within the project area (Martin 2005). The hydraulic core placed at the site revealed deep alluvial/colluvial fan deposits with 2 apparent buried soils occurring above bedrock, which was at approximately 300 cm bgs. The trenches at the site confirmed the core results and revealed a buried A-horizon at approximately 130 cm bgs with stratified sands and gravels at approximately 175 cm bgs. The deeper buried soil, which was indicated by the core, could not be sampled safely in these conditions. Therefore, the focus of units placed here was on the sub-plow zone deposits and the buried A-horizon. Data recovered from the site investigation indicated a moderate density sub-plow zone artifact scatter. The artifacts recovered demonstrated a likely intact, near-surface archaeological deposit that contained flakes and prehistoric pottery (Woodland component), as well as prehistoric lithic artifacts associated with the buried A-horizon, indicating another likely intact site component. Downslope on the landform, less archeological material was found in the sub-plow zone deposits, despite the continued presence of a buried A-horizon. Ultimately, these results indicated at least two intact, sub-plow zone archaeological deposits (likely stratified late Holocene components) at the site. Considering the apparent intact sub-plow zone archaeological deposits, the site was recommended as eligible for the NRHP under Criterion D (Martin 2005).

Data recovery work at Site 23CK267 was conducted in September of 2005. Site 23CK267 was entirely within a fill area, and as a result, it was judged that sub-plow zone deposits at the site would not be impacted. Therefore, the data recovery at Site 23CK267 focused on the near-surface archaeological deposits found directly below the plow zone.

This investigation consisted of the removal of the plow zone in a series of four strip blocks to expose features anticipated at the base of the plow zone. As a result, approximately 846 sq m (9,106.2 sq ft) of plow zone was removed at the site. No features were observed across the block, although some historic disturbance was noted in the southern portion of the site. The landowner, James Crawford, reported that a barn burned at that location. The disturbance consisted of a scatter of brick and glass, with no associated features found.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK298

During the initial archaeological survey of project corridor between ROW station numbers 570 and 580, two isolated finds consisting of historic and prehistoric items were found (Markman et al. 1996) (Figure 7.2). During the resurvey of the area, additional historic and prehistoric artifacts were recovered, and the artifact scatter was designated as Site 23CK298 (Morrow 1997). In addition to the surface collection, one auger core was placed in the site area and revealed fine grained sediments to approximately 160 cm bgs. No further work was recommended at the site, and it was judged not eligible for the NRHP. However, the site was on a landform that was believed to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing at the site, two hydraulic cores were used to sample site landforms within the project area (Martin 2005). The cores revealed shallow (approximately 90–120 cm thick) alluvial/colluvial fan deposits over a weathered bedrock bench. Ultimately, these cores indicated that there was a poor depositional context for finding significant archaeological deposits here. Therefore, no further archaeological work was recommended here for the AOS project.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity is further discussed in Volume II.

Britton Fan Site (23CK299)

The Britton Fan site is located north of Sites 23CK267 and 23CK298 between ROW station numbers 563 and 570 (Figures 7.60 and 7.61). Elevations within the site boundary range between 154.8 and 156 m (508 and 512 ft) AMSL. Geomorphologically, the site is located on the medial portion of a small alluvial/colluvial fan.

Previously, 10 excavation units and 16 hand-excavated auger cores were used to sample the archaeological deposits at the site (Snow 2000). This investigation recovered Early through Late Woodland pottery, as well as Late Archaic through Late Prehistoric diagnostic hafted bifaces from the ground surface and plow zone. Unidentified Woodland pottery was also recovered from the upper sub-plow zone deposits. Features were not found in any of the units (Snow 2000). Based on these results, the site was recommended as eligible for the NRHP.

During CRAI's utility corridor investigation and archaeological testing at the site, two hydraulic cores, three trenches, and four excavation units were used to sample site landforms within the project area (Martin 2005). The hydraulic cores placed at the site revealed approximately 170 to 210 cm of alluvial/colluvial fan deposits over bedrock. A thick sub-plow zone A-horizon was noted as extending to approximately 70 cm bgs. The trenches at the site confirmed the core results and in one trench the results revealed a buried A-horizon at approximately 100 cm bgs.

Figure 7.60. Plow zone removal and unit excavation at Site 23CK299 (Britton Fan).

Excavation units revealed an ephemeral lithic and Late Woodland pottery scatter above 100 cm (39.3 in) bgs. At the footslope of the fan, in the northern part of the site near the unnamed tributary stream, an Early Woodland hafted biface (Dickson Cluster) and some Late Woodland pottery, as well as flakes, were also recovered from the upper 100 cm (39.3 in) bgs. Data recovered from the site investigation indicated a moderate density sub-plow zone artifact scatter associated with at least two stratified components, Late Woodland over Early Woodland, and the site was recommended as eligible for the NRHP under Criterion D (Martin 2005).

Data recovery work at Site 23CK299 was conducted in September of 2005 (Martin 2006a). However, the Britton Fan site was entirely within a fill area, and as a result, it was judged that any deep sub-plow zone archaeological deposits at the site would not be impacted. Therefore, the data recovery investigations initially focused on identifying any features within the near-surface deposits directly below the plow zone. This investigation consisted of two stages.

Stage I consisted of plow zone removal within three strip blocks. The strip blocks were used to expose features that were anticipated at the base of the plow zone. No cultural features were observed in either block, although two areas of artifact concentration (including both flake debris and pottery sherds) below the plow zone were identified. In addition to the scatter of prehistoric materials, a historic disturbance was noted in the southern portion of the western block. The disturbance consisted of burned brick and charcoal. No associated features or additional historic artifacts were found. Also, in places, shallow subsurface colluvial gravels were noted that occur as a series of fingers extending in a downslope direction to the east.

Stage II investigations consisted of six additional excavation units used to delineate the buried Early Woodland component. Each excavation unit terminated on colluvial gravels at approximately 90 to 103 cm (35.4 to 40.5 in) bgs. In addition, one of the hydraulic cores placed near these units also encountered gravels at a depth of approximately 90 cm bgs. Furthermore, low artifact densities were found throughout most of the levels. However, it was noted that the highest density of cultural materials occurred between 30 to 100 cm (11.8 to 39.3 in) bgs. The distribution of artifacts indicated that a series of archaeological components occur below the plow zone that are stratified vertically and horizontally, with the examination of the prehistoric pottery from the Britton Fan site best demonstrating this stratification. Ultimately, a transition in artifact type and count was noted between an upper Late Woodland occupation and a lower Early Woodland occupation. Nevertheless, no significant archaeological deposits were identified directly below the plow zone during the data recovery.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK269

This site was previously recorded by MoDOT archaeologists during a resurvey of the project ROW between station numbers 541 and 550 (Figure 7.2). The site was previously reported by MODOT archaeologists as a small prehistoric lithic artifact scatter, and the NRHP status of the site was not determined at that time.

During CRAI's utility corridor investigation and archaeological testing at the site, one trench and one hydraulic core were used to sample the site setting within the project area (Martin 2005). Both the trench and core revealed very shallow (approximately 70 cm thick) alluvial/colluvial fan deposits overlying weathered bedrock. No archaeological deposits were identified at the site. Considering the poor depositional context found here and lack of significant archaeological deposits identified, no further archaeological work was recommended for the project, and the site was recommended as not eligible for the NRHP.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity are further discussed in Volume II.

Site 23CK270

This site was previously recorded by MoDOT archaeologists during a resurvey of the project ROW between station numbers 532 and 540 (Figure 7.2). The site was reported as a small prehistoric lithic and historic artifact scatter, and the NRHP status of the site was not determined at that time.

During CRAI's utility corridor investigation and archaeological testing at the site, three trenches and three hydraulic cores were used to sample the site setting within the project area (Martin 2005). The trenches and cores revealed different profiles, with shallow alluvial/colluvial fan deposits overlying bedrock in the northern portion of the site, and a shallow veneer of fan sediment overlying Mississippi River alluvium in the eastern part of the site. On the apex of the fan, alluvial/colluvial fan sediments were encountered to a depth of approximately 3 m bgs over bedrock. Trenches, however, did not identify any archaeological deposits, although a moderate possibility for intact sub-plow zone buried archaeological deposits was identified here. Much of the site area was within a fill area, and no significant near-surface archaeological deposits were identified. Therefore, no further archaeological work was recommended here for the project.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected

from the hydraulic cores in the site vicinity are further discussed in Volume II.

Big Branch Fan Site (23CK302)

The Big Branch Fan site is located north of Sites 23CK269 and 23CK270, between ROW station numbers 525 and 532 (Figures 7.62 and 7.63). Elevations within the site boundary range between 154.53 and 155.75 m (507 and 511 ft) AMSL. Geomorphologically, the site is located on the medial portion of a moderately large alluvial/colluvial fan associated with Big Branch, a low order tributary stream that borders the site to the south.

Site 23CK302 was originally identified as a low density lithic artifact and FCR scatter found on the ground surface and in the plow zone (Morrow 1997). Based on these results, the site was not previously recommended eligible for the NRHP. However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

CRAI's utility corridor investigation sampled landforms in the vicinity of Site 23CK302 and identified buried, intact archaeological deposits that were associated with the site (Martin 2005, 2006a). At that time, two trenches, two excavation units, and two hydraulic cores were placed in the site vicinity. A buried A-horizon was observed at approximately 80 cm (24.3 in) bgs in trenches and units placed here. In addition, lithic artifacts and charcoal were recovered from the buried A-horizon, indicating a good potential for thermal features to be associated with these sub-plow zone deposits. These investigations determined that the site had at least one stratified sub-plow zone archaeological component. As a result, the site had significant research potential and was recommended as eligible for the NRHP.

Since the Big Branch Fan site was within a cut area, any deep sub-plow zone archaeological deposits at the site would likely be impacted by construction activities. Therefore, the data recovery focused on delineating and recovering data from any intact and significant archaeological deposits at the site. The data recovery of the Big Branch Fan site began in the fall of 2005, but adverse weather conditions (freezing temperatures, frozen sediments) prevented the completion of data recovery work until the spring of 2006. This investigation consisted of three stages.

Figure 7.62. Block excavation at the Big Branch Fan site.

Stage I consisted of additional phase II testing to identify the extent of the archaeological deposits prior to any data recovery. This included the systematic placement of excavation units and auger cores. The auger cores and units revealed three stratified archaeological components representing Late Woodland and Archaic periods. The upper two components are in the plow zone or are associated with an A-horizon directly below the plow zone, which was 50 to 60 cm (19.6 to 23.6 in) thick in places. The lower component was identified within the B-horizon at the site, beginning at approximately 100 cm (39.3 in) bgs. These results indicated that the vertical and horizontal distribution of artifacts across the site was related to the landforms geomorphic development. Particularly, a relationship between elevations and the presence, or absence, of a buried A-horizon was noted, with the higher elevations at the site containing the buried A-horizon. Lithic artifacts found and associated with the buried A-horizon suggest an older archaeological deposit preserved below a more recent occupation containing Late Woodland pottery. Deeper alluvium containing Woodland pottery occurred in the southern part of the site, which was likely associated with more recent stream migration.

Stage II investigations consisted of block excavation, trenching, and hydraulic coring to provide additional geological data for the site and to recover archaeological data from the three components. A total of 95 excavation units, encompassing approximately 80 cu m (2,825 cu ft), 4 trenches, and 2 hydraulic cores, were completed during this stage of the investigation.

During Stage II trenching, a feature that contained a nearly complete domestic pig skeleton was found extending from the plow zone and determined to be a historic interment. In another trench, two American Bison bones were found just below the plow zone but not associated with any other artifacts or features. These may also represent historic or late prehistoric deposits.

In the excavation blocks, a low density Late Woodland component was identified in the upper levels (56 to 76 cm bgs). Few lithic artifacts were found in this component, and the recovered pottery was similar to several Late Woodland varieties (e.g., cord-marked and grit tempered). One feature was found in these deposits and represented a small burned earth and charcoal scatter that contained flakes and presumably functioned as a small surface hearth. A radiocarbon date from the feature indicates a late, or terminal, Late Archaic time period for the occupation. This suggests some mixing of the archaeological material in the upper deposits.

Below the Late Woodland/Late Archaic zone, another archaeological component was identified within a buried A-horizon and B-horizon between approximately 76 and 106 cm bgs. Numerous flakes and chipped stone tools were recovered, but no pottery was found in these deposits. Five hafted bifaces were included in this assemblage and indicate a Late Archaic association for this component. Radiocarbon dates acquired from suspected surface hearths from this zone indicate a Late Archaic age for these archaeological deposits.

Below this upper Late Archaic component, another zone containing only lithics was identified between 146 and 186 cm bgs. Numerous flakes and a few chipped stone tools were recovered from these deposits. No prehistoric pottery was found at this depth, suggesting another, albeit earlier, Archaic zone. Two features were identified in this zone and interpreted as surface hearths. Radiocarbon dates acquired for these features indicate an earlier Late Archaic component for these deeper archaeological deposits. One of these features had a dense lithic scatter with numerous flakes, one biface fragment, and a hammer stone surrounding it, whereas the other was located approximately 3 m east and at a similar depth. This second feature was associated with a much lower density lithic scatter. Taken together, these two features in the lower zone likely represent two different activities during the same Late Archaic time period.

Along with the units, two trenches were excavated from north to south and two from east to west across the site. Furthermore, two hydraulic cores were placed adjacent to the excavation blocks to better discern the geomorphic context. The trenches and cores revealed a deep surface soil to approximately 65 cm bgs with a buried A-horizon at approximately 95 cm bgs (Ap-A-Bt-Ab horizonation) on the apex of the landform. Coarse alluvial deposits (stratified sand lenses) representing an old stream channel were also identified to the south in the trench. Based on this data and the radiocarbon dates, it appears that different rates of sedimentation have occurred across the site, likely related to prehistoric stream activity. To further provide paleoenvironmental data for the site, one column of pollen and phytolith samples was recovered from the excavation blocks. This analysis suggested a change in vegetation in the site vicinity through time. Specifically, a shift from an oak forest to a more open prairie environment is indicated (personal communication, Linda Scott-Cummings 2008).

The final stage of investigation at Site 23CK302 entailed mechanically stripping portions of the site area in search of additional features. No additional features were identified.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume V of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK303

This site is located north of Site 23CK302 between ROW station numbers 520 and 525 (Figure 7.2). Elevations within the site boundary ranged from approximately 155.14 to 155.75 m (509 to 511 ft) AMSL. Geomorphologically, the site is located on the medial portion of a moderately large alluvial/colluvial fan associated with Big Branch.

The site was previously recorded as a low density prehistoric artifact scatter of an undetermined age found on the ground surface (Morrow 1997). Based on these results, the site was not previously recommended as eligible for the NRHP. However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

CRAI's utility corridor investigation and archaeological testing at the site was conducted in the summer of 2005 (Martin 2005). At that time, two trenches and two hydraulic cores were placed to sample the landform at the site. Cores and trenches revealed that alluvial/colluvial fan deposits became shallower further north across the landform, with approximately 4 m of fan deposits over bedrock in the southern part of the site and approximately 1.5 m of fan deposits over Mississippi River alluvium in the north. No archaeological deposits were identified at the site. Later, it was determined that the site was within a fill area and only surface deposits would be affected. Therefore, considering the lack of significant archaeological deposits identified in the near surface deposits, no further archaeological work was recommended here.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity are further discussed in Volume II.

Site 23CK304

This site is located between a tributary of Big Branch and Pleasant Hill School Road, approximately between ROW station numbers 516 and 519 (Figure 7.2). Elevations within the site boundary ranged from approximately 155.14 to 155.44 m (509 to 510 ft) AMSL. Geomorphologically, the site is located on the medial portion of a moderately large alluvial/colluvial fan. Nearby levee construction and stream channelization were also apparent and had likely affected site deposits.

The site was previously recorded as a low density prehistoric lithic artifact scatter found on the ground surface from which one Small Triangular Cluster hafted biface was recovered (Morrow 1997:58). Furthermore, an auger core was placed in the site area and revealed heavily mottled and gleyed sediments, suggesting a very wet or disturbed setting. Based on these results, the site was not previously recommended as eligible for the NRHP. No further work was conducted at the site during CRAI's utility corridor investigation (Martin 2005). No further discussion of this site is provided in any other report volume.

Site 23CK305

This site is located north of Site 23CK304 between ROW station numbers 502 and 510 (Figure 7.2). Elevations within the site boundary ranged from approximately 155.14 to 155.44 m (509 to 510 ft) AMSL. Geomorphologically, the site is located on the medial portion of a moderately large alluvial/colluvial fan associated with a tributary of Big Branch.

The site was previously recorded as a low density prehistoric and historic artifact scatter of an undetermined age found on the ground surface (Morrow 1997). An auger core placed at the site during this previous investigation indicated that a significant amount of post-settlement alluvium mantled the site area. Based on these results, the site was not recommended as eligible for the NRHP. However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

CRAI's utility corridor investigation and archaeological testing at the site were conducted in the summer of 2005 (Martin 2005). At that time, two trenches, one unit, and two hydraulic cores were placed to sample the landform at the site. Cores and trenches revealed that alluvial/colluvial fan deposits became shallower further south across the landform, with approximately 3 m of fan deposits over Mississippi River alluvium in the northern part of the site and approximately 1.75 m of fan deposits over Mississippi River alluvium in the south. No archaeological deposits were identified at the site during these investigations. Later, it was determined that the site was within a fill area and only surface deposits would be affected. Therefore, considering the lack of significant archaeological deposits identified in the near surface deposits, no further archaeological work was recommended here.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity are further discussed in Volume II.

Site 23CK306

This site is located south of Sites 23CK307 and 23CK308, approximately between ROW station numbers 470 and 475 (Figure 7.2). Elevations within the site boundary ranged from approximately 157.27 to 157.88 m (516 to 518 ft) AMSL. Geomorphologically, the site is located on the medial portion of a small alluvial/colluvial fan.

The site was previously recorded as a low density prehistoric artifact scatter of an undetermined age found on the ground surface (Morrow 1997). Based on these results, the site was not previously recommended as eligible for the NRHP. However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation in the site vicinity, one hydraulic core was conducted at approximately station 467 (Martin 2005). The core revealed that alluvial/colluvial fan deposits were approximately 3 m deep over bedrock. No indications of archaeological deposits were identified at the site during this investigation and no paleosols were noted. Later, it was determined that the site was within a fill area and only surface deposits would be affected.

Therefore, considering the lack of significant archaeological deposits identified in the near surface sediments, no further archaeological work was recommended here.

No further discussion of this site is provided in any other report volume. However, paleoenvironmental data collected from the hydraulic cores in the site vicinity is further discussed in Volume II.

Site 23CK307

This site is located south of Site 23CK308 between ROW station numbers 456 and 460 (Figure 7.2). Elevation within the site boundary was approximately 155.44 m (510 ft) AMSL. Geomorphologically, the site is located on a terrace of Sugar Creek or a very narrow alluvial/colluvial fan.

The site was previously recorded as a low density prehistoric lithic and historic artifact scatter found on the ground surface (Morrow 1997:58). Furthermore, an auger core was placed in the site area and revealed the water table at approximately 50 cm bgs. Based on these results, the site was not previously recommended as eligible for the NRHP. Furthermore, it was determined that the site was within a fill area and only surface deposits would be affected. Considering the lack of significant archaeological deposits identified in the near surface sediments, no further archaeological work was recommended here. No further discussion of this site is provided in any other report volume.

Site 23CK308

This site is located south of Sugar Creek and Site 23CK57 between ROW station numbers 452 and 455 (Figures 7.64 and 7.65). Elevations within the site boundary range between 155.4 and 156 m (510 and 512 ft) AMSL. Geomorphologically, the site is located on a floodplain and a small alluvial/colluvial slope.

Figure 7.64. Overview of Site 23CK308, Trench A during excavation at Unit 3, facing north.

Previously, two excavation units and five hand-excavated auger cores were used to sample the archaeological deposits at the site (Snow 2000). At this time, Woodland pottery was identified within the plow zone and to a maximum depth of approximately 60 cm (18.2 in) bgs. Higher densities of prehistoric pottery were recovered from the plow zone and directly below the plow zone. The pottery included Late Woodland types with either cord-marked or net-impressed surface treatments. Also, auger cores placed here during this initial investigation yielded flakes to a depth of 120 cm (36.5 in) bgs, suggesting a deeper, and earlier, cultural zone. As a result, considering the potential for intact sub-plow zone archaeological deposits, the site was determined to have significant research potential and was recommended as eligible for the NRHP.

During CRAI's utility corridor investigation and archaeological testing at the site, a low density of lithic and pottery artifacts was found (Martin 2005). At that time, two trenches, four excavation units, and one hydraulic core were placed in the site vicinity. Data from the core and trenches identified shallow fan deposits above a bedrock bench, while the northern site areas were on deep alluvial floodplain deposits associated with Sugar Creek.

Lithics and Woodland pottery were found in the plow zone and just beneath it in units placed on the bench in the southern portion of the site. On the floodplain, intact and significant archaeological deposits were within a thicker, preserved A-horizon below the plow zone. A Late Woodland time period was inferred for the upper artifact scatter, whereas a deeper lithic scatter likely represented a stratified, earlier component. Data recovered from the site investigation indicated a moderate density sub-plow zone artifact scatter associated with at least two stratified components: Late Woodland over an unidentified lithic component. The site was recommended as eligible for the NRHP (Martin 2005). However, the site was entirely within a fill area, and as a result, any deep sub-plow zone archaeological deposits at the site would not be impacted. Therefore, the data recovery initially focused on identifying any features within the near-surface deposits directly below the plow zone. Data recovery work at Site 23CK308 was conducted in the fall of 2005 (Martin 2006a).

The data recovery was initiated by removing the plow zone across the entire site area within the ROW to expose features anticipated at the base of the plow zone. As a result, approximately 457 sq m (4,919.1 sq ft) of plow zone removal occurred. The strip block revealed an area of historic disturbance (likely an outbuilding location) and at least 20 dark soil anomalies. A small scatter of lithic and pottery artifacts was also found across the strip block. Excavation work focused on the examination of approximately 20 soil anomalies. Each anomaly was trowel scraped and probed in order to determine its vertical depth. Also, several were bisected in order to delineate their profiles. All of the anomalies were determined to be natural features. Since it was determined that project construction would not affect any significant archaeological deposits at Site 23CK308, no further archaeological work was conducted here.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from the hydraulic cores in the site vicinity are further discussed in Volume II.

Sugar Creek Site (23CK57)

The Sugar Creek site is located to the east of the existing U.S. 61 ROW along Sugar Creek and south of County Road 313 between ROW station numbers 439 and 447 within the current project area (Figures 7.66 and 7.67). Elevations at the site ranged from 155.4 and 156.7 m (510 and 514 ft) AMSL. The site is situated on the alluvial fan and associated terrace of Sugar Creek, which prehistorically formed an oxbow to the southeast of the site. Historically, the oxbow has been cut off, leaving a straight channel to the south of the site.

Figure 7.66. Overview of feature identification in Block F at the Sugar Creek site, facing northwest.

The Sugar Creek site was initially defined by a surface collection conducted in 1984 by Boyd and Walters (1984). Recovered artifacts included a biface, lithic debris, fire cracked rock, and prehistoric pottery sherds. The assemblage suggested that the Sugar Creek site was a Late Woodland period habitation site. The site was revisited in 1994 by Markman & Associates, Inc., who conducted a surface collection, a hydraulic core, and test unit excavation (Markman et al. 1997). Markman's investigation focused on the northern site area. The hydraulic core indicated that an intact A-horizon was present beneath the plow zone; however, this horizon was not evident in the test unit profile. Artifacts recovered during this second site visit included prehistoric pottery sherds, lithic debris, a utilized flake, and projectile points. Most of the temporally diagnostic materials dated to the Late Woodland period. As a result, the site had significant research potential and was recommended eligible for the NRHP.

During the fall of 2005, CRAI conducted the utility corridor investigation and archaeological testing at Site 23CK57 (Martin 2005). Two trenches (B and C) and five test units were excavated to examine different portions of the landforms. During this investigation, significant, intact, and possibly stratified, Woodland period archaeological deposits were documented within the upper 75 cm (22.8 in) of deposits at the site. Soils in the southern site area represented recent alluvium associated with Sugar Creek. Soils in the northern portion of the site were middle to late Holocene age alluvial fan deposits. These fan deposits overlie Mississippi River terrace deposits (early Holocene). A dense prehistoric pottery concentration was noted at 30 to 40 cm (9.1 to 12.1 in) bgs in this area. Additional prehistoric lithic and pottery artifacts were located at 75 cm (22.8 in) bgs, which may represent an earlier Woodland component. Finally, two flakes were recovered from 90 cm (27.4 in) bgs. Due to the small sample size, it was unclear if these two flakes represented an additional component or if they had been displaced by non-cultural forces. Furthermore, analyses of pollen and phytolith samples from a trench at the site indicated a vegetation record spanning the Late Pleistocene and Holocene periods for sub-plow zone deposits (personal communication, Linda Scott-Cummings 2008).

Most of the site area was located within a proposed fill area; however, it was determined that project construction would impact near-surface archaeological deposits. For this reason, data recovery focused on possible features at the base of the plow zone (Martin 2006a, 2006b).

Data recovery (Stage I) at the Sugar Creek site consisted of plow zone removal within the ROW to document intact features and community patterns associated with the near-surface component(s). The work completed in the fall of 2005 consisted of plow zone removal from strip blocks A, D, and E. Numerous soil anomalies were located and test units were placed to investigate a few of these stains. Additionally, 14 stains were excavated as features, with 8 of these judged to be cultural pit features. In the spring of 2006, the data recovery resumed with plow zone removal from strip blocks F, G, H, I, and J. Numerous soil anomalies were identified and excavated as either pit features or post holes (Figure 7.66). Plow zone stripping was concentrated across the north end of the site, where the archaeological deposits were located immediately beneath the plow zone (on the higher terrace). A variety of feature types were identified and consisted of storage pits, earth ovens/roasting pits, processing pits, shallow basins, post holes, and pits used for mortuary purposes. These feature types suggested a longer-term occupation.

The southern site area contained deeper, stratified archaeological deposits. Plow zone removal was attempted, but no distinct prehistoric surface could be discerned. Ten additional test units were excavated in an attempt to locate prehistoric surfaces and features. Cultural features were identified and partially excavated (between 156.54-156.13 m AMSL); however, no long-term stable prehistoric surfaces were identified. Consequently, plow zone stripping was halted, since these deeper deposits would not be impacted by the current project.

In all, a total of 262 (non-post hole) soil anomalies were identified in stripped blocks and test units with 189 (72 percent) being investigated. A total of 159 (84 percent) of the excavated non-post hole soil anomalies were cultural in origin. Also, 256 suspected post hole stains were identified, with 186 (73 percent) excavated. Seventy of the identified post hole sized anomalies (22 percent) were left unexcavated but were mapped. A total of 73 (39 percent) of the 186 excavated stains were prehistoric post holes.

Cultural material recovered from the features, test units, and post holes included prehistoric lithic and pottery artifacts, botanical remains, and a small amount of faunal materials. Diagnostic lithic materials included various Late Woodland hafted bifaces (e.g., Scallorn, Klunk, and Lowe Clusters). A single Middle Woodland, Snyders Cluster hafted biface and other stone tools, such as hammerstones, unifaces, and undiagnostic bifaces, were also recovered from features at the site. Pottery recovered at the site was also largely Late Woodland in age. Surface treatments were predominately either net-impressed or cordmarked, but smoothed-over varieties of these and plain examples also occurred. Decoration is restricted to the vessel rims and necks (interior and exterior) and most commonly included nodes, doweling, cordwrapped-stick, and dentate stamps. Features typically contained a mix of pottery types, which is dissimilar to the Late Woodland occupation at 23LE178/357 (see this volume). A considerable amount of botanical remains were recovered from feature contexts at the site. Plant utilization is examined using data obtained from micro-botanical, macro-botanical, and pottery residue analysis.

Few features were superimposed, although one area of the site had numerous superimposed pits (northern center, Block G). This area included mortuary contexts (see below), which were themselves superimposed by other pit features. The presence of several overlapping features at the site further suggests frequent reuse of this location during the Late Woodland period. Additionally, there appears to be a coherent spatial arrangement of post holes at the site. These clusters of pit features and post holes suggest that at least three prehistoric structure locations were within the areas investigated.

Data recovery at the Sugar Creek site resulted in the identification and recovery of

human remains from five prehistoric features. One feature produced an isolated dental element that was probably shed naturally due to pathology or trauma, and it was an incidental inclusion in the feature fill. Two other features produced fragmentary, secondarily-deposited remains of a few skeletal elements, and these human remains may have been incidental inclusions in which prehistoric disturbance resulted in deposition from other mortuary features or facilities at the site. Alternately, the remains could have been purposefully included during mortuary activities, but this could not be confirmed. The two remaining features were burial pits that contained single, primary human interments. One produced fragmentary dental and post-cranial remains of a flexed adult of indeterminate sex, and the other produced a well preserved and almost completely articulated flexed skeleton of a late adolescent female. In all, the mortuary component of the Sugar Creek site consisted of two features used specifically for interment of the dead. The other three features consisted of two pits for which a mortuary context was inferred but could not be confirmed, and another pit that was used for disposal of a naturally-shed tooth. Temporally-diagnostic artifacts were incidentally included with the feature fill of the primary internments and consisted of Late Woodland pottery sherds. The lack of grave inclusions and flexed position of the bodies for interment further suggests the burials were associated with the Late Woodland temporal period.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume VIII of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK245

This site was previously recorded approximately 100 m north of Site 23CK57 between ROW station numbers 431 and 438 (Figures 7.2 and 7.68). The site was reported as a low density prehistoric lithic and historic artifact scatter that was recommended not eligible for the NRHP (Markman et al. 1996). However, the site was on a landform that was judged to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing in the site vicinity, three trenches, three excavation units, and one hydraulic core were used to sample site landforms within the project area (Martin et al. 2006). Seven flakes were recovered from the plow zone of one excavation unit. Furthermore, the trench and core results indicated that there are shallow alluvial/colluvial fan deposits overlying bedrock at approximately 1 m bgs in the site area. Considering the lack of significant archaeological deposits found and the poor depositional context, the site was recommended as not eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK246

This site was previously recorded approximately 300 m north of Site 23CK245 between ROW station numbers 423 and 427 (Figures 7.2 and 7.69). The site was reported as a low density prehistoric lithic artifact scatter from which a "Sedalia-like" hafted biface fragment was found (Markman et al. 1996). Furthermore, the geomorphic setting was considered good for containing deeply buried archaeological deposits. Therefore at that time, an excavation unit and hydraulic core were conducted to assess the NRHP eligibility of the site. The core indicated that a relatively shallow mantel of alluvial/colluvial fan deposits was present at the site to approximately 1.35 cm bgs. These fan deposits were found to overlie older Pleistocene terrace deposits. Furthermore, the excavation unit did not find any archaeological deposits. Based on these results, the site was determined as not eligible for the NRHP (Markman et al. 1996). However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing in the site vicinity, 2 trenches, 1 excavation unit, 1 hydraulic core, and 12 hand-excavated auger cores were used to sample site landforms within the project area (Martin et al. 2006). A low density of artifacts was recovered, largely from the ground surface or plow zone of 1 excavation unit and 3 auger cores. Furthermore, like Site 23CK245, the trench and core results indicated that there are shallow alluvial/colluvial fan deposits overlying bedrock at approximately 1 m bgs in the site area. Considering the lack of significant archaeological deposits and the poor depositional context, the site was recommended as not eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Killdeer Site (23CK310)

The Killdeer site is located between ROW station numbers 415 and 420 within the project area (Figures 7.70 and 7.71). Modern ground surface elevations at the site range between approximately 159 and 162.2 m (522 and 532 ft) AMSL. The setting for the Killdeer site is a sandy Pleistocene-age terrace.

Toby Morrow (1997) notes that Site 23CK310 was originally recorded by Rodger Boyd as a moderately sized lithic and tool scatter that yielded bifaces (e.g., a Godar-like point base), a grooved axe, hammer stone, a piece of mussel shell, and a scatter of FCR. Boyd's work was an informal survey that occurred following the completion of the 1994 phase I survey (i.e., Markman et al. 1996, 1997). The site was not revisited nor evaluated for its NRHP eligibility until the current investigation.

Figure 7.70 Excavation in progress at Block 2, the Killdeer site, facing west.

CRAI's utility corridor investigation and archaeological testing in the site vicinity was conducted in stages to determine the nature, extent, and integrity of the archaeological components within all, or portions, of the impact area of the site (Martin et al. 2006). Initially, two trenches were placed within the utility corridor on, or near, this site. These trenches were located near two previously placed hydraulic cores. Both cores encountered sands and gravels below 100 cm bgs. The utility corridor was located on the lower, distal portion of the landform, and trench profiles revealed very weathered deposits (frequent strong brown mottles [iron masses] and manganese nodules) below 60 cm bgs. In excavation units placed adjacent to the trenches, no artifacts were found within, or below, the weathered deposits. The upper deposits were suggestive of Holocene age fan sediments, with a preserved A-horizon beneath the plow zone. Flakes were recovered from this A-horizon in the units. Ultimately, significant archaeological deposits within the utility corridor were not indicated by these results, and no further work was recommended within the utility corridor at the Killdeer site (Martin et al. 2006).

Stage I investigations within the ROW included the completion of a series of auger cores and test units (1-x-1 m). A preserved A-horizon was encountered beneath the plow zone on the upslope portion of the fan. Six excavation units were placed to assess this higher part of the landform outside the utility corridor. These test units provided a north-to-south profile across the landform. Recovered materials included both prehistoric and historic artifacts. Prehistoric artifacts consist of lithic debris, lithic tools, pottery, and fire cracked rock. Historic artifacts include, but are not limited to, architectural remains and domestic items, as well as a variety of material related to furnishings, clothing, and other personal articles. All the historic artifacts were found in the plow zone. Prehistoric material was found in the plow zone, the sub-plow zone A-horizon (20–25 cm thick), and the B-horizon. Several lithic tools and pieces of prehistoric pottery, charcoal flecking, and fire cracked rock were recovered from the sub-plow zone A-horizon. The B-horizon contained cultural materials in lower densities. Increasing gravels and large glacial boulders occurred below the B-horizon. Although most of the site area was located within a proposed fill area, it was judged that project construction would impact near surface archaeological deposits. For this reason, data recovery focused on archaeological deposits at the base of the plow zone.

Seven additional test units were completed along the site peripheries on the slope of the landform. These profiles demonstrated thicker plow zones with a thinner or absent sub-plow zone A-horizon, which differed from profiles on the landform apex. Despite the thinner sub-plow zone A-horizon, one prehistoric feature was identified along the eastern site periphery as a small pit or large post hole. Test units along the northern and southern boundaries appear to transition almost directly into a B-horizon beneath the plow zone. Test units along the eastern boundary also did not appear to have a preserved A-horizon beneath the plow zone. Large glacial outwash rocks and high gravel counts were present in the eastern units at much shallower depths than seen elsewhere on site, suggesting the occurrence of long-term erosion.

Two additional areas were tested adjacent to the main artifact concentration at the Killdeer site. Five test units were placed in each area in a cruciform pattern. A slight rise to the south of the main concentration yielded relatively intact stratigraphy; however, the artifact concentration was very low and largely confined to the plow zone. Further to the north, near a tree line and tributary drainage, a low and flat area yielded a large amount of historic material and a lower amount of prehistoric material, most of which was from the plow zone.

Of the recovered artifacts, several items suggested a temporal affiliation. A Late Woodland pottery sherd and Lowe Cluster hafted biface were recovered just beneath the plow zone. A second broken hafted biface was recovered from the B-horizon, which

suggested an earlier temporal affiliation. One final pattern was seen in the historic materials recovered from the Killdeer site. Recovery of historic materials increased dramatically toward the northern end of the site, where counts for historic materials from the plow zone were much higher. These data suggested that a historic component was present at the northern extent of the site. Most of the historic items were small and relatively dispersed, suggesting that the items had undergone extensive plow damage. Furthermore, the historic assemblage was consistent with a nineteenth-century farmstead, including moderate amounts of architectural debris and larger percentages of ceramic and glass. Since the historic component was largely centered to the north of the prehistoric concentrations, it appeared that the prehistoric component at the site had not been greatly impacted by any historic intrusions.

At this time, Stage 2 block excavation was recommended to recover additional data from these deposits. Excavation Block 1 was initially laid out in an area that demonstrated intact natural stratigraphy, as well as denser prehistoric artifact concentrations, on the landform. Excavation Block 2 was positioned to further investigate the area around the previously identified cultural feature. Each of these excavation blocks was initially 4-x-4 m in size. Based on positive results, each was expanded to recover data from additional areas of the site. In general, block excavation involved removing the plow zone and hand-excavating the sub-plow zone deposits.

Due to high artifact densities, Excavation Block 1 was extended south and west. Most important in Excavation Block 1 was the discovery of a human skeletal fragment at the same depth as Middle Woodland diagnostic material (Snyders Cluster hafted biface and copper pin). At this stage, the skeletal fragment was photographed and left in-situ within the excavation while further data recovery strategies were developed through consultation with MoDOT and the Missouri State Historic Preservation Office (SHPO). It was decided that additional hand excavation was needed to explore a 1 sq m area surrounding the discovery, but it was also decided not to go any deeper than 10 cm above the level the skeletal fragment was found. This resulted in the identification of a large, oval-shaped dark stain. Additional work in Excavation Block 1 around the skeletal fragment was also completed, with the recovery of additional pottery and flakes as well as a large fragment of Cobden chert in the Middle Woodland zone. No additional bone or any other evidence of features was found.

Aside from the previously mentioned Woodland components, Block 1 excavations yielded a relatively low density scatter of Early Woodland pottery sherds and a lithic scatter in sub-plow zone deposits stratified below the Late and Middle Woodland deposits. The sandy paste and sand or crushed-rock temper (grit) surface treatments and incised decorations are similar to Early Woodland, specifically Black Sand, pottery recovered from surrounding regions. Although this material was not recovered from feature contexts, its recovery provides valuable insight into the Early Woodland period in northeastern Missouri.

After MoDOT consulted with tribal representatives and the SHPO, it was decided that the stain and the remaining unexcavated area surrounding the human skeletal fragment, encompassing at least a 4-x-4 m square, would be investigated for additional human remains. Excavation of the remaining units within this vicinity produced no additional human skeletal remains, and the stain was found to be non-cultural, resulting instead from bioturbation. The isolated human skeletal element recovered at the Killdeer site consisted of the fragmentary shaft of an unsided humerus that was broken into 1 large and 22 small pieces. The bone was from an adult of indeterminate sex. No other inferences regarding the skeletal element could be made, due to fragmentation. Artifacts recovered from within the vicinity of the human skeletal remains consisted primarily of lithic debitage, pottery sherds, and faunal remains. Although several diagnostic artifacts were recovered in nearby units, including a complete Snyders Cluster hafted biface and 1 copper pin, their direct

association with the remains could not be substantiated.

Excavation Block 2 was expanded in size to a 6-x-6 m area when additional features were documented (Figure 7.70). These included a mix of prehistoric and historic features. Interestingly, none of the prehistoric features yielded any pottery, suggesting that they were not associated with the Woodland components in Excavation Block 1. Since only lithics were found within these features, it is likely that they represent a separate Archaic component. The historic material is mostly mid- to late-nineteenth-century domestic items with few modern artifacts. Furthermore, the historic artifacts and features suggested a residence, but informant interviews with the landowner and nearby landowners did not reveal any specific information regarding this component of the site.

Due to the presence of cultural features, Stage 3 mechanical plow zone removal was recommended in the vicinity of Excavation Block 2. Additional features were encountered during plow zone removal, including several large, likely structural, historic features. In all, 32 cultural features were identified in, and around, Excavation Block 2. Many of these (n = 12) were associated with the historic component at the site, 8 features were associated with the prehistoric occupation(s), and the 12 remaining post holes could not be associated with a component. The historic features represent trash pits, post holes, and a cellar. Most of the prehistoric features represented small, shallow basins; however, 2 features represent overlapping pit complexes. The prehistoric features are closely grouped; therefore, the overlapping pit features are more likely a result of function than reuse of the site. No temporally diagnostic, prehistoric materials were recovered from Excavation Block 2.

The historic component of the site represents a domestic occupation dating during the second half of the nineteenth century and into the twentieth century. This coincides with archival documentation that indicates that the property was sold to Abram W. Mitchell in 1853 and was later owned by the J.P. Davis family (circa 1896) and then the Dawson family beginning in 1907. The abundance of architectural remains (cut nails, wire nails, and window glass fragments) firmly indicates that a building was once standing and that it was constructed during this period. A wide variety of domestic group items (i.e., ceramic and glass container types, cookware, glass tableware, utensils) indicate that food was prepared, consumed, and stored at the site. The ceramic decoration and glass container and tableware colors indicate that the occupation of the site was post-Civil War era and very early twentieth century. The variety of other artifacts found at the site, namely buttons, buckles, a safety pin, a skeleton key, dolls, smoking pipes, furnishings, hardware, and ammunition, in conjunction with the features discussed above, decidedly support the residential use for the site. It is interesting to note, however, that historic atlases dating to 1878, 1896, and 1915 do not show a structure at the site (the property owners lived across the street), and it may be surmised that the residential structure represents a tenant or servant's home.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume IX of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Logsdon Fan Site (23CK59)

The Logsdon Fan site is located between ROW station numbers 407 and 413 within the project area (Figures 7.72 and 7.73). Elevations at the site range from between approximately 160.3 to 163.4 m (526 and 536 ft) AMSL. Geomorphologically, the site is located on the medial portion of a moderately large alluvial/colluvial fan associated with an unnamed low order tributary stream that borders the site to the south.

Figure 7.72. Overview of excavation work being conducted at Locality B on the Logsdon Fan site, facing north.

The Logsdon Fan site was originally recorded by Boyd and Walters (1984) as a small lithic scatter and was resurveyed in 1994 (Markman et al. 1996). Based on these reconnaissance surveys, the site was determined to be not eligible for the NRHP. Although the site was not recommended for further work, the setting in which it was found suggested a good potential for the preservation of archaeological deposits; therefore, utility corridor investigations were conducted here by CRAI to better explore this potential.

The utility corridor survey and archaeological testing occurred within the project utility corridor at the Logsdon Fan site in March of 2006 (Martin et al. 2006). The utility corridor investigations included the placement of two trenches, three test units, and one hydraulic core within the site vicinity. These initial investigations identified a low density prehistoric lithic and pottery scatter just below the plow zone, as well as a deeper, likely Archaic, lithic artifact scatter within a buried A-horizon at approximately 150 cm bgs. These results indicated that the site retained significant research potential and was recommended as eligible for the NRHP. Furthermore, considering that a majority of the site area was within a cut area, data recovery was recommended. The data recovery work at the Logsdon Fan site occurred between April and June of 2006. This work was conducted in three stages (Martin et al. 2006).

Stage I consisted of the assessment of the shallow sub-plow zone deposits with a total of 20 excavation units systematically placed within the utility corridor in the vicinity of the initial discoveries. A very low density of artifacts was recovered, and no features were found in these units. Based on these results, it was determined that the near surface component did not contribute to the site's NRHP eligibility.

When the initial Stage I units were completed, large blocks of the utility corridor were mechanically excavated to sample and recover data from the deeper cultural zone previously observed in the trench. This second step of Stage I included excavation units that were arranged across block and trench floors to sample and recover data from the deeper deposits. In total, 6 trenches, 4 hand-excavated auger cores, and 53 hand-excavated units were completed within the utility corridor.

Initially, 2 trenches (designated Blocks A and B) were mechanically excavated to within 10–20 cm above the buried A-horizon, and a total of 4 excavation units were arranged in their floors to sample the deposits. The 2 test units placed at Block A, which was located approximately 10 m south of the trench in which the buried A-horizon was originally identified, revealed very coarse, stratified sand and gravel deposits, and no artifacts or evidence of features were discovered. These deposits were interpreted as tributary stream channel alluvium. In Block B, which was located approximately 20 m north of Block A, dark brown and heavily mottled, gleyed clays were identified in the 2 excavation units there. Furthermore, similar to Block A, no artifacts or features were found. These clayey deposits were found at a similar depth to the previously identified buried A-horizon and were interpreted as soils that formed in a wetland environment. Considering the negative results in the 2 blocks, it was determined that additional trenching and units would focus closer to the original discovery, as well as explore deeper deposits south of the stream sediments identified in Block A.

The area south of Block A within the utility corridor, where the stream deposits were observed, was designated Locality A. Two additional trenches and 31 additional excavation units were placed to explore the deposits in Locality A. One trench was orientated perpendicular to the previously identified stream deposits and followed the sandy alluvium south until fine-grained sediments were found associated with a buried A-horizon. The buried A-horizon sloped downward toward the stream deposits, with the depth of the buried A-horizon approximately 110 cm bgs in the south to roughly 170 cm bgs in the north near the stream deposits. Then, the trench was expanded to a block and an approximately 5-x-15 m area of excavation units sampled the buried A-horizon. Units closest to the stream deposits yielded only a few flakes (between 3 and 5 per unit) and some charcoal from the buried A-horizon. Further south, units revealed a larger concentration of lithic artifacts associated with the buried A-horizon. Chipped stone artifacts recovered from this archaeological deposit included bifaces, a uniface, and a hammer stone. Feature 1, a small surface hearth, was identified in the southern end of the block. This feature consisted of a concentration of charcoal, burnt earth, and flakes. A radiocarbon date from Feature 1 indicated an early Holocene age for the feature and associated buried A-horizon in Locality A. Finally, additional trenches were placed in the floor of the Locality A block to delineate the cultural zone outside the utility corridor and to explore deeper deposits. One trench extended an additional 142 cm below the block floor (a total of approximately 3 m bgs). In this trench, another deeper buried soil was identified, and it resembled sediments seen elsewhere in the project associated with Mississippi River alluvium. Generally, these deposits were redder in color and contained stratified lamina of sands and clays; no additional archaeological deposits were identified in these sediments. Another trench was used to explore the deposits upslope and revealed that the buried A-horizon only extended a short distance upslope.

The area north of Locality A within the utility corridor was designated Locality B, and 2 additional trenches, 18 excavation units, and 4 hand-excavated auger cores were placed to explore the deposits here. Similar to Locality A, sandy sediments were observed grading to silts and clays, and a buried A-horizon was observed further from the previously identified stream deposits. Excavation units that sampled the buried A-horizon identified another lithic artifact concentration associated with features. Chipped stone artifacts recovered from this archaeological deposit included bifaces, unifacial tools, a blade, and a core.

The two features in Locality B were identified in the northern end of the block and consisted of concentrations of charcoal and burnt earth that resembled one of the features in Locality A. In general, the depth of the deposits, as well as the sediment characteristics, were similar to those seen in Locality A, tentatively suggesting that they were associated. A radiocarbon date from Feature 2 also indicated an early Holocene age for the feature and associated buried A-horizon in

Locality B. Four auger cores were placed across the floor of the trench to provide additional information regarding deeper sediment stratigraphy here. These cores revealed yellowish brown, sandy clay approximately 50 cm below the buried A-horizon, and test units that sampled these deposits indicated that they were archaeologically sterile. Ultimately, the block excavation at Localities A and B helped demonstrate that archaeological deposits with good integrity were present at the site and that further investigation should proceed within the project area to delineate and recover any additional associated data outside the utility corridor.

Stage 2 consisted of the placement of 56 hand-excavated auger cores, 9 trenches, and 21 excavation units on the slope and apex of the landform. Initially, auger cores were systematically placed approximately 10 meters apart along east to west transects upslope from Localities A and B. Flakes and charcoal were recovered from sub-plow zone deposits in several of the auger cores, with the greatest density of positive auger cores occurring on the large central rise just upslope from Localities A and B. Therefore, trenches and excavation units were placed across the central part of the rise to investigate the archaeological deposits identified from the auger cores and to guide data recovery. Overall, a low density lithic scatter was found in a majority of these exploratory trenches and units. However, upslope from Locality B, a paleosol with a high density of lithic artifacts was identified. Therefore, these archaeological deposits were the focus of the final stage of the investigation.

To complete the data recovery at Site 23CK59, a total of 48 excavation units were arranged within a block centered on the high density sub-plow zone scatter identified in the previous upslope portion of the landform. This block area was designated Locality C. A high density of lithic artifacts (flakes, tools, and cores) was recovered from an approximately 20–30 cm thick zone that occurred above glacial gravels. No features were found, but one probable activity area (where the highest density of artifacts was recovered) was identified in the western part of the block. The lack of prehistoric pottery and the stratigraphy suggest that these deposits may be from a similar time period as the components at Localities A and B. The recovery of data from Locality C was followed by the placement of 2 additional trenches, which provided access to undisturbed deposits from which pollen/phytolith, micromorphology, and bulk soil samples were taken from representative sediment zones. This environmental sampling represented the conclusion of the data recovery at the Logsdon Fan site.

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume IV of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK60

This site was previously recorded approximately 200 m north of Site 23CK59 between ROW station numbers 395 and 400 (Figures 7.2 and 7.74). The site was previously reported as a small lithic scatter that was not relocated during the 1996 survey (Boyd and Walters 1984; Markman et al. 1996). The site was recommended as not eligible for the NRHP (Markman et al. 1996). However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, two trenches and one excavation unit were used to sample an alluvial/colluvial slope in the site vicinity within the project area (Martin et al. 2006). The trenches revealed shallow fan deposits overlying glacial gravels at approximately 110 cm bgs. Three flakes were recovered from the plow zone of the excavation unit here. Considering the depositional context and the lack of significant archaeological deposits found, the site was recommended as not eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK61

This site was previously recorded approximately 100 m north of Site 23CK60 between ROW station numbers 390 and 392 (Figure 7.2). The site was previously reported as a small lithic scatter that was not relocated during the 1996 survey (Boyd and Walters 1984; Markman et al. 1996). The site was recommended not eligible for the NRHP (Markman et al. 1996). However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, one trench and one excavation unit were used to sample an alluvial/colluvial slope in the site vicinity within the project area (Martin et al. 2006). The trenches revealed shallow fan deposits overlying glacial gravels at approximately 100 cm bgs. Furthermore, no archaeological deposits were found in the trench or unit. Considering the depositional context and the lack of significant archaeological deposits found, the site was recommended as not eligible for the NRHP (Martin et al. 2006).

No further discussion of this site is provided in any other report volume. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK239

This site was previously recorded in the southwest corner of the U.S. 61 and SR 27 intersection, approximately between ROW station numbers 381 and 384 (Figure 7.2). The site was previously reported as a historic school/residence and a low density prehistoric lithic scatter (Markman et al. 1996; Snow 2000). The site was determined to be not eligible for inclusion in the NRHP. However, the site was on a landform that was believed to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

Since no further archaeological work was recommended at this site, and considering the amount of sampling CRAI conducted in the vicinity on the same landform within the project area, no work was conducted here during CRAI's utility corridor investigation. No further discussion of this site is provided in any other report volume.

Site 23CK311

This site was previously recorded in the northwest corner of the U.S. 61 and SR 27 intersection between ROW station numbers 378 and 380 (Figures 7.2 and 7.75). The site was previously reported as a historic farm/residence scatter. Structures at the site had been demolished in the late twentieth century causing disturbances, and the site was recommended as not eligible for the NRHP (Morrow 1997). However, the site was on a landform that had a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, one trench and one excavation unit were used to sample an alluvial/colluvial slope in the site vicinity within the project area (Martin et al. 2006). A foundation area and a historic artifact scatter were noted on the ground surface. The trench and unit were placed to investigate the foundation and revealed a mixed prehistoric and historic scatter along with evidence of burning. Three prehistoric flakes were recovered from disturbed context in the excavation unit. Considering the depositional context and disturbances, our investigations confirmed the previous results, and the site was not recommended as eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series.

Site 23CK312

Site 23CK312 is located along U.S. 61 near the Running Fox elementary school at ROW station number 383 within the project area (Figures 7.2 and 7.76). Elevations at the site within the project area range between approximately 158.5 and 160 m (520 and 525 ft) AMSL. Geomorphologically, the site is located on a remnant Pleistocene-age terrace adjacent to an old stream or river channel (Hajic et al. 1996).

Toby Morrow (1997) notes that Site 23CK312 was originally recorded by Rodger Boyd as a small lithic scatter during an informal survey following the completion of the 1994 phase I survey (i.e., Markman et al. 1996, 1997). The site was not revisited nor evaluated for its NRHP eligibility until the current survey. Because landowners would not permit CRAI to access their property, Site 23CK312 was not investigated until the spring of 2006 (Martin et al. 2006). At that time, the utility corridor investigations and archaeological testing were conducted and consisted of 1 hydraulic core, 2 trenches, and 10 excavation units.

The core and trenches revealed a shallow, preserved A-horizon below the plow zone. Lithic artifacts and prehistoric pottery, as well as charcoal, were encountered in excavation units that sampled these deposits. Below approximately 1 m, sands and gravels were encountered. Archaeological deposits contained a light density of artifacts, mostly from the plow zone but also from slightly deeper deposits on the landform slope. Furthermore, no features were found. Ultimately, the site represents an ephemeral scatter of Woodland pottery, charcoal, and lithics in a disturbed context. Considering the amount of testing completed with no significant, intact archaeological deposits found at Site 23CK312, the site was not recommended as eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK63

This site was previously recorded approximately 200 m south of Site 23CK64 in the northeast corner of the U.S. 61 and SR 27 intersection between ROW station numbers 377 and 380 (Figure 7.2). The site was previously reported as a small lithic scatter that was not relocated during the 1996 survey (Boyd and Walters 1984; Markman et al. 1996). The site was recommended as not eligible for the NRHP (Markman et al. 1996). However, the site was on a landform that was believed to have a good potential for buried archaeological deposits and was subject to additional archaeological investigation as part of this project.

During CRAI's utility corridor investigation and archaeological testing, one trench and one excavation unit sampled the alluvial/colluvial slope in the site vicinity within the project area (Martin et al. 2006). The trench revealed shallow fan deposits overlying gravelly glacial outwash at approximately 130 cm bgs. Furthermore, no archaeological deposits were found in the trench or unit. Considering the depositional context and the lack of significant archaeological deposits found, the site was recommended as not eligible for the NRHP (Martin et al. 2006).

No further discussion of this site is provided in any other report volume. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK64

Site 23CK64 is located between ROW station numbers 362 and 371 within the project area (Figures 7.2 and 7.77). Elevations at the site within the project area range between approximately 158.5 and 161.5 m (520 and 530 ft) AMSL. The geomorphic setting for Site 23CK64 is a remnant Pleistocene-age terrace adjacent to an old stream or river channel (Hajic et al. 1996).

Site 23CK64 was originally recorded in 1984 (Boyd and Walters 1984) as a small lithic scatter and was resurveyed in 1994 (Markman et al 1996). Two Nebo Hill Cluster hafted bifaces, a drill, groundstone items, and hematite were found during these surveys. Based on the surface reconnaissance, a phase II NRHP evaluation was recommended. Previous hydraulic coring at the site in 1996 found no evidence of a buried soil at the site but did identify a shallow, intact A-horizon just below the plow zone (Hajic et al. 1996). The site was not revisited nor evaluated for its NRHP eligibility until the current survey. Because landowners would not permit CRAI to access their property, Site 23CK64 was not investigated until the spring of 2006 (Martin et al. 2006). At that time, 2 hydraulic cores, 7 trenches, and 12 excavation units, as well as approximately 1,000 sq m of plow zone removal, were conducted at the site.

The core and trenches revealed a shallow, preserved A-horizon below the plow zone and an apparently older, more weathered, soil profile below 150 cm bgs. During the initial testing, flakes and a Late Archaic Stemmed Cluster hafted biface were recovered at the site. Flakes, a core, and FCR were recovered from the upper 1.3 m of 2 test units that sampled the portion of the site on the west side of U.S. 61. No artifacts or evidence of features were noted below approximately 130 cm bgs. Therefore, additional units and trenches were placed near the initial units where sub-plow zone archaeological deposits were found. These units and trenches revealed very sandy and gravelly deposits with a low density of lithic artifacts. The sands and gravels are suggestive of high-energy stream deposits most likely associated with an old stream channel. Ultimately, the majority of the archaeological material that was found at the site was from the plow zone or ground surface, with decreasing flake counts occurring deeper in the units. Even in a suspected buried A-horizon, very few, or no, flakes were found. Furthermore, no evidence of prehistoric cultural features (e.g., charcoal, burnt earth, or FCR) was found in any of the units, trenches, or strip blocks. Considering the amount of testing completed with no significant, intact archaeological deposits found at Site 23CK64, the site was not recommended as eligible for the NRHP (Martin et al. 2006).

More detailed discussions of the site, materials recovered, and the results of the investigations are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Site 23CK65

This site was previously recorded north of Site 23CK64 between ROW station numbers 360 and 362 (Figure 7.2). The site was previously reported as a small prehistoric lithic and historic artifact scatter (Boyd and Walters 1984; Markman et al. 1996). Recent disturbances were noted to have affected site deposits, and the site was recommended as not eligible for the NRHP (Markman et al. 1996).

During CRAI's utility corridor investigation and archaeological testing, a mid-twentieth-century residential structure was observed in the site vicinity. Considering the age of the structure and the noted previous disturbances, no further archaeological work was recommended here for the AOS project. No further discussion of this site is provided in any other report volume.

Windy Hill Site (23CK66)

The Windy Hill site, 23CK66, is located on a terrace landform overlooking the Fox River between ROW station numbers 350 and 360 within the project area (Figures 7.78 and 7.79). The site is located on a high terrace overlooking the Fox River.

Figure 7.78. Overview of the Windy Hill site depicting Feature 12 (arc of post holes) facing west.

The Windy Hill site was originally recorded in 1984 (Boyd and Walters) as a small lithic scatter and was resurveyed in 1994 (Markman et al. 1996). During the initial site recording, materials collected included lithic debris, a core, core fragments, and a biface fragment. Fire cracked rock was observed but not collected. Between the initial visit in 1984 (Boyd and Walters) and the revisit in 1994 (Markman et al. 1996), a residential structure had been built on the portion of the site overlooking the Fox River north of a secondary road that bisected the site. No additional materials were observed or collected during the site revisit. Based on these two surface investigations, the site was determined to be not eligible for listing in the NRHP. Since the site was determined not NRHP eligible during Markman's survey, no additional testing or subsurface geoarchaeological investigations were conducted at that time (Markman et al. 1996).

Although the site was not recommended for further work, the environmental setting in which it was found suggested a good potential for the preservation of archaeological deposits; therefore, additional geoarchaeological investigations were suggested during the utility corridor investigation to better explore this potential. The utility corridor investigations were conducted in the spring of 2006 to determine the nature, extent, and integrity of any archaeological components within all, or portions, of the impact area at the site (Martin et al. 2006). These results assisted in determinations to proceed to subsurface testing and ultimately, in data recovery by providing data on the portion(s) of the site that would have the greatest information return.

A pedestrian survey and a series of hand-excavated auger cores were used to investigate the utility corridor at the site. The auger core survey suggested that shallow Holocene age sediments were present at the site. The pedestrian survey recovered lithic debris, a biface, a core, and fire cracked rock but no temporally diagnostic materials. The bulk of these items were recovered from the northern site area, which is a prominent rise overlooking the Fox River. Based on the potential for intact, sub-plow zone deposits and a material assemblage that suggested a variety of activities and a short-term occupation, sub-surface testing was recommended.

In all, 17 test units were completed at the Windy Hill site. Twelve 1-x-1 m excavation units were initially completed on a large checker board pattern with 4 placed in the utility corridor and 8 within the ROW. When a large soil anomaly was identified, 5 additional test units (four 1-x-1 m and one 1-x-0.5 m) were excavated to the base of the plow zone to fully expose the soil anomaly (Feature 1), which was later determined to be non-cultural.

Nine of the original 12 test units contained an intact, sub-plow zone, A-horizon from which artifacts were recovered. Artifact densities, while low overall (typically no more than 11 flakes from the plow zone and less than 4 flakes from the sub-plow zone deposits), are highest in units that contain the sub-plow zone A-horizon. The artifact densities further suggest that many of the artifacts have been dispersed in the plow zone, and it seems likely that the sub-plow zone artifacts have been redeposited through bioturbation. The southernmost test units on the landform demonstrated a deflated profile where the plow zone was underlain by culturally sterile compact clay and gravel. At this stage, the artifacts recovered consisted solely of flakes and fire cracked rock.

Although the available information (geoarchaeological investigation and material content) suggested that an intact occupation surface or midden area was not likely present at the site, it was determined likely that intact cultural features might still be present beneath the plow zone. The plow zone was mechanically removed from an area measuring approximately 900 sq m across the highest point on the landform (Stage 2), where the deposits had previously been identified as being the least eroded. Nineteen additional soil anomalies were identified during the plow zone stripping and marked for further investigation. Five of these anomalies were determined to be non-cultural and 2 were determined to be historic intrusions. The remaining 11 features were judged to represent prehistoric anomalies and were subsequently excavated. Six of these were designated pit features due to their larger size and 7 were judged to be prehistoric post holes.

Of the 6 cultural pit features, most were shallow (likely truncated), approximately 10 cm in depth, and contained only a sparse material assemblage. No temporally diagnostic artifacts were recovered. Five of the excavated post holes were located within close proximity to one another, and 3 formed a loose arc. No additional post holes could be located to complete a structure form (designated as Feature 12). As can be seen in Figure 7.78, the western end of the loose arc of posts likely extends out of the ROW. No additional posts were located to the east, and it is not clear if most of the pattern is simply outside of the ROW or if heavy site erosion has removed all additional traces. Alternatively, the posts could represent a wind break or other less substantial structure (e.g., Sassaman and Ledbetter 1996). The 3 posts that form the body of the arc ranged in depth from 8–12 cm below the plow zone and were approximately 10–12 cm in diameter. No pottery was recovered from the features or units, suggesting that the archaeological deposits possibly represent an Archaic occupation.

The test unit excavation, plow zone stripping, and feature excavation have exhausted any further research potential of this site within the project boundary. Therefore, no further archaeological work was recommended at the Windy Hill site.

More detailed discussions of the materials recovered and the results of the investigations at this site are documented in Volume III of this series. Paleoenvironmental data collected from this site are further discussed in Volume II.

Chapter 8. Summary

Between November of 2004 and August of 2006, archaeological investigations were conducted at 55 sites in Lewis and Clark Counties, Missouri, in conjunction with the AOS project. The AOS project covered approximately 9.66 linear km (6 linear mi) within Lewis County, Missouri, and approximately 14.3 linear km (8.9 linear mi) within Clark County, Missouri. The Clark County portion of the project was situated between the Fox River and the Lewis County line. The Lewis County portion of the project area began at Route B, approximately 2.4 km (1.5 miles) north of Canton, Missouri, and the Clark/Lewis County line.

This report is the first in a series of volumes that documents the archaeological investigations of sites within the AOS archaeological project in Lewis and Clark Counties, Missouri. Background information, research design, methods, and site summaries were presented in this volume. Subsequent volumes detail the environmental data (Volume II) and the results of the analysis of materials recovered from each of the sites (Volumes III–IX). A synthesis of the important research themes of the project and a view of the excavated sites within a regional perspective will be the focus of the final volume of this series (Volume X).

The Undertaking

The undertaking included grading, bridge construction, and paving of a four-lane expressway for 6 mi in Lewis County and 9 mi in Clark County, Missouri. The improve-existing alternate, which was the focus of the current archaeological investigations, consisted primarily of adding two lanes east of the existing U.S. 61 two-lane road between Canton and Wayland, Missouri. These additional two lanes represent an area of potential effects encompassing an approximately 122 m (400 ft) wide corridor that expands to 244 m (800 ft) at intersections. Four objectives were identified for the mitigation of adverse effects to archaeological sites within the project:

1) to delineate areas of significant archaeological deposits at each site that would be adversely affected by the project;

2) to better understand the research potential of those deposits;

3) to collect data for directing efforts to preserve the deposits in the highway corridor;

4) and to develop plans to manage those deposits.

The data recovery process entailed two main investigations intended to accomplish the overall mitigation goals. The first consisted of examining the utility corridor, an approximately 2 m wide utility corridor that ran the entire length of the project area in both Lewis and Clark counties. The utility corridor investigation helped identify if additional buried sites were within the project area and provided information regarding the known site boundaries (vertical and horizontal). This also allowed for an evaluation of the integrity of archaeological deposits, a determination of the number of components represented, and a better understanding of the age and character of the components at the sites. Based on these data, a revised list of NRHP eligible sites was provided at the completion of the utility corridor investigations and compared with project construction plans to determine the amount and nature of impact to those sites.

The second part of this work involved collecting additional data from the NRHP eligible sites that would be directly impacted by highway construction. Archaeological data recovery was conducted within portions of those NRHP eligible sites located within the ROW that would be subject to significant ground disturbances. Ultimately, a staged data recovery approach, which considered the project impacts, was used for the data recovery at each NRHP eligible site. Each

stage of investigation at each of these sites was used to guide the work conducted during the subsequent stages.

Geoarchaeological survey and archaeological testing along the utility corridor in Lewis County was initiated in 2004. During these investigations, additional data were collected at 18 previously recorded archaeological sites and 1 newly recorded site within the proposed project corridor. As a result of this work, 14 of the sites examined were considered eligible for the NRHP. Nine of the Lewis County sites (23LE41, 23LE174, 23LE178/357, 23LE327, 23LE342, 23LE346, 23LE348, 23LE365, and 23LE369) had data recovery work conducted at them.

Geoarchaeological survey and archaeological testing along the utility corridor in Clark County was initiated in 2005. During these investigations, additional data were collected at 37 previously recorded archaeological sites within the proposed project corridor. Eleven of these sites were determined eligible for the NRHP. Data recovery work occurred at 6 sites in Clark County (23CK57, 23CK59, 23CK66, 23CK299, 23CK302, and 23CK310).

Early Archaic to Late Woodland and historic components were represented at the sites investigated during the project. A summary of the sites by cultural period that had significant data recovered from them during the project is provided below. Relevant research questions for the time period and sites are also presented.

Results

Of the 15 sites in Lewis and Clark Counties at which data recovery was conducted, 9 were determined to have significant archaeological deposits that were within cut areas. At the remaining 6 sites (23CK299, 23LE327, 23LE342, 23LE346, 23LE365, and 23LE369), significant archaeological deposits were either in fill areas or situated outside the proposed project boundaries, and their significant sub-plow zone archaeological deposits would not be impacted by the project implementation. Therefore, only minimal data recovery excavations were conducted at these 6 sites. Data from the remaining 9 sites were used to address project research questions. The sites are organized below according to the dominant components investigated.

Unidentified Prehistoric

One site, the Windy Hill site (23CK66), had data recovery completed at it but could not be confidently assigned to a prehistoric time period. The site is summarized below.

Windy Hill Site

Shallow, sub-plow zone features and a low density plow zone lithic scatter were identified at the Windy Hill site (23CK66). A majority of the site deposits were eroded; however, remnants of several prehistoric post holes and small pits features were identified in the central portion of the site. The pits and posts were arranged in a semi-circular pattern, suggesting an element of site structure. The low artifact density suggests a possible single and specialized use of the site.

Research questions asked of this site center on site structure and settlement. Feature and artifact patterning is examined to identify occupational intensity and frequency of site use as well as site function. Comparison with prehistoric feature and post patterning from other sites in the region is conducted to offer hypotheses regarding the function of the feature patterning seen at the Windy Hill site. This further leads to hypotheses regarding the architecture used and the mobility of the group that was associated with these features. The factors responsible for the deposition and erosion of deposits at the site are also identified.

Early Archaic Subperiod (circa cal. 9200–6400 B.C.)

Based on the available information from sites in the region, several expectations for Early Archaic sites in northeast Missouri were made. In general, such sites would be of small size, have indications of short-term or non-intensive use, and represent small numbers of

people. Subsistence remains, when preserved, should indicate an emphasis on hunting with lesser amounts of botanical remains. Deer and squirrel remains should dominate the faunal assemblages, whereas nuts will be the main botanical remains recovered. Chipped stone assemblages will be dominated by a few tool types and exhibit evidence of nonlocal chert resources. Few, if any, features would be expected. When present, these features are expected to represent surface hearths and other thermal features. Finally, diagnostic hafted biface types associated with the Early Archaic consist of corner-notched, side-notched, and stemmed forms. The former includes named types such as Thebes and Kirk Corner-Notched. Side-notched forms include Graham Cave and Early Side Notched (Big Sandy I). Hardin Barbed types represent stemmed forms.

Early Archaic material was recovered from shallow terrace deposits at the Baxter Lake site (23LE41) and in deep deposits on an alluvial/colluvial fan at the Logsdon Fan site (23CK59). Questions regarding chronology, site structure, settlement, and technological organization from this time period are addressed through the data recovered from these two sites. Details of the excavations and analysis of these two sites are provided in Volume IV of this series. These sites are summarized below.

Baxter Lake Site

Early Archaic deposits were sampled in a hand-excavated block at the Baxter Lake site (23LE41). Several Hardin Barbed hafted bifaces and bifacial cores were recovered from this excavation. Tool manufacture appears to have been one of the main activities conducted at the site. Three main activity areas were defined based on flake, core, and tool distributions. Large quantities of flake debris were recovered from two of these areas. In addition, a number of large bifacial cores were recovered from one of the activity areas. No features were defined within the excavation block or during plow zone stripping at the site.

Patterning of the recovered lithic artifacts from this site is examined to explore the functionality of activity areas as well as occupational intensity and frequency during the Early Archaic occupation. In addition, artifacts will be examined to determine if there are any significant patterns with lithic raw material use. Furthermore, the site location will be examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection. Finally, environmental data obtained from the site will help identify local and regional patterns of landscape development.

Logsdon Fan Site

Three localities containing sub-plow zone archaeological deposits were identified at the Logsdon Fan site (23CK59). The site was sampled through the use of excavation units and hand-excavated blocks. A few features, representing small hearths that date to the Early Archaic, were documented within the excavation blocks. Furthermore, although no diagnostic artifacts were recovered from the excavations, several of the artifacts are suggestive of an Early Archaic technological organization. A low density of botanical remains was recovered from the features. One locality likely represents a palimpsest of activity areas, possibly throughout the Archaic periods, while the other two localities represent discrete Early Archaic activity areas buried within fan deposits. Overall, the site appears to represent a series of small campsites located on the same landform during this time period.

Much like the Baxter Lake site, lithic raw material and distributional patterns with the recovered lithic artifacts from this site are examined to explore the functionality of activity areas and to determine raw material utilization. Subsistence related questions can be addressed from the small sample of archaeobotanical remains recovered from features at the site. Furthermore, the paleoenvironmental setting is reconstructed, and local and regional patterns of landscape development are determined for the site setting and examined as possible reasoning for site selection. The factors responsible for the

deposition and preservation of these archaeological deposits are also explored.

Middle Archaic Subperiod (circa cal. 6400–3000 B.C.)

Middle Archaic occupations in northeast Missouri have been characterized as follows: there should be an indication of increased sedentism and evidence of the exploitation of bottomland and riverine resources. While the hunting of deer is still important, there is an increase in the use of aquatic animal sources. Mast resources are also important plant resources. Diagnostic hafted bifaces are expected to be side notched. Chipped stone industries are expected to be dominated by local raw material sources. In addition to the chipped stone assemblage, ground stone tools are expected. These may include axes (full grooved and three-quarter grooved), bannerstones, and plant processing tools (manos, metates, and pestles). Pit features, in addition to surface hearths, would also be expected at sites representing longer-termed occupations.

One excavation block sampled deeply buried Middle Archaic deposits at the Berhorst site (23LE174). Questions regarding chronology, site structure, settlement, subsistence, and technological organization are addressed for this time period through the data recovered from this site. Summaries of the results of the excavations at this site are provided below. Details of the excavations and analysis will be provided in Volume V of this series.

Berhorst Site

Two excavation blocks sampled separate Late Woodland and Middle Archaic aged deposits at the Berhorst site (23LE174). The focus of the excavations was on the Middle Archaic component. Middle Archaic side-notched hafted bifaces were associated with the deepest deposits sampled in the Archaic block. Several radiocarbon dates obtained for the two blocks confirm the temporal placement of the cultural materials. Relatively low densities of botanical and faunal remains were recovered from the site. Of note for the Middle Archaic component at the base of excavations was that several activity areas were noted in the field. These were further defined through analysis of the recovered materials.

Site structure analysis is conducted to explore the functionality of activity areas. Lithic analysis, including low magnification micro-wear, is conducted to determine raw material utilization. The combination of information gleaned from these analyses provides information concerning site use and occupation intensity. The paleoenvironmental setting is reconstructed, and local and regional patterns of landscape development are determined for the site setting and examined as possible reasoning for site selection. The factors responsible for the deposition and preservation of these archaeological deposits are also explored.

Late Archaic Subperiod (circa cal. 3000–600 B.C.)

Several characteristics of the Late Archaic in northeast Missouri were expected. First, a variety of site types have been suggested, ranging from large, intensively occupied base camps, to smaller residential extractive camps and limited activity areas. Also, numerous features and possible structures would be expected at the larger base camps. These sites may also exhibit evidence of planned settlements. Smaller residential extractive camps will be identified by fewer features (mostly hearths), a lack of structures, and a smaller, less diverse artifact assemblage. Limited activity sites will lack structures and features and have very limited artifact classes. Chipped stone assemblages are expected to be dominated by local sources. During the Late Archaic, there was also a shift in hafted biface morphology, reflecting the increasingly local and regional nature of the various native groups. Many of the earlier side- and corner-notched forms gave way to a variety of lanceolate, stemmed, and corner-notched varieties, including those of the Merom, Late

Archaic Stemmed, Nebo Hill, Wadlow, Etley, Ledbetter, and Saratoga Clusters.

Stratified Late Archaic deposits were documented at the Big Branch Fan site (23CK302) and Carskadon site (23LE348). Questions regarding chronology, site structure, settlement, subsistence, and technological organization are addressed for this time period through the data recovered from these sites. Summaries of the results of the excavations at these two sites are provided below.

Big Branch Fan Site

Two blocks were hand excavated during the investigations at the Big Branch Fan site (23CK302). Stratified Late Archaic components were defined below a Woodland component within fine-grained alluvial sediments at the site. Three features were excavated within the blocks, with low densities of faunal and archaeobotanical remains recovered from these contexts. Diagnostic hafted bifaces recovered included several expanding-stem and corner-notched forms similar to those found at various Late Archaic sites in the region (i.e., Mo-Pac, Callaway Points) as well as one that was a contracting-stem (i.e., Dickson Cluster) form. Radiocarbon dates of the features indicate very late Late Archaic occupations. Overall, the site appears to represent multiple, but brief, occupations during the Late Archaic subperiod suggestive of limited, possibly specialized, use of the site.

Patterning of the recovered lithic artifacts from this site is examined to explore the functionality of activity areas as well as occupational intensity and frequency during the site use. Artifacts are also examined to determine if there are any significant patterns with lithic raw material use. Furthermore, the site location is examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection and use. Finally, environmental data obtained from the site is used to identify local and regional patterns of landscape development and climatic change since the Late Archaic period. Details of the excavations and analysis are provided in Volume V of this series.

Carskadon Site

A minor Late Archaic component was excavated at the northern portion of Site 23LE348. This component of the site was situated just above a colluvial gravel lens and was represented by Sedalia/Wadlow, Nebo Hill, and Etley hafted bifaces, as well as by a modest amount of debitage. No features or definable activity areas were identified at the site, and it is interpreted as representing a small, likely specialized site type during this period.

Patterning of the recovered lithic artifacts from this site is examined to explore site function and raw material use, among other research focused on understanding the technological organization of the assemblage. Other research questions may focus on chronology and settlement patterning. Ultimately, this component of Site 23LE348 provides additional information regarding the Late Archaic subperiod in the area.

Early Woodland Subperiod (circa cal. 1000–200 B.C.)

Early Woodland sites have rarely been documented or intensively investigated in northeast Missouri or the surrounding region. Despite this general lack of information, and considering that several factors complicate the issue of separating the Early Woodland from the terminal Late Archaic, many overall trends and regional variations may be noted. In general, settlement patterns seem to shift from larger, intensively occupied upland base camps in the Late Archaic (i.e. Nebo Hill and Sedalia) to smaller, less intensively occupied riverine habitats (i.e. floodplains). These smaller camps may have been exploiting shorter-term, seasonally available resources near lakes, swamps, and sloughs. These bottomland sites typically have one of two archaeological footprints. These include either low density scatters over large aerial extents or smaller, denser scatters with clearly defined boundaries. These sites typically contain

Marion or Black Sand pottery and a limited variety of hafted bifaces, such as Kramer, Belknap, Dickson Contracting Stemmed, Adena, Waubesa, and Gary types. Evidence of horticulture is limited but present during the Early Woodland subperiod. Data suggests that groups were supplementing their hunting and gathering with a variety of plants in the early stages of domestication, including but not limited to little barley and goosefoot. Masting resources continue to be important. Faunal assemblages are dominated by white-tailed deer; however, smaller mammals, fish and other aquatic resources, and avian species were also exploited.

The Killdeer site (23CK310) contained Early Woodland deposits that were one focus of the data recovery at that site. Questions regarding chronology, settlement, subsistence, and technological organization are addressed for this time period through the data recovered from this site. Details of the excavations and analysis will be provided in Volume IX of this series. A summary of the results of the excavations at this site is provided below.

Killdeer Site

Block excavation and the mechanical removal of the plow zone and feature excavation were completed at 23CK310 (Killdeer site). Early Woodland, Middle Woodland, and Late Woodland diagnostic material was found in the archaeological deposits within block excavations at the site. Prehistoric and historic features were documented at the base of the plow zone in one of the blocks. However, the prehistoric features were small basins with no diagnostic material to provide a date or function. Late Woodland pottery was found in the plow zone. A Middle Woodland Snyders point, copper pin, and Cobden chert, suggesting a Middle Woodland component, were found near scattered human remains, but no funerary features were identified. Early Woodland Black Sand pottery was found associated with a small lithic scatter in sub-plow zone deposits at the site, suggesting a stratified Early Woodland component, which was the focus of the data recovery in the prehistoric excavation block at the site. The small artifact assemblage and lack of features associated with the Early Woodland component indicates a brief use of the site at any one time. However, multiple vessels appear to be represented in the Early Woodland pottery assemblage, suggesting that several brief occupations may have occurred during this period.

Patterning of the recovered lithic artifacts from this site is examined to explore occupational intensity and frequency during the site use. Artifacts are also examined to determine if there are any significant patterns with lithic raw material use. In addition, the distribution of artifacts is examined to clarify the apparent component stratification and to determine factors related to the preservation or erosion of the deposits. Finally, the site location is examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection and use during this time period. Details of the excavations and analysis are provided in Volume IX of this series.

Middle Woodland Subperiod (circa cal. 200 B.C.–A.D. 500)

A variety of site types are known from this time span, ranging from small upland habitations to larger settlements. Given the topography of the AOS project area, the latter are expected. These larger sites should have a large number of features, including storage facilities and the possible presence of residential structures. Ceramics are expected to be tempered using crushed rock. When present, decoration would likely consist of nodes, dentate stamping, and zoned decorations. Diagnostic hafted bifaces are typically corner notched, including specimens in the Snyders Cluster. Local Burlington/Keokuk chert is expected to dominate lithic assemblages, although blue-gray chert is expected to be represented in minor quantities on sites. A blade industry is expected. Indication of inclusion in the Hopewell Interaction Sphere should be evident on the more riverine oriented sites.

Subsistence resources should include domesticated starchy seeds along with minor amounts of oily seeded plants. Faunal resources would reflect a localizing strategy of subsistence.

The Carskadon site (23LE348) contained Middle and Late Woodland features, Late Archaic deposits, and a historic component, all of which were found just below the plow zone. The Middle Woodland components represented the primary focus of data recovery at the site and are discussed below.

Carskadon Site

The main component represented among the dozens of pit features found and excavated at the southern portion of Site 23LE348 relate to the Middle Woodland Havana-Hopewell manifestation. Minor Late Woodland and Late Archaic components were also present, indicating that this landform was periodically reused before and after Middle Woodland times. The site was bisected roughly north to south by the existing Route 61 realignment. On the east side, which represents the majority of the cultural deposits, both Middle Woodland and Late Woodland features were identified. On the west side most of the features were Middle Woodland interspersed with a few historic features. Middle Woodland deposits were also identified in the northern part of the site, although it was ephemeral and consisted of a few cordmarked pottery sherds and flake debitage.

The Middle Woodland occupation consisted of numerous discrete and overlapping pit features ranging from hearths and earth ovens to ephemeral basins. The presence of post holes on the east side of the road indicates that one or several structures had been present in the area. Also on the east side of the road was a probable Middle Woodland burial containing the remains of five individuals. Pottery included mostly plain and cordmarked Havana wares but also decorated Havana types. The lithic assemblage consisted mainly of Snyders and Dickson Cluster hafted biface, with a heavy reliance on local Burlington cherts. Blades and blade cores were also identified as were minor amounts of nonlocal blue-gray chert. Faunal and botanical remains were well preserved and indicate the utilization of both upland and floodplain settings as well as terrestrial and aquatic resources.

Patterning of the recovered lithic and pottery remains from feature contexts at the site are examined to explore the presence of possible activity areas as well as occupational intensity and frequency during site use. For example, was the Carskadon site seasonally occupied on a cyclical basis, or was it a single, large occupation? Faunal and floral remains should help in this interpretation as well. Can the pottery help tie down the Middle Woodland chronology? Important variables to be considered will be wall thickness measurements, decoration variation, and surface treatment. Artifacts are also examined to determine if there are any significant patterns with lithic raw material use. Furthermore, site location is examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection and use. Finally, environmental data obtained from the site is used to identify local and regional patterns of landscape development and climactic change since the Middle and Late Woodland subperiod. Details of the excavations and analysis will be provided in Volume VI of this series.

Late Woodland Subperiod (circa cal. A.D. 500–1400)

A variety of site types are well known from the Late Woodland. These include small upland extractive (or special purpose sites) and larger floodplain sites. Larger sites are expected to have a large number of features. These will represent food processing, storage, and thermal features. Residential structures are also expected on such sites. In comparision to previous Middle Woodland assemblages, Late Woodland ceramics are expected to exhibit less regionalization, and when present, decoration would typically consist of nodes/punctations and lip impressions. Medium-sized stemmed and notched hafted

bifaces are expected during the early Late Woodland, whereas smaller, more expediently produced flake points would be expected in the latter portion of the Late Woodland. Subsistence resources, including both plant and faunal resources, would increasingly reflect localizing behaviors. An increasing evidence for native cultigens, including both starchy and oily seeded plants, is expected.

Late Woodland features were documented directly below the plow zone at the Artesian Branch site (23LE178/357) and at the Sugar Creek site (23CK57). Both of these sites will help identify the temporal placement of the Late Woodland components compared with the Late Woodland groups identified from the neighboring regions. Questions regarding site structure and settlement patterning during the Late Woodland can also be addressed by the results from these sites. For example, feature and artifact patterning can provide indications of occupation intensity and frequency as well as the identification of intra-site activity areas. Furthermore, examination of botanical remains and residue from ceramic sherds can provide information regarding seasonality as well as utilized food resources. Other subsistence related questions, such as the amount of resource intensification and the use of native cultigens, can also be addressed by these data. Examination of the various lithic and ceramic artifacts from these sites will further provide a better understanding of the technological variation and function of the various artifact classes during this time period. Finally, paleoenvironmental data collected from these sites will provide a basis for landscape and vegetation reconstruction for this time period. The results of each Late Woodland site excavated during this project are provided below.

Artesian Branch Site

Through hand and mechanical excavations, a large Late Woodland, mainly South Branch phase occupation, was identified just below the plow zone at the Artesian Branch site. The site was bisected roughly north to south by the existing Route 61 realignment. On the east side, which represents the majority of the cultural deposits, Late Woodland features were identified that mainly relate to the South Branch phase occupation. On the west side, most of the features were also Late Woodland but, in this case, appear to be a later non-South Branch phase occupation. Few of the features identified and excavated at the site were superimposed.

As noted, the overwhelming majority of the features at the site relate to the South Branch phase occupation. Net-impressed pottery in association with Lowe Cluster hafted bifaces was characteristic of this phase. Little to no faunal remains were identified from this occupation, and both nuts (predominantly thick shell hickory) and seeds (mainly starchy varieties but also some oily varieties) were present. Maize does not appear to be present in South Branch phase features. Feature types include numerous large-orifice, deep pits as well as earth ovens and pit hearths.

The minority of the features from the site appear to relate to a later non-South Branch phase occupation. Most of the features dating to this occupation were located on the west side of Route 61, although a few were present on the east side at the south end. Artifacts from these features consisted of Scallorn hafted bifaces and thin-walled cordmarked pottery with few decorations. Of the decorative traits present, a few were cord-impressed and some had castellated rims. Little to no faunal remains were present from these features, but a small amount of maize was identified. Most features were shallow basins.

The difference in the artifact assemblages between the two Late Woodland occupations at the site is supported by a series of radiocarbon dates, indicating an early Late Woodland and a later Late Woodland occupation.

Patterning of the recovered lithic and pottery remains from feature contexts at the site are examined to explore the possible presence of activity areas as well as occupational intensity and frequency during

site use. For example, was the Artesian Branch site seasonally occupied on a cyclical basis, or was it a single, large occupation? Faunal and floral remains should help in this interpretation as well. Can the pottery help tie down the Late Woodland chronology, for example, differentiating early and late portions of the Late Woodland subperiod? Important variables to be considered will be wall thickness measurements, decoration variation, and surface treatment. Artifacts are also examined to determine if there are any significant patterns with lithic raw material use. Furthermore, site location is examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection and use. Finally, environmental data obtained from the site is used to identify local and regional patterns of landscape development and climatic change since the Late Woodland subperiod. Details of the excavations and analysis are provided in Volume VII of this series.

Sugar Creek Site

Similar to the Artesian Branch site, hundreds of cultural features, including post holes, were excavated during the investigations at the Sugar Creek site (23CK57). Artifacts recovered from these features (e.g., cordmarked and net-impressed pottery, Scallorn Cluster hafted bifaces) primarily indicate a Late Woodland timeframe for the occupation. The presence of several overlapping pits across the site suggests frequent reuse of this location during that time. Furthermore, distinct post hole patterns were noted, indicating structures at the site. Also, botanical remains recovered from features at the site are abundant. Human remains were recovered from several Late Woodland features. Diagnostic lithic materials included various Late Woodland hafted bifaces (e.g., Scallorn, Klunk, and Lowe Clusters). A single Middle Woodland, Snyders Cluster hafted was also recovered. Pottery recovered at the site was also largely Late Woodland in age. Surface treatments were predominately either net-impressed or cordmarked, but smoothed-over varieties of these and plain examples also occurred. Features typically contained a mix of pottery types, which is dissimilar to the Late Woodland occupation at 23LE178/357. The mix of pottery types is indicative of several occupations utilizing this site during various Late Woodland phases. In addition to the several research questions noted above being asked from data recovered at this site, environmental data obtained from the site is used to identify local and regional patterns of landscape development and climatic change since the early Holocene. Details of the excavations and analysis are provided in Volume VIII of this series.

Other Excavated Late Woodland Components

Sites 23LE174, 23LE348, and 23CK302 all had small Late Woodland components identified at them. At Site 23LE174, trench excavation revealed three features, and block excavation revealed a small artifact scatter associated with the Late Woodland component. Net-impressed pottery was among the diagnostic artifacts recovered from those deposits. Similarly, at Site 23CK302, a low density lithic and Late Woodland pottery scatter was identified, although no features were found. Both of these sites are interpreted as locations that were briefly utilized, likely focused on logistical purposes. At Site 23CK348, the Late Woodland component there had several features, mainly shallow basins and bell-shaped pits, restricted to one area of the site. Pottery included some South Branch material but was mostly thin-walled cordmarked vessels with few decorations. Botanical remains were generally well preserved and indicate the utilization of both upland and floodplain settings. Faunal remains were not as well preserved. This site, in comparison with sites with smaller Late Woodland components, such as 23CK302 and 23LE174, as well as larger sites, such as 23LE178/357 and 23CK57, appears to represent another type of Late Woodland site. All of these sites will further assist our understanding of settlement during this period. Research on the pottery types represented at

these sites may further assist our understanding of their placement within the Late Woodland time period. Site location is further examined in relation to the surrounding paleoenvironmental setting to determine if environmental factors were an influence for site selection and use.

Historic Period

Many cultural, political, and economic changes have occurred in Missouri over the last 300 years. Although specific historic events have affected towns and districts within northeast Missouri, in general, much of that region's history has paralleled the history of the state as a whole. After early historic Native American occupation, European exploration, and the American Revolution, European-American settlement of the region was slow until after the War of 1812. Once the fear of conflict subsided, immigration to Missouri steadily increased. After statehood in 1821, American populations soared for the remainder of the mid-nineteenth century. Community organization and increased farming and industry resulted. After the Civil War, the implementation of the Homestead Act secured homes for settlers on public domain, thereby stimulating even more migration into the state. Significant themes continued to center on agriculture and industry, with farms increasing in size and production, while railroads and factories provided mass production of goods and services at an increasing rate of demand. Also by the late nineteenth century, education was becoming more prevalent with the establishment of many county schools. In the twentieth century, Missouri's economy continued to revolve around industry and agriculture. By the mid-twentieth century, Missouri had fully modernized, although agriculture had slightly diminished as a prominent part of the state's economy.

Significant historic components were documented at two sites, even though many sites had ephemeral trash scatters unrelated to intensive historic occupation. The historic features and artifacts found in shallow deposits at the Killdeer site (23CK310) were associated with a domestic occupation dating during the second half of the nineteenth century and into the twentieth century. Historic materials from features at the Carskadon site (23LE348) were indicative of a domestic occupation dating to the second half of the nineteenth century and possibly into the very early twentieth century. Research questions that can be addressed from the historic material recovered and from excavated features at these sites includes an identification of the period of occupation, the layout of the site and the type(s) of construction used, as well as a determination of the socioeconomic status of the site occupants. Finally, archival documentation is used to determine the owners of the property through time. In addition to the previously mentioned prehistoric components, the historic components represent another focus of the data recovery at these sites and are summarized below.

Killdeer Site

Block excavation and the mechanical removal of the plow zone identified prehistoric and historic features at the base of the plow zone in one of the blocks at 23CK310 (Killdeer site). The historic features indicated a late-nineteenth-century structure location and associated activity areas. However, no structure is represented on historic atlases of the area, and archival records indicated that the property owners lived on the opposite side of U.S. 61, suggesting that the site represents the remains of a tenant or servant's home. Details of the excavations and analysis are provided in Volume IX of this series.

Carskadon Site

In addition to the prehistoric features, several scattered features on the east side of Route 61 contained historic materials. A house cellar, cistern, and several other historic features were also found on the west side of Route 61. The recovered historic materials were indicative of a residential occupation dating most intensely during the second half of the nineteenth century and possibly into the

very early twentieth century. About 65 percent of the artifacts recovered were architectural and indicate that a structure(s) was likely built during the nineteenth century. The structure was consequently maintained and utilized into the late nineteenth and possibly the very early twentieth century, as demonstrated by the presence of a smaller wire nail assemblage. The window glass shows that the peak period of occupation of the site was after circa 1845 into the early twentieth century. The domestic group artifacts indicate that the site was occupied as a residence. Details of the excavations and analysis will be provided in Volume VI of this series.

Conclusions

Fifty-five archaeological sites were located within the Lewis and Clark Counties' portions of the AOS project area. Archaeological work was conducted at most of these sites by CRAI from the fall of 2004 to the summer of 2006. These investigations ranged from hydraulic cores and trenches to intensive excavations (plow zone removal/feature excavation and hand-excavated blocks). This work provided information concerning significant archaeological deposits within the project area. Data recovery investigations were conducted only on sites where significant archaeological deposits were to be impacted by highway construction activities.

Nine archaeological sites provided data regarding the Early through Late Archaic periods, Middle and Late Woodland periods, and the historic period. Investigations at these sites were guided by the research design (see Chapter 2) and goals set forth in the scope of work and memorandum of agreement for the project. In short, these goals were to establish a baseline comparative dataset for similar settings in the region. These goals were to be achieved by addressing six broad research themes: 1) chronology; 2) settlement patterns; 3) site structure; 4) subsistence; 5) paleoenvironment; and 6) technology. Questions regarding these broad themes were examined within the framework of the objectives of contemporary American archaeology (c.f., Thomas 1989a) which are, as outlined in the research design, defining cultural chronologies and inferring lifeways while working toward the ultimate goal of identifying cultural processes. A staged approach was used during the investigations as a means of assessing archaeological deposits within the project area and determining their data content. At sites with significant deposits that would be directly impacted, the research design guided the data recovery excavations.

As noted above, the results of the investigations at the 55 sites within the AOS project area are detailed in seven separate volumes. In addition, environmental data are summarized in a separate volume, and a synthesis of the important research themes of the project and a view of the excavated sites within a regional perspective will be the focus of the final volume of this series. It is hoped that these volumes provide the baseline data for future excavations in this portion of northeast Missouri.

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Appendix A. Comparative Chert Sample Descriptions

Table. A-1. Local and Nonlocal Chert Sample Descriptions.

AOS Material Type	Geologic Chert Type	Color	Texture	Cortex	Impurities	Luster	Workability	Effect of Heat Treatment	Comments	Source
A		White (N9)	Fine to medium grained with patches of coarser grain towards the cortex	Thin patinated and commonly iron stained	Highly oolitic (ooliths <1 mm); siliceous spicules and unsilicified voids/vugs are common near cortex	Predominately dull, with occasional slight luster	Unknown	Unknown	Most samples were collected from colluvial gravels from project area	Lewis and Clark Counties, MO
B	Burlington	White (N9)	Medium to coarse grained	Thin patinated and occasionally iron stained; St. Louis County sample is a stream cobble w/ dark yellowish brown patina (10YR 4.5/6)	Many indeterminate fossil fragments with occasional crinoid, siliceous spicules, and unsilicified voids/vugs	Dull	Unknown	Unknown	Most samples were collected from colluvial gravels from project area	Clark and St. Louis Counties, MO
C		White (N9) banded with medium light grey (N6) and occasional mottles of medium grey (N5)	Fine to medium grained	Thin patinated; stream cobble specimens have a dark yellowish brown (10YR 4/4) patina	Common to many indeterminate fossil fragments with occasional crinoid, siliceous spicules, and brachiopod fragments along with calcareous and calcitic blebs and voids	Dull	Unknown	Unknown	Most samples were collected from colluvial gravels from project area	Lewis County, MO
D		Medium light grey (N6) with occasional small irregular mottles of bluish grey (6/10B) and very light grey (N8)	Medium to coarse grained	Thin patinated with occasional iron staining	Ooliths commonly present; scattered indeterminate fossil fragments and siliceous spicules and calcareous and calcitic blebs and voids	Predominately dull, occasionally will exhibit a slight gloss	Unknown	Unknown		Lewis County, MO
E		White (N9) with medium to large very light grey (N8) mottles and occasional small light grey (N7) mottles	Fine grained	Thin patinated and commonly iron stained; Thin, chalky limestone residuum on bedrock source with iron staining along incipient fracture planes.	Common indeterminate fossil fragments with occasional ooliths and siliceous spicules; streaked calcitic and calcareous voids	Predominately dull, occasionally will exhibit a slight gloss	Unknown	Unknown	Source material (Lewis 'B') came from middle chert lens in ravine cut north of site 23Le348. (Andy)	Lewis County, MO
F		Highly variable - predominately very light grey (N8) to light grey (N7) matrix with few small to medium irregular yellowish brown (10YR 5/4) mottles and few fine white (N9) streaks	Fine grained	Thin patinated with occasional iron staining; streams cobble specimens have a dark yellowish brown (10YR 4/4) patina	Common to many indeterminate fossil fragments with occasional crinoid, siliceous spicules, brachiopod, and fenstrate bryozoa fragments along with calcareous and calcitic blebs and voids	Predominately dull, commonly will exhibit a slight gloss	Unknown	Unknown	Most samples were collected from colluvial gravels from project area	Lewis and Clark Counties, MO
G	Keokuk?	Grey to light greyish brown (10YR 1.5) and white (N9); variegated color pattern	Fine grained	None present in sample	Few indeterminate fossil fragments	Dull	Unknown	Unknown	Sample description based on a single flake (given by T. Morrow)	Hampton, Illinois (Rock Island County, IL ???)
H	Keokuk?	Highly variable - light grey (N7) with common fine medium light grey (N6) mottles; to light grey (N7) banded with medium light grey (N6); to very light grey (N8) with common to many fine irregular medium light grey (N6) mottles	Fine grained	Thin patinated	Common indeterminate fossil fragments with occasional crinoid and siliceous spicules and calcareous and calcitic blebs and voids	Dull to slightly glossy	Unknown	Unknown	Samples given by T. Morrow	Hampton, Illinois (Rock Island County, IL ???)
I		Light grey (N7) with faint very light grey (N8) streaks and occasional small light olive grey (5Y 6/2) mottles	Fine grained	Thin patinated, commonly iron stained	Few to common indeterminate fossil fragments with few siliceous spicules	Slightly glossy	Unknown	Unknown	Samples collected from colluvial gravels from project area	Lewis County, MO
J	Burlington	Predominately white to very pale brown (10YR 8/1 - 10YR 8/2) with faint irregular light yellowish brown (10YR 6/4) mottles; occasionally contains irregular medium to large pale red (10R 7/2) and pale red purple (5BP 6/2) mottles and fine weak red (10R 5/4) mottles	Fine to medium grained	Thin patinated stream cortex -- yellowish brown (10YR 5/4 and 10YR 5/6)	Infrequent indeterminate fossil fragments and fenstrate bryozoa fragments	Dull	Unknown	Unknown	Samples collected from stream gravel deposits; some pieces appear to be High Ridge Burlington (BGD)	St. Louis County, MO
K		Homogenous white (N9 to 10YR 8/1)	Fine grained	Thin and generally fine to medium-grained; some samples exhibit a thin, smooth iron stained cortex	Infrequent indeterminate fossil fragments and fenstrate bryozoa fragments; occasional calcitic blebs and voids; occasional bedding planes	Dull	Unknown	Unknown	Most samples were collected from colluvial gravels from project area (23Le346)	Lewis and St. Louis Counties, MO
L	Keokuk	Very light grey to light grey (N7 to N8) matrix with many fine white (N9) inclusion (fossil fragments)	Fine to coarse grained	Ranges from thick (~1 cm) highly fossiliferous to thin, iron stained stream cortex	Highly fossiliferous; containing abundant ooliths and indeterminate fossil fragments; also contains common brachiopod and fenstrate bryozoa fragments	Dull	Unknown	Unknown	Samples given by M. Meinkoth	Marion County, MO and Hamilton, IL (Rock Island County, IL ???)
M	Burlington	Light bluish grey (10B 8/1) with bands of white (N9) near cortex	Very fine grained	Thick (~0.5 mm) coarse grained white (N9) cortex	Predominantly nonfossiliferous; few fine siliceous spicules	Slightly glossy	Very Good	Unknown	Samples collected from stream gravel deposits	Jersey County, IL
N	Glacial Till -- chert	Variable - predominately homogenous grey to light greyish brown (10YR 6/1 to 6/2), to light grey (2.5Y 7/2), and grey (10YR 5/1) with many small to medium irregular greyish brown (10YR 5/2) and common small light greyish brown (10YR 6/2) mottles	Fine to medium grained	Thin patinated stream cortex -- yellowish brown (10YR 5/4)	predominately non inclusions; some samples contain small calcite/ quartz vugs	Dull	Unknown	Unknown	Samples collected in stream gravel deposits	Lewis and Clark Counties, MO
O	Burlington (wood grain variety)	White to light grey with dark yellowish brown to brown (10YR 3/6 to 5/3) and pale to very pale brown (10YR 3/6 to 7/3) bands	Fine grained	None present in sample	Predominantly nonfossiliferous; few fine indeterminate fossil fragments	Dull to glossy	Very Good	Color becomes pinkish with the banding remaining distinct	Samples given by B. Koldehoff	St. Louis County, MO
P		Homogenous very pale brown (10YR 8/2.5)	Fine to medium grained	Thin patinated, iron stained stream cortex (10YR 5/4)	Highly oolitic (ooliths visible only under 10X magnification); with occasional indeterminate	Dull	Unknown	Unknown	Sample description based on a single	Unknown (Nor's Creek ?)

AOS Material Type	Geologic Chert Type	Color	Texture	Cortex	Impurities	Luster	Workability	Effect of Heat Treatment	Comments	Source
					fossil fragments and siliceous spicules				nodule (given by L. Kinsella)	
Q		Variable - white (N9) to light grey (N7) matrix streaked with light brownish grey (10YR 6/2); contains many fine to medium white (N9) fossil fragments	Fine to medium grained	Ranges from thick (~1 cm) coarse chalky limestone along bedrock source to thin patinated with minor amounts of iron-staining	Highly fossiliferous; contains abundant medium-sized (~2-3 mm) crinoid fragments and indeterminate fossil fragments; fossil inclusions appear to occur in broad horizontal bands primarily near the cortex at the upper/lower portions of the blocks	Dull	Unknown	Unknown	Samples collected by A. Martin from source area A (in ravine)	Lewis County, MO
R		Predominately white (N9) to very light grey (N8) with common fine light grey (N7) mottles; one sample displays thin bands of white (N9) interspersed with light grey (N7) and medium light grey (N6) streaks	Predominately medium grained, although patches of fine grained are present	Thick (~ 1 cm) coarse chalky limestone along the bedrock source; some samples have thin patinated cortex	Predominately nonfossiliferous; although few fine indeterminate fossil fragments are present	Dull	Unknown	Unknown	Samples collected by A. Martin from source area B (in ravine)	Lewis County, MO
S		Variable - predominately light grey (N7) and medium light grey (N6) with common white (N9) mottles; some samples are predominately white (N9) with common fine to medium light grey (N7) mottles	Fine to medium grained	Thick (~0.5 mm) coarse grained chalky white (N9) cortex along bedrock source	Few to common indeterminate fossil fragments with few siliceous spicules	Dull	Unknown	Unknown	Samples collected by A. Martin from source area C (in ravine)	Lewis County, MO
T		Variable - predominately very pale orange (10YR 8/2) with common yellowish brown (10YR 5/4) mottles and streaks; some patches of white (N9) and dark yellowish orange (10YR 6/6) coarser-grained matrix	Fine to medium grained	Thin patinated cortex, white (N9) with irregular 10YR 7/4 mottles; with few coarser patches	Few to common indeterminate fossil fragments with few siliceous spicules and brachiopod fragments	Dull	Unknown	Unknown	Samples from 23Le327 -- Andrew B.	Lewis County, MO
U	Glacial Till -- chalcedony / quartzite	Variable - predominately light brown (5YR 6/4) matrix with pale reddish brown (10R 5/4) and greyish orange pink (5YR 7/2)	Medium to coarse grained	Thin patinated cortex, typically moderate yellowish brown (10YR 5/4); some samples exhibit coarse gnarly cortex (typical of chalcedony)	Very few to few fine calcite/quartz vugs	Dull	Unknown	Unknown	Samples collected from 23Ck	Clark County, MO