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Multi-staged Research at the Denmark Site, A Small Early-Middle Mississippian Town

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MULTI-STAGED RESEARCH AT THE DENMARK SITE, A SMALL EARLY-MIDDLE MISSISSIPPIAN TOWN

by

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Abstract

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Early-Middle Mississippian settlements in the hinterlands of West Tennessee have largely gone unstudied. The void in settlement data leaves a gap in understanding Early-Middle Mississippian settlements within the Mid-South region. A multi-staged research design at the Denmark Site (40MD85) in Madison County, Tennessee was employed to determine a settlement system at Denmark. Denmark was originally thought to be a Vacant Mound Center that did not support an associated habitation, but topographic mapping, LiDAR data, magnetometry survey, and targeted excavation reveal that the Denmark mound group represents a sizeable settlement.

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1. Introduction

This thesis examines the community layout of the Denmark site. In general, West Tennessee is an area of the Southeast that has lacked Early-Middle Mississippian settlement studies. A site layout model is developed and Denmark is then compared to sites in the surrounding region and across the greater Midcontinent. Understanding settlement patterning in the hinterlands of West Tennessee and parts of the Mid-South is necessary to further understand continuity and variability in Mississippian settlement systems as a whole. A multi-staged research design is utilized here to determine the type of settlement present at Denmark. Denmark is then compared to other sites in the region to better understand the nature of Early-Middle Mississippian settlements in the region.

Located in Madison County, Tennessee, Denmark (40MD85) is located on Big Black Creek, a tributary of the Hatchie River. Denmark consists of one platform mound, a small conical mound, and a low-lying rectangular mound. The preservation of Denmark and its unique location in the uplands of West Tennessee makes the site extremely valuable to understanding regional community plans and settlement systems.

Research Questions

Research at Denmark was conducted to understand how the site functioned in the past as well as to explain the role that the mounds and settlement played in the lives of the Early-Middle Mississippian populations responsible for the site's construction. Therefore, determining what kind of settlement, if any, was associated with the mounds is necessary. Was Denmark a Vacant Ceremonial Center? Surface collections by Mainfort (1992) suggest that the surrounding area lacks evidence of habitation based upon a small density of artifact debris similar to Owl Creek (Rafferty 1995). Did Denmark support a

large, permanent population similar to that at Ames (Goddard 2011; Mickelson and Goddard 2011), Obion (Garland 1992) or Jonathan Creek (Webb 1952)? If the site did support a sizeable population, how did people organize themselves spatially? Is the spatial organization similar to that seen elsewhere across the region? If so, what might be some of the implications of these settlements in relation to other local settlements?

At present, West Tennessee is generally lacking in terms of understanding Mississippian space-time systematics. Outside of Denmark, only three other Early-Middle Mississippian sites in West Tennessee have been investigated, Ames (40FY7), Chucalissa (40SY1), and Obion (40HY14). Work at Denmark and other sites in the region will help to build a space-time chronology necessary to understand the nature of Mississippian occupations across West Tennessee. For instance, was Denmark contemporary with other communities? Understanding when Denmark was occupied will aid in examining how it interacted with other regional polities. Comparison of Early-Middle Mississippian sites across the region can then be made. In order to better understand Early-Middle Mississippian culture, it is necessary to know when and where settlement was occurring and how these groups constructed and interacted in their environments. Defining the settlement system for Denmark will provide needed information placing Early-Middle Mississippian people at the site. Progress in understanding how Mississippian populations were organized across the landscape has been made at Ames (Goddard 2011; Mickelson 2008; Mickelson and Goddard 2011), and work at Denmark will contribute to the West Tennessee dataset.

Hypotheses

The following hypotheses of prehistoric human settlement practices at Denmark are evaluated in this thesis:

H_0- settlement type cannot be determined given the available data.

H_1- Denmark was a Vacant Ceremonial Center.

H_2- Denmark was a small-scale settlement such as a farmstead or hamlet.

H_3- Denmark was a town-scale settlement.

H_4- Denmark was a fortified town-scale settlement.

H_5- The Denmark settlement system changed in structure through time; permutations of H_1-H_4 are expected.

H_0: The Null Hypothesis. With the methods utilized will there be sufficient data to determine a settlement model for the site? The null hypothesis is posited in the event that the data collected cannot sufficiently address the research question.

H_1: Vacant Ceremonial Center. Denmark was a Vacant Ceremonial Center. For H_1 to be plausible, it is expected the data provide evidence for sparse habitation across the site. There would be little evidence of structures, features, and domestic refuse suggesting no or only ephemeral habitation existed.

H_2: Farmstead or Hamlet Settlement. H_2 posits that a small group of people resided at the site. There will be evidence for small-scale settlement at the site, but mostly at the level of a farmstead or hamlet. In order to confirm this hypothesis, it is expected that evidence for about one to three domestic structures would be found.

H_3: Town-scale Settlement. H_3 posits that Denmark represents a town-scale settlement. For this hypothesis to be plausible, it is expected that the data would need to provide evidence of several domestic structures (approximately ten at minimum) across the site. A full definition of what is meant by the term "town" will be discussed in chapter three.

H_4: Fortified Town. H_4 would be confirmed if the site has evidence for town-scale settlement and a palisade or other defensive structure is delineated. Evidence would have to effectively demonstrate that a palisade, ditch, or embankment was present at Denmark.

H_5: Permutations of H_1-H4. H_5 posits that site function and structure changed through time. The site would need to demonstrate characteristics of H_1-H_4 as well as a chronological sequence to separate the different settlement configurations across the site.

Given the above hypotheses, research was conducted to determine the type of settlement present at Denmark. These hypotheses will be evaluated in the following chapters. Chapter 2 provides an overview of the environmental background, Mississippian culture history, and previous work conducted at Denmark. Settlement systems and models for Mississippian populations are outlined in Chapter 3. Chapter 4 details the research design and methods employed to gather data at Denmark. Chapter 5 presents the results of the collected data at Denmark. Chapter 6 provides an analysis of the results as well as compares Denmark to other Early-Middle Mississippian sites found across the region. Finally, Chapter 7 provides a summary and conclusion for the work conducted at Denmark.

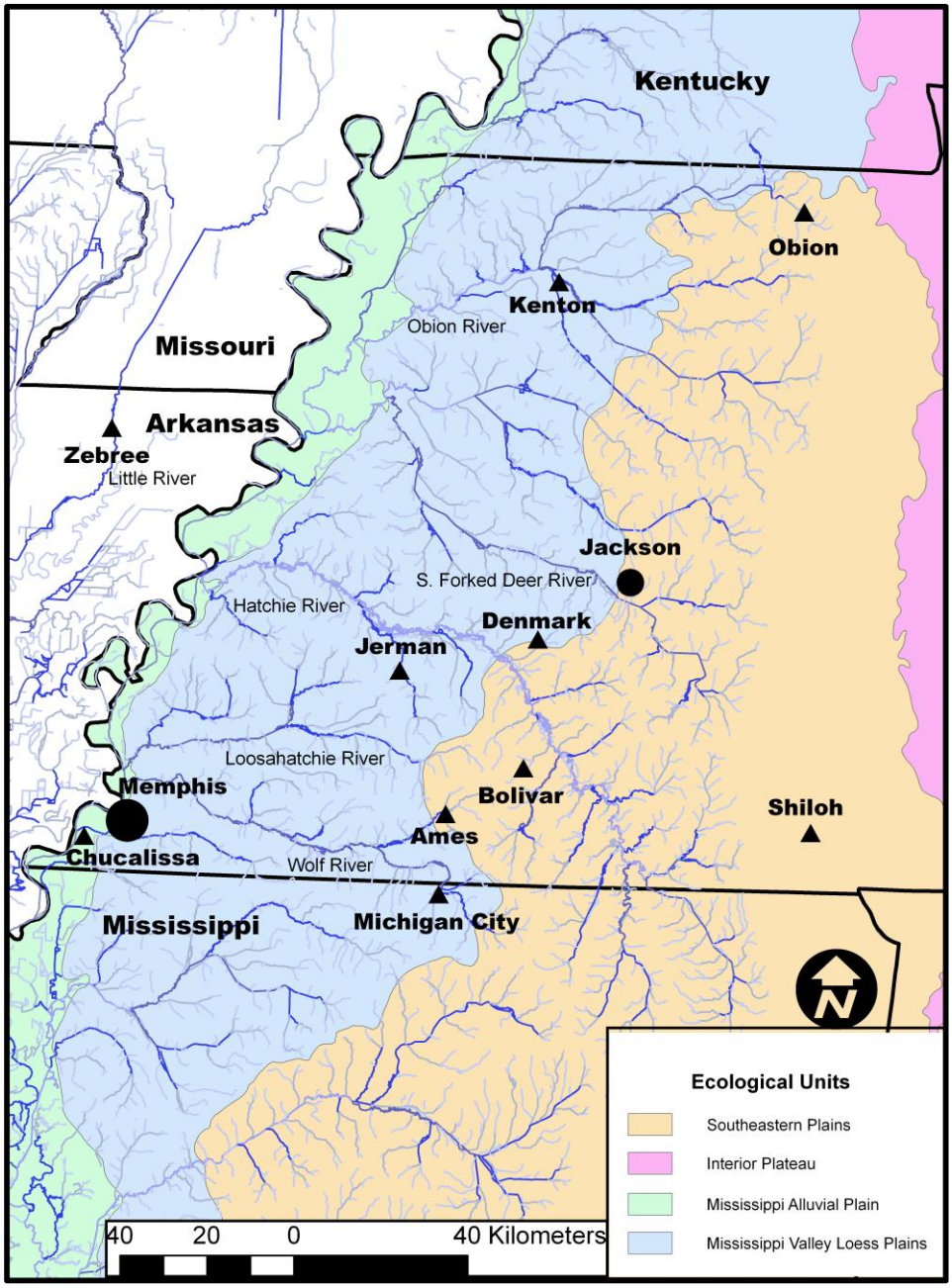

Figure 1. Denmark in relation to other key Early-Middle Mississippian sites in West Tennessee.

2. Background and Setting

Environmental Background

Denmark is located on the edge of the Mississippi Valley Loess Plains (Figure 1) and the Southeastern Plains and Hills (Griffith et al. 1998). The Mississippi Valley Loess Plains "are gently rolling, irregular plains…with loess up to 50 feet thick," and the Southeastern Plains and Hills "contain several north-south trending bands of sand and clay formations" with a "more rolling topography and more relief than the Loess Plains" (Griffith et al. 1998). The natural vegetation for the area consists of oak-hickory forests as well as southern floodplain forests, which are vital to wildlife habitat (Griffin et al. 1998).

Geologically, parts of West Tennessee are included in the Mississippi Embayment, a "sedimentary trough filled with Upper Cretaceous to upper Eocene marine and deltaic sediments locally overlain by Pliocene and Quaternary fluvial deposits of the Mississippi River and its tributaries," (Cox and Van Arsdale 2002:164). During the middle to late Pleistocene aeolian sedimentation of thick loess deposits covered the region (Bettis et al. 2003: 1909). The Peoria loess that accrued during and after the Last Glacial Maximum for West Tennessee is generally between 5-20 m thick (Bettis et al. 2003: 1910). Loess soil is a type of alfisol that is high in natural fertility and known for productive agriculture and forestry. The natural habitat consisted of oak-hickory-pine, floodplain forests, and cypress-gum swamps (Griffith et al. 1998). Dominant species would have included elm, chestnut, walnut, poplar, cottonwood, sycamore, and persimmon trees with understory species of vines, shrubs, herbaceous plants, and cane (Smith 1996:99). Many of these forests have been removed for farming. Populations living in this environment

would have benefitted greatly from the floodplain and oak-hickory forest regimes. These areas would have been ideal for game, and economically important flora. The dominant faunal species would have included white-tailed deer, turkey, rabbit, black bear, opossum, raccoon, ducks, geese, pigeons, fish, and turtles as well as migratory birds (Smith 1996:99). Low order streams may not have been ideal for fishing, but access to the larger river systems would have provided local Mississippian populations with abundant aquatic resources. Furthermore, the expansive loess deposits of the upland area would have supported high biomass levels of plants and animals, and would have been ideal for prehistoric maize-based farming systems (Smith 1978: 482).

Mississippi Period (A.D. 1000-1600)

Mississippians were a prehistoric Native American population who shared several distinct cultural traits across the Southeast ca. A.D. 1000-1600. The Mississippians are known for construction of platform mounds, plazas, wall-trench houses, shell tempered pottery, maize agriculture, elaborate iconography, and socially ranked hierarchies (Griffin 1967; Hally and Mainfort 2004; Milner and Schroeder 1999; Steponaitis 1986).

The term "Mississippian" was first employed by William H. Holmes (1886, 1903, 1914) based upon the distinctive ceramic collections he obtained from the Mississippi River Valley. Holmes (1914:424) identified common traits of Mississippian culture such as sedentary life, extensive agricultural, construction of permanent works and mounds. Mississippian societies that inhabited the Midwest and Southeastern United States are still identified by a shared set of cultural traits and practices within archaeological culture area as originally put forth by Holmes.

Utilizing McKern's (1939) Midwestern Taxonomic Method, Deuel (1935:433-436) defined Mississippian culture as having numerous shared traits. Deuel's trait list included the following: rectangular dwellings, personal ornaments, unique burial customs, mounds for temples and houses of officials, simple triangular points, discoidals, shell-tempered dominance in pottery, and highly developed art forms. Additionally, others have begun to define Mississippian culture based upon their sociopolitical organization (Blitz 2010; Hally and Mainfort 2004; Smith 1978; Steponaitis 1986). Mississippians were an agriculturally based society with a socially ranked hierarchy. Elites would have maintained strict control over political, economic, and ideological aspects of the society. Non-elites would have spent their time maintaining the crops, hunting for food, as well as providing basic services for their household and community.

Mississippian populations would have exploited the numerous resources in their local environments for subsistence. Typical Mississippian meat consumption would have consisted primarily of backwater species of fish, migratory waterfowl, white-tail deer, raccoon, and turkey (Smith 1978:483). Nuts, fruits, and berries would have been collected, but a heavy reliance was also placed on cultivating domesticated maize, beans, and squash with secondary crops consisting of sunflower, marsh elder, and gourd (Smith 1978:483). Exploiting numerous local resources as well as adopting a maize-based agricultural system would have provided Mississippian populations with ample food resources throughout the year.

Mississippian settlements were generally located in specific environmental niches, to which these agriculturally based groups had become accustomed. These areas were floodplain habitat zones that provided the necessary resources for potential energy

sources (Smith 1978:484). Settlements were usually either large nucleated towns or dispersed and scattered farmsteads (Hally 2006; Hally and Mainfort 2004). Settlements were mainly located on the fluvial terraces bordering the floodplain where conditions would have been ideal for agriculture (Smith 1996:99). These localities would have been biologically diverse, as well as providing fertile soils necessary for maize-based agricultural practices. Floodplain habitat zones also provide the necessary forest species for timber consumption. Settlements would have been spread out across different waterways, and in West Tennessee during Early-Middle Mississippian times it seems that the upland terraces of low order tributaries were preferred.

Mississippian social organization has been characterized as chiefdom based societies with mound centers and plazas comprising local polities (Cobb 2003; Hally and Mainfort 2004). Local chiefdoms would have been ranked societies with two internal "classes," elites and non-elites (Peebles and Kus 1977; Steponaitis 1986). Social status would have been largely dependent upon kin ranking in the chiefdom. Local chiefs would have maintained some degree of control over political, economic, and ideological functions, while non-elites or commoners would have provided the labor necessary to maintain the food supply and needs of the community.

Mississippian ideology was complex and highly ritualistic. Shamans and priests were empowered with the sacred knowledge and capabilities to transcend the earthly realm and access the above and below worlds in order to communicate with deities, spirits and culture heroes (Dye 2012:139). Common themes of Mississippian ideology include maintaining balance, renewal, and dualism, as well as defining a sacred landscape (Dye 2012). The chief would have been imbued with religious authority as he was thought to

be the closest to the deities, while the other priests and shamans would have also practiced and maintained religious knowledge. Ritual ceremonies would have been an integral part of Mississippian lives. Deities consisted of creators, culture heroes and tricksters that would have been represented in the celestial bodies (Dye 2012:144). These deities were the main protagonists in Mississippian ideology and cosmology and formed the basis for how Mississippian people viewed their world.

Shared cultural traits and sociopolitical organization have come to define Mississippian culture, but the Mississippian way of life is still in many ways, unknown. For example, settlement patterning of Mississippian people across the landscape is an area that needs refinement for parts of the Southeast, including the uplands between the Mississippi and Tennessee Rivers in Tennessee. Once settlement is better defined for the region research into the cultural practices and sociopolitical organization can be analyzed.

Previous Research

The first possible description of Denmark comes from Haywood's (1823) *The Natural and Aboriginal History of Tennessee*. Haywood described a site located, "Seven miles southwest of Hatchy river, 50 miles east of the Mississippi (River), in a fertile part of the country." He recorded, "three mounds enclosed by an intrenchment (sic) 10 feet deep and 30 feet wide." If the direction of southwest is inverted to northeast, Haywood's description would precisely locate Denmark (no known site would fit his "southwestern" orientation). William E. Meyer (1925) visited Denmark in 1917, as a part of his work for the Smithsonian, and included Denmark on a map (Figure 2) but does not discuss the site. Mainfort completed the first site report and recorded the site in 1983. In 1990, the large mound was vandalized; Tennessee Division of Archaeology (TDOA) was notified

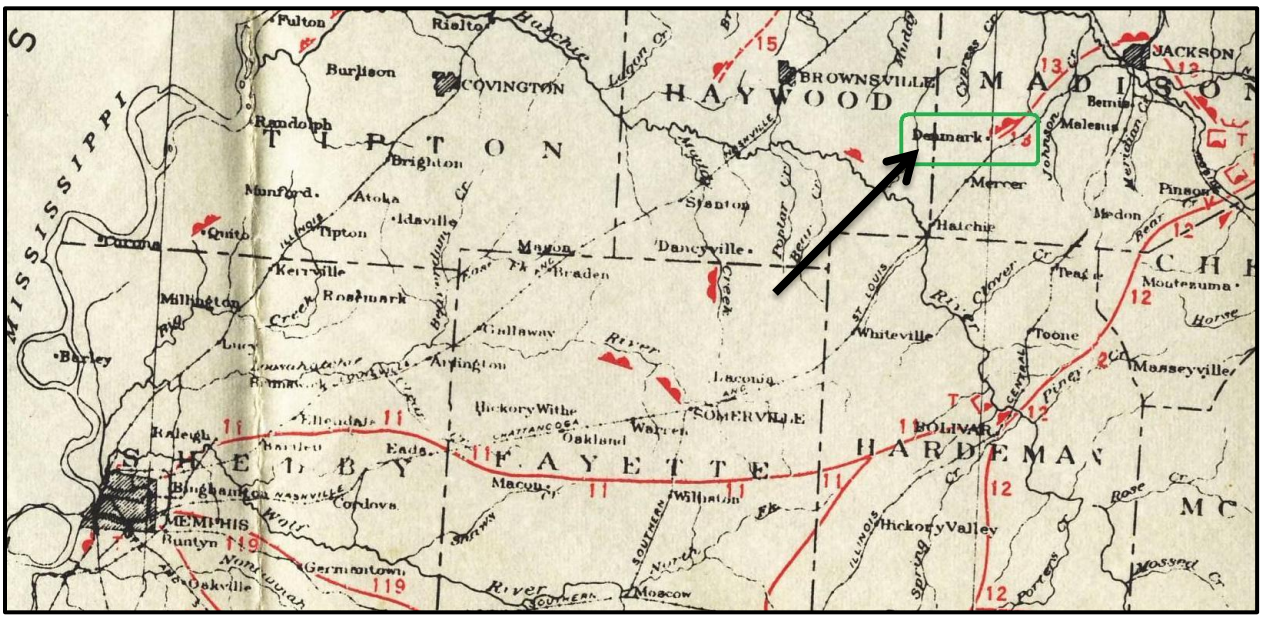

Figure 2. William E. Myer's map from *Indian Trails of the Southeast* (1925) with the Denmark Mounds identified.

(Mainfort 1992), and efforts were made to retrieve any archaeological data that remained from the looters' pit. A profile map was completed for Mound B. In 1992, Denmark was placed on the National Register of Historic Places.

Until the present research project, archaeological work has been lacking at Denmark. Some non-systematic surface collections have been completed providing an idea of the cultural materials at the site. Mainfort (1992) delineated several small concentrations of artifacts surrounding the mounds as separate sites (Figure 3), and concluded that, "the small size of the collections suggests that none of these localities represent domestic habitation."

In February of 2010, Mickelson and Goddard (personal communication, 2010) conducted a small magnetometry survey to test for subsurface features. Based on their interpretations, the magnetometry test found evidence for Mississippian wall-trenched structures.

Mainfort's (1992) work as well as Mickelson and Goddard's magnetometry survey tentatively identified Denmark to be an Early-Middle Mississippian occupation. Evidence for structures may be present at the site. Both Mainfort and Mickelson noted the need for further research. Based on limited archaeological investigations at Denmark, this work details the planned multi-staged research effort that was executed to determine the settlement at Denmark. In the next chapter I propose two models of Mississippian settlement systems and how these two models may be tested.

Figure 3. Artifact concentrations surrounding the Denmark Mounds, as mapped by Mainfort (1983).

3. Settlement Models

There are two general settlement models discussed in the literature for Mississippian settlements. The Vacant Ceremonial Model has been employed to characterize sites exhibiting monumental architecture, but lacking evidence for sedentary populations (Dancey and Pacheco 1997; Prufer 1964). Primarily used to understand Hopewell settlements in the Ohio Valley, the Vacant Ceremonial Model has at times been used to describe Mississippian mound centers (e.g. Peterson 1979; Rafferty 1995). Dispersed communities would have utilized these Vacant Ceremonial Centers to conduct ceremonial and other specialized activities. The second model conceives of Mississippian settlements as villages or towns, and in some cases possessing outlying hamlets and farmsteads scattered across the countryside (Hally 2006; Hally and Mainfort 2004; Lewis et al. 1998; Milner and Schroeder 1999; Smith 1978; Steponaitis 1978, 1986). The two models are further discussed below.

The Vacant Ceremonial Model

The Vacant Ceremonial Model refers to mound or ceremonial centers that lack substantial settlements, though some evidence of domestic refuse may be suggestive of small encampments during the construction of the mounds or ceremonies that took place (Prufer 1964:71). For example, Prufer (1964) used the Vacant Ceremonial Center-Dispersed Agricultural Hamlet pattern to describe the Hopewell mound sites in the Ohio Valley. Dancey and Pacheco (1997) refined Prufer's model for Hopewellian community settlements, and referred to it as the Dispersed Sedentary Community model (Figure 4a). Their model proposes that farmsteads or hamlets would have been dispersed across the landscape and shared a common ceremonial center. Farmsteads and hamlets probably

consisted of single-family or multiple-family households that had considerable autonomy. Residences surrounding the ceremonial centers would have constituted the local community. The only permanent habitation, if any, at the ceremonial center would have been occupied by local elites and/or those who maintained the site and its structures.

Regionally, the Vacant Ceremonial Model has been applied to Mississippian mound sites that seemed to lack evidence of domestic habitation (Mainfort 1992; Mickelson 2008; Morse and Morse 1983; Peterson 1979; Rafferty 1995; Smith 1978). Additionally, the term *mound centers* has been used synonymously with the term Vacant Ceremonial Centers to describe "sites with earthworks but little or no archaeological evidence of habitation," (Lewis, Stout, and Wesson 1998:5). Pauketat (2007:102) correctly observes that, "vacancy is an assertion not founded on actual excavations of potential residential areas but on hunches based…on the lack of obvious accumulations of refuse on the site surfaces." Based on surface collections at Denmark, Mainfort thought that the site most likely fit the Vacant Ceremonial Model because surface collections around the site were observed to be low-density artifact scatters. Though surface collections may suggest no or limited habitation at the site, further research is necessary to make such conclusions. Sites once thought to be vacant often were not once adequate surface, subsurface, and geophysical data recovery has occurred. Some sites contain evidence for substantial habitation (e.g., Mickelson and Goddard 2011).

Mississippian Towns

Often the terms *village* and *towns* have been used interchangeably and indiscriminately to describe Mississippian settlements with populations larger than farmsteads and hamlets. Smith (1978:491) employs the term local centers, which also

may be of utility in describing sites like Denmark. I utilize the term *town* to describe permanent settlements larger than the hamlet-scale. This follows the definition put forth by Lewis, Stout, and Wesson (1998:5) where they state that a town is, "a habitation center with a public area, such as a plaza or courtyard, that may be flanked by one or more mounds." These settlements occupied around two to five hectares, maintained a defensive palisade, central plaza, residential structures, and public buildings (Hally and Mainfort 2004:279-280). I use the term *village* to describe other Mississippian settlements only when previous researchers have labeled these sites as villages.

Mississippian sociopolitical organization, likely at the scale of chiefdoms, was a main driving force behind regional scale settlement patterns. Mississippian chiefdoms are based upon sociopolitical organization with inherited leadership roles (Blitz 1999; Cobb 2003; Hally 2006; Hally and Mainfort 2004; Milner and Schroeder 1999; Peebles and Kus 1977; Smith 1978; Steponaitis 1978, 1986). A decision-making body in a central community would have maintained control regional settlement of towns, hamlets, and farmsteads.

Settlement Models and Hypothesis Testing

Hypothesis (H_1) tests whether or not Denmark was a Vacant Ceremonial Center. If the results demonstrate that Denmark had evidence for ephermal habitation, then the Vacant Ceremonial Model is supported. If this model is supported, then Denmark would have served as an area for communal, civic, and ceremonial purposes, but not for permanent residential habitation. Populations would have probably been dispersed across the landscape in hamlets and farmsteads around a shared mound center.

If the data collected at Denmark does provide evidence for habitation, then the intensity of habitation will be evaluated to determine if the site was a farmstead, hamlet, or town-scale settlement. The magnetic signature for a farmstead or hamlet would contain one to five structures, storage and production facilities and other features associated with household-level activities. If low-level evidence for habitation is found, H_2 would be confirmed indicating that a hamlet- or farmstead-scale habitation was present. A town-scale settlement ($H_{3)}$ would be confirmed if the data recovery indicates archaeological signatures of a magnitude greater than what would be expected for the hamlet-scale. Examples of these archaeological signatures include substantial artifact assemblages indicating permanent habitation, half a dozen to several dozen structures present at the site, and plazas, courtyards, or other public spaces. H_4, that Denmark was a fortified town-scale settlement, will have to effectively demonstrate that a town-scale settlement was present as well as clear evidence for at least one defensive structure such as palisades, ditches, or embankments.

In the following chapters I discuss the data collected and the results of analysis that were employed to test the above described settlement models and the previously presented hypotheses.

4. Data Collection Methods

Research Design

Multiple methods of data collection were employed at the Denmark Mounds. Topographic mapping including LiDAR data, extensive landscape-scale magnetometry survey, and targeted excavation to ground-truth data acquired from the magnetometry survey were completed. Work was conducted at Denmark between the fall of 2010 and the fall of 2012. Utilizing these three methods, enough data was gathered to determine the settlement patterning present at Denmark. The methods employed and the results of these methods are discussed below.

Topographic Mapping and GIS

A total station and data collector were utilized to produce an accurate topographic map of the site. The topographic map served as a baseline dataset for superimposition of other spatial data. For this project, spatial data were stored, managed, and manipulated in a Geographic Information System (GIS). A GIS is a software package that provides data acquisition, spatial data management, database management, data visualization, and spatial analysis (Connolly and Lake 2006). Incorporating all data into a GIS will manage the accurate spatial distribution of all work that is conducted at the site. Also, the topographic map is required for magnetometry survey so that we can incorporate the two data sets and produce an accurate overlay of the magnetometry data with all other data.

LiDAR

Light Distance And Ranging data (LiDAR) (Figure 4) was obtained from the Natural Resources Conservation Service (NRCS), and utilized to produce a highly detailed terrain model of Denmark. LiDAR is an aircraft-based laser altimetry system that can record

2000-5000 height measurements per second, and the point dataset is used then to produce a Digital Elevation Model (DEM) with horizontal resolution of about 1 m and vertical accuracy of +/- 15 cm (Connolly and Lake 2006:72). The LiDAR data produced high-resolution topographic maps and was also compared to the topographic data manually collected with the total station to test the precision and accuracy of the total-station collected dataset. The LiDAR data proved to be about 20 times better than traditional total-station generated map, revealing minute details about the site's terrain that will be further discussed in the results section.

Magnetometry Survey

A magnetometer is a geophysical instrument that detects magnetic variations in the soil sub-surface. The instrument shows contrasts between the natural background of the soil and archaeological features. Magnetometry has seen increased use among archaeologists because the method is particularly suited to detecting subsurface archaeological features (Kvamme 2006a:205). Over large areas, magnetometers can locate structures, pits, post molds, hearths, and other features. Magnetometers can aid in identifying organization and structure, inter-settlement comparisons, and the examination of individual houses (Kvamme 2006a:228) therefore ideal for answering questions regarding prehistoric settlement patterns and inter-site plans.

The Denmark magnetometry survey was conducted utilizing a Bartington 601-2 magnetic gradiometer (Figure 5) and covered over 4 ha (8.8 acres). The survey consisted of 108 20 x 20 m blocks and data were collected at a .5 m transect interval with four readings per meter along the traverse.

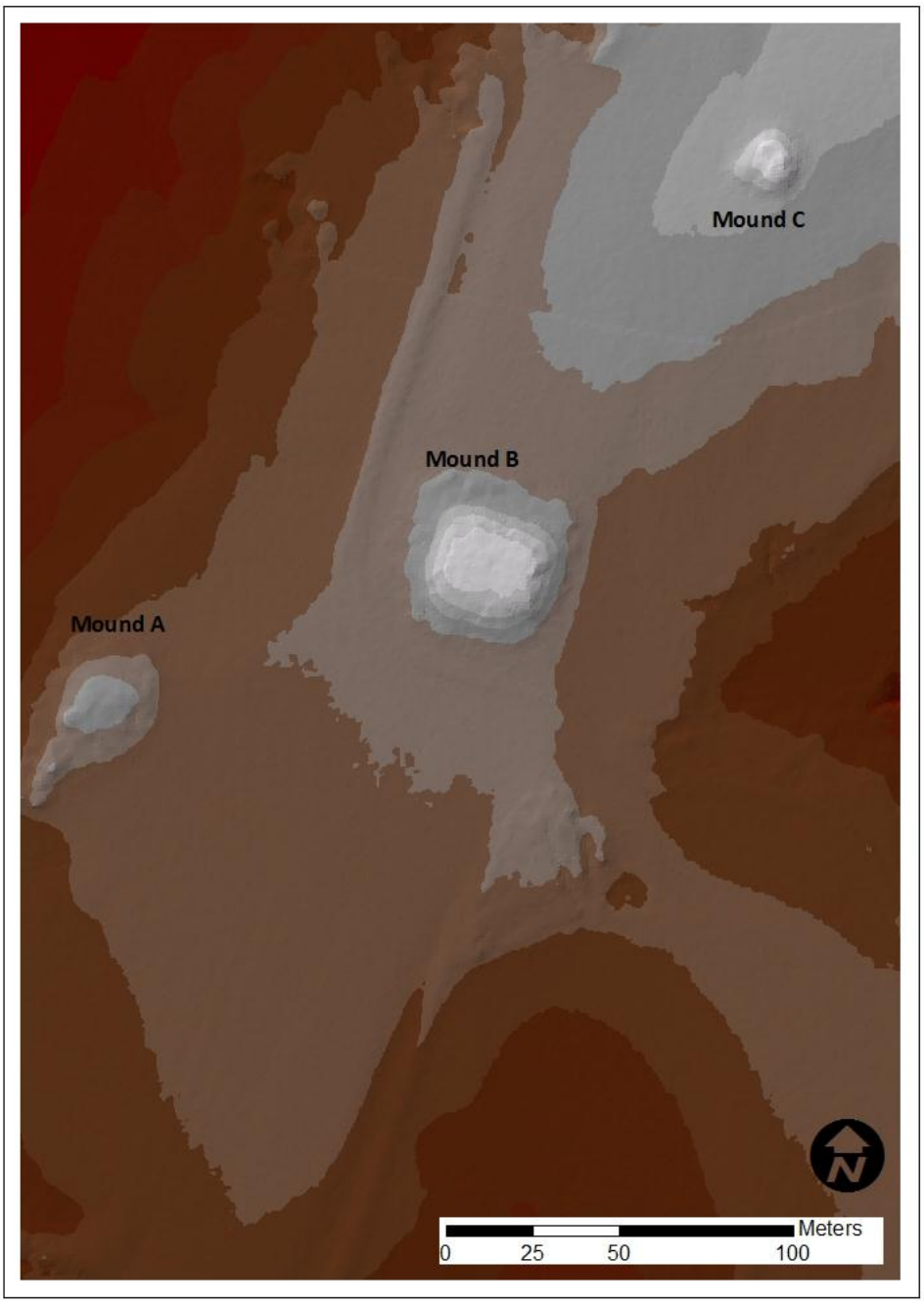

Figure 4. Digital Elevation Model (DEM) of Denmark produced from LiDAR data.

Archeosurveyor (Version 2.5.7.19) software was used to process and analyze the magnetometry data. Archeosurveyor is a computer program that is specifically designed to process magnetometry data from archaeological contexts. The raw data set entered into Archeosurveyor needs processing before archaeological features and other anomalies can be identified. These processes help to reduce high spikes in the data set, interferences introduced by the operator, and other disturbances during data collection. Multiple processes were run in order to interpret the magnetometry data.

The first process necessary to make the data set relevant was to destagger the grids by -2 intervals. Staggering by the operator is caused when timing in traverse completion is off in zig-zag surveys (Kvamme 2006b:241). The destagger process is used to compensate for data collection errors caused by the operator either starting to record each traverse too soon or too late (DW Consulting 2010). In this case an outbound of -2 intervals helped to pull the data backwards at a set interval to help align traverses.

A destripe process was applied to all traverses for the grids. Destripe helps to equalize the underlying differences between grids caused by directional effects, instrument drift, delays between surveying adjacent grids, and changes in the instrument set-up during a survey (DW Consulting 2010). Applying the destripe to the traverses of all grids using the median method helped to balance grid readings.

The magnetometry dataset was then clipped to +/- 6 nT. Clipping helps to remove extreme datapoint values throughout the entire dataset. When extreme values are present, they force the display to represent all values in between the maximum and minimum to

be the same color reducing detail and visibility (DW Consulting 2010). Removing the extreme values enhances the visibility of archaeological features detected in the Denmark data.

Figure 5. Author operating the magnetometer.

The last process to be applied to the dataset was a low pass Gaussian filter at a 3 x 4 window. Since the low pass filter is "designed to block high-frequency information in an image and 'pass' low-frequency data," (Kvamme 2006b:242-243). The low pass filter helped to increase the visibility of the relatively weak signatures of cultural features in the Denmark dataset.

Over four hectares of processed magnetometry survey shows that throughout the entire surveyed area, numerous cultural features are present and preserved in the loess soils. With the data set entered into a GIS (Figure 6) interpretation of anomalies can be discussed and ground-truthing excavations can take place.

Targeted Excavation

The processed magnetometry data revealed numerous cultural features throughout the survey area. Cultural features were interpreted to be the remains of structures, pits, and posts across the site. A targeted excavation was employed to confirm interpreted structures in the magnetometry data were actual structures. Two areas of interest were identified due to a high concentration of features within them (Figure 7). Area A is located southeast of Mound A approximately 66 m, and Area B is located 180 m to the east-southeast of Area A.

Area A had numerous features readily identifiable within it. The rectangular patterning present in the dataset was interpreted to be the remains of Mississippian wall-trenched structures. Other prominent features are identified as large pits that were most likely utilized for household refuse. One easily identified structure was selected for targeted excavation and labeled Block 2. An excavation unit was placed in Block 2 over

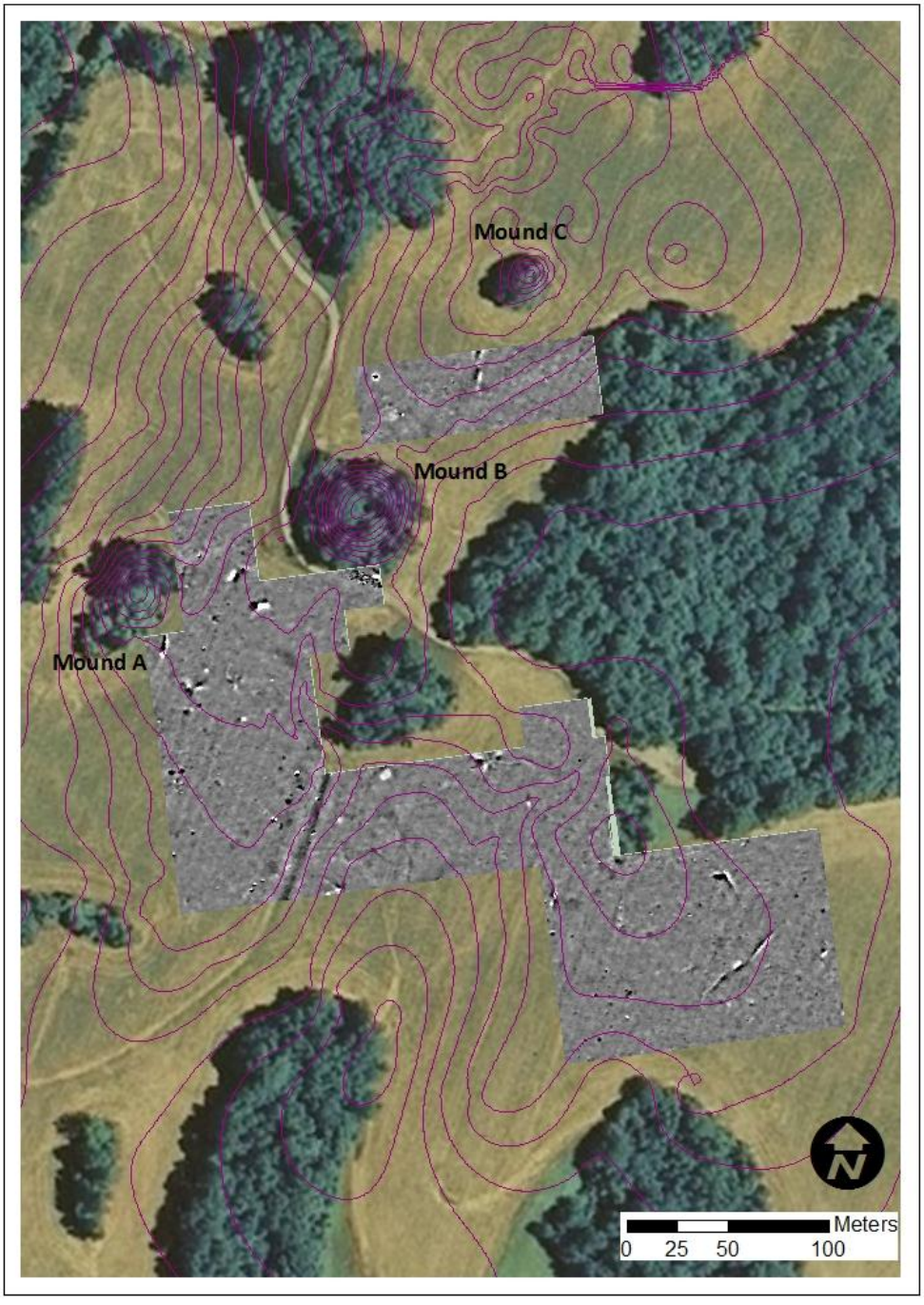

Figure 6. Denmark map with magnetometry overlay and .5 m contour lines.

one of the structures remaining corners as inferred from the magnetometry data. A targeted excavation of the hypothesized structure was required to ground-truth the results from the magnetometry data as well as obtain a sample for radiocarbon analysis, and a representative artifact assemblage.

Interpretations in Area B reveals upwards of eight structures surrounding a larger structure in the center and numerous pits and posts as well. The smaller structures in Area B are thought to be residential structures encompassing a larger ceremonial or public structure. Given time constraints no test excavations occurred in Area B.

Targeted excavations allow for the ground-truthing of interpretations derived from magnetometry data. A targeted excavation was placed over an interpreted structure in Area A. The wall-trenched structure excavated in Area A confirms what structure architecture looks like in magnetometry data. The results from excavation allow for reliable interpretations to be made of structures observed in the magnetometry data. The results of this work will be discussed in the next chapter.

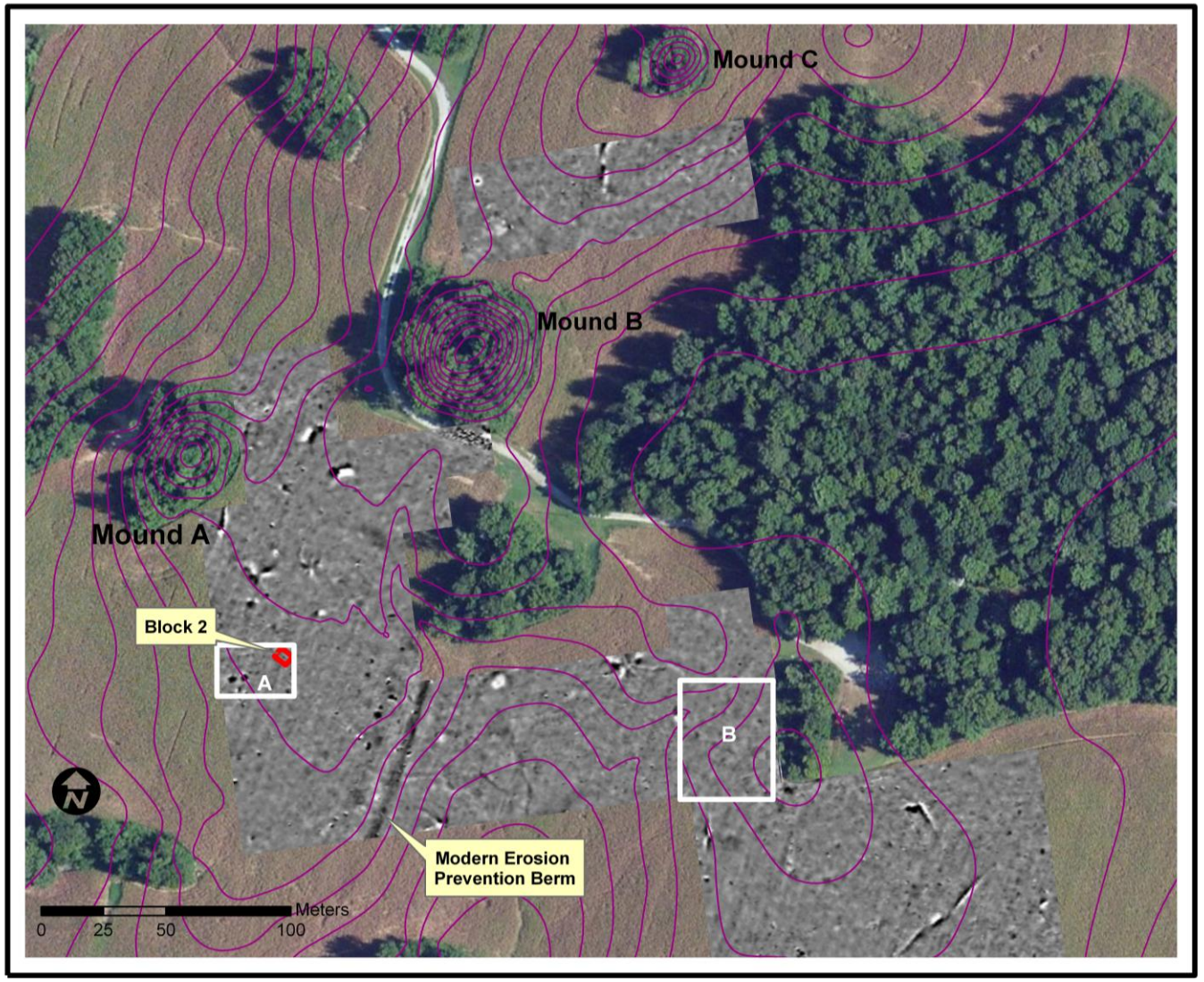

Figure 7. Magnetometry data at Denmark with Areas A and B as well as Block 2 excavation identified.

5. Results

Data collected at Denmark provided the essential information needed to determine what type of settlement model was present at Denmark. The acquired data collected facilitates a better understanding of: (1) mound architecture and size, (2) the wall-trench structures present at Denmark, (3) the settlement model for Denmark, and (4) regional-scale interaction. The above four facets of the research are discussed below.

Results of Topographic Mapping and LiDAR

Topographic mapping at Denmark provides accurate elevation data for the parts of the site surveyed. The addition of LiDAR data reveals shortcomings in the collected topographic data. A DEM derived from LiDAR revealed architectural features for parts of the mounds that topographic mapping did not. For instance, a previously unknown ramp to Mound A's summit (Figure 8) is visible in the LiDAR data. Topographic mapping and LiDAR data have provided highly accurate elevation and distance data across Denmark that can be used to assess the architectural features of the three mounds.

LiDAR data revealed interesting aspects of the architecture of the three mounds. Mound A is a ramped oblong mound that rests on a northeast-southwest axis. The function of Mound A is not known, but based on its shape it may have been utilized for mortuary or ceremonial purposes. Mound B is the largest mound of the three at Denmark. The large platform summit is typical of Early-Middle Mississippian platform mounds and most likely would have been used for the chief's residence. Mound C is a small conical mound to the north of Mound A that was most likely used for burials. Though the originally produced topographic map demonstrates some of these

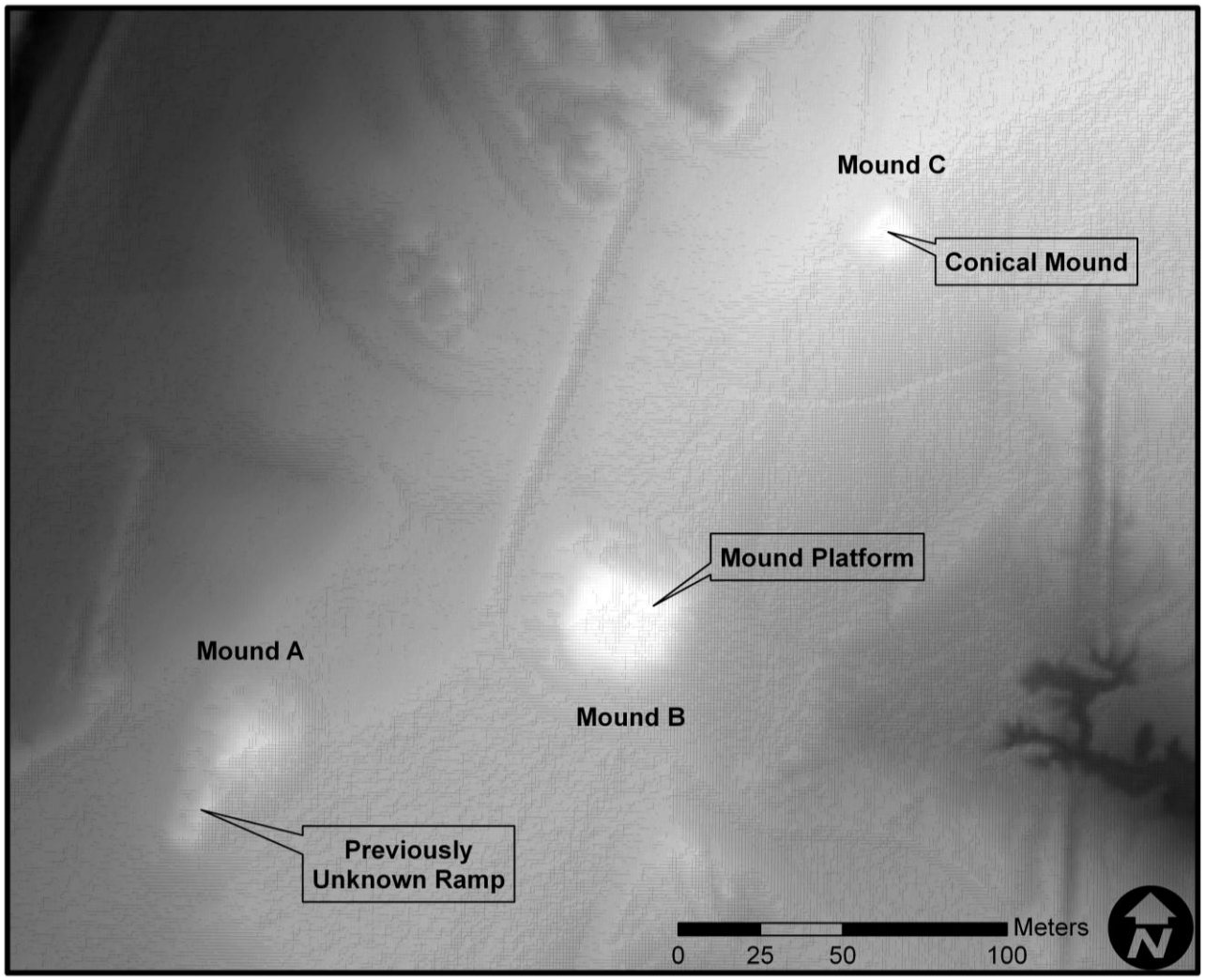

Figure 8. DEM of Denmark produced from LiDAR data with 1 m point spacing and a +/- 7 cm vertical accuracy revealing a previously unknown ramp to Mound A and architectural features.

architectural features, the LiDAR data has a much higher accuracy for elevation and distance and reveals more about the mounds' true shapes and sizes.

Results of Magnetometry Survey

Numerous archaeological features are present in the processed magnetometry data. These features have been interpreted to be structures, pits, and posts throughout the survey area. Area A and Area B (Figure 9) when viewed at a higher resolution demonstrate these interpretations as the features become easy to identify. These select areas reveal numerous structures and pit anomalies present in the data. Throughout the entire magnetometry survey, archaeological features are present, and structures, pits, and posts are prevalent across the site.

The weak magnetic signatures present in the magnetometry data mostly represent archaeological features that are within the range of +/-5 nT (Kvamme 2006a:209) Evidence of plow scars, a large erosion berm, and naturally forming gullies are identified as well. Rectangular features representing structures can be delineated across the survey area. In total, over 70 possible structures (Figure 10) are present in the magnetometry data. The majority of structure sizes range in size from 24 m^2 to 35 m^2 with a few as large as 120 m^2. The buildings are presumably domestic structures with the larger ones representing public buildings. The buildings generally form in clusters across the site with a few scattered in between.

The magnetometry data provides slight evidence for a palisade at Denmark. Different linear patterns are present in the surveyed area, but the weak magnetic signatures make interpretation difficult. These presumed palisades cannot be verified and as such must remain in question until test excavations are conducted.

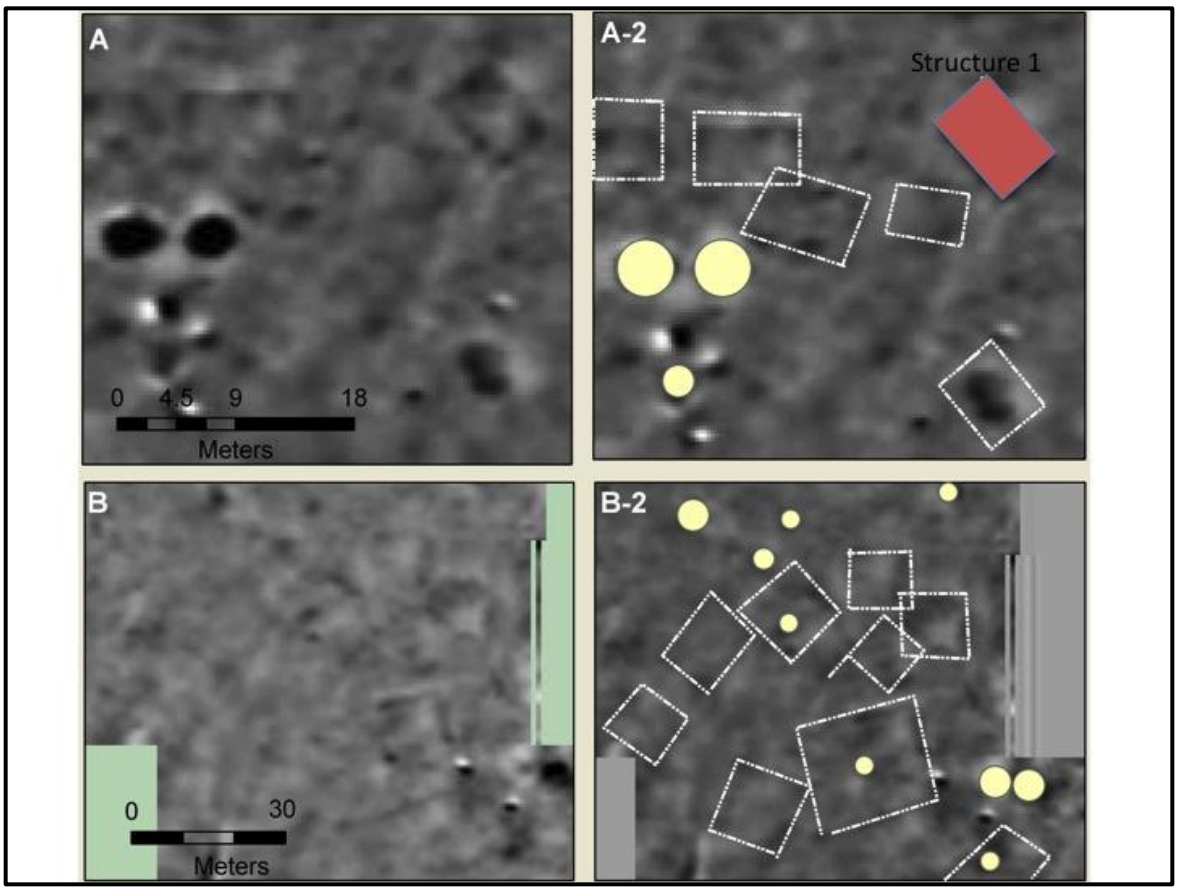

Figure 9. Magnetometry data (+/-6 nT) for Areas A (top left) and B (bottom left). Interpreted structures and pits present as well as Structure 1 identified in Area A (top right) and Area B (bottom right).

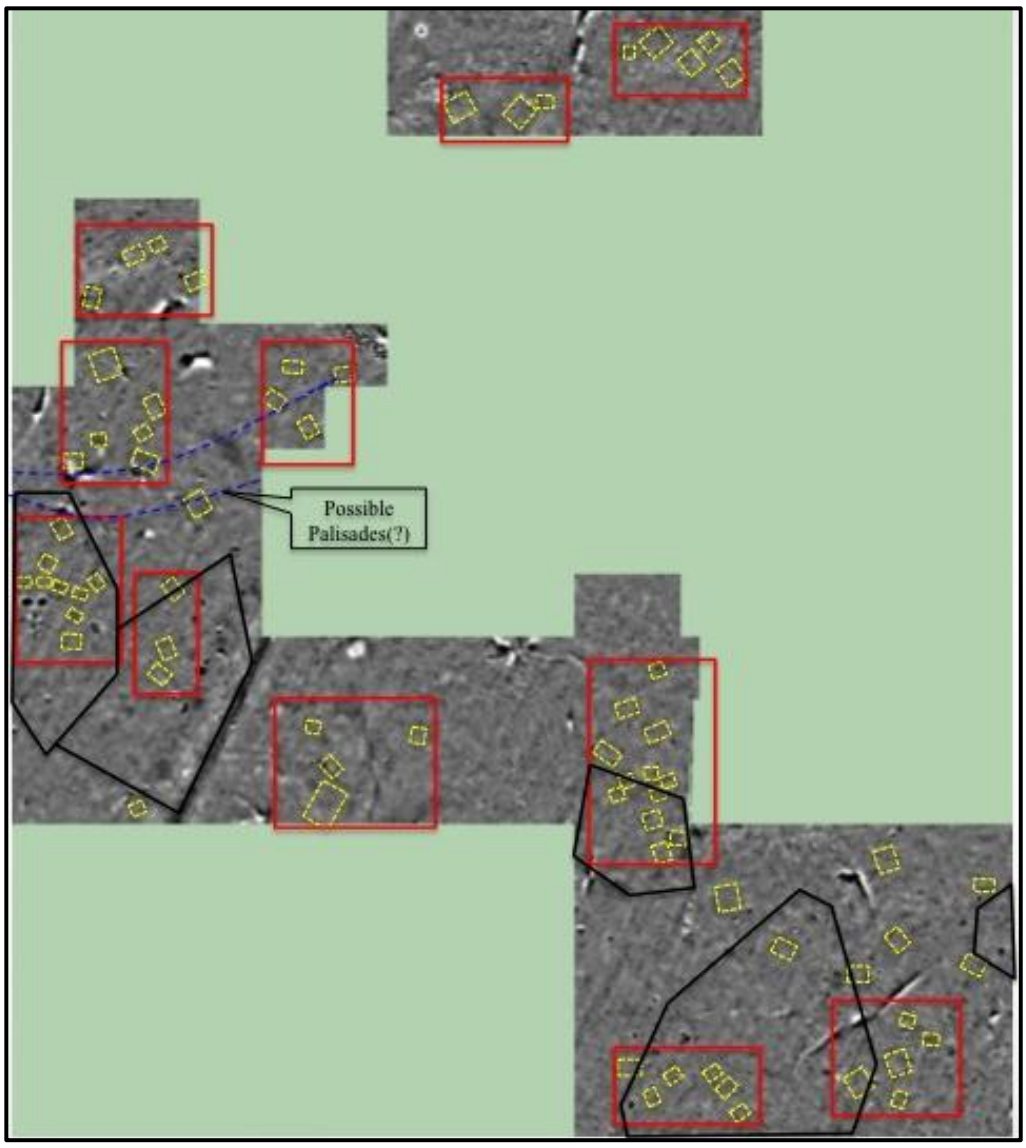

Figure 10. Magnetometry data (+/- 6 nT) with 70 interpreted structures mostly in clustered groups (red) as well as possible palisades. Recorded artifact scatters (black) tend to correlate with clusters of structures.

Results of Targeted Excavation

Block 2 was selected for targeted excavation because of the high probability that the rectangular anomaly in the magnetometry data represented a Mississippian wall-trench structure. An original 2 x 2 m excavation unit was placed over the northern wall to delineate the interpreted structures limits from the surrounding soil. After discovery of the structural remains, the block was expanded to reveal the entire structure, labeled Structure 1.

Structure 1 was excavated in order to ground-truth interpretations of the magnetometry structures across the site, to obtain a radiocarbon sample for site dating, and to obtain other archaeological data such as floor size, lithics, ceramics, botanical samples, etc. Structure 1 represents a typical wall-trench structure common for the Mississippian period. Upon further excavation of Structure 1, the remains of a single pot scattered across the structure floor was found. Underneath a group of sherds on the floor of Structure 1, a charcoal sample of charred wood was retrieved for analysis. The radiocarbon assay for Structure 1 yielded a radiocarbon age of 710 +/-30 BP (Beta-320578; charred material; $\delta^{13}C$ = -25.8o/oo) with a 2σ calibration date of cal A.D. 1270-1300 and cal A.D. 1370-1380. Additionally, it should be noted that charcoal was present throughout the entire structural remains and indicates that the structure was burned.

The excavations of Structure 1 have resulted in the recovery of 239 artifacts (Appendix B). The artifacts recovered consisted of: ceramic sherds (n = 144), lithic flakes/fragments (n = 43), pieces of iron-bearing sandstone (n = 40), chunks of daub (n = 10), a projectile point (n = 1), and a single flake of mica. The artifacts recovered from the structure represent refuse typical of domestic habitation. The full extent of the structure

walls was approximately 6 m x 4.5 m (Figure 11). Few interior features are identifiable within Structure 1, although the entire structure was not completely excavated.

Structure 1 (Figure 12) was a wall-trench structure of Middle Mississippian origin. The preservation of the floor remains indicates that the structure was most likely semi-subterranean (Figure 13) at a shallow depth below the surface. Structure 1 highly corresponds to the interpreted magnetometry data for that location.

Results of Surface Collections

Mainfort mapped different scatters adjacent to the mounds at Denmark, but a controlled systematic surface survey has not occurred. However, collections by the landowner and Mainfort have produced ceramic sherds, a few projectile points and flakes, a biconcave discoidal or "chunky stone" (Figure 14), and part of a greenstone celt (Figure 15). Some ceramics were analyzed (Appendix A) and are temporally diagnostic of Late Woodland and Early Mississippian pottery. As Binford (1972) demonstrated at Hatchery West, surface deposits can be utilized to provide a preliminary definition for what type of a site is present. The surface deposits highly correlate to structure clusters observed in the magnetometry data (refer back to Figure 10).

Artifact scatters at Denmark are sparse across the landscape due to the practice of no-till farming and low surface visibility, but surface finds have revealed a few exotic artifacts that would have been highly important. The exotic materials collected from surface contexts include a greenstone celt and a discoidal stone. Greenstone is not local to West Tennessee, and this celt's source material probably originated from the St. Francois River valley in southeastern Missouri (Swihart, personal communication 2011). Cobb (2000:59) observes that greenstone was an important trade good that had

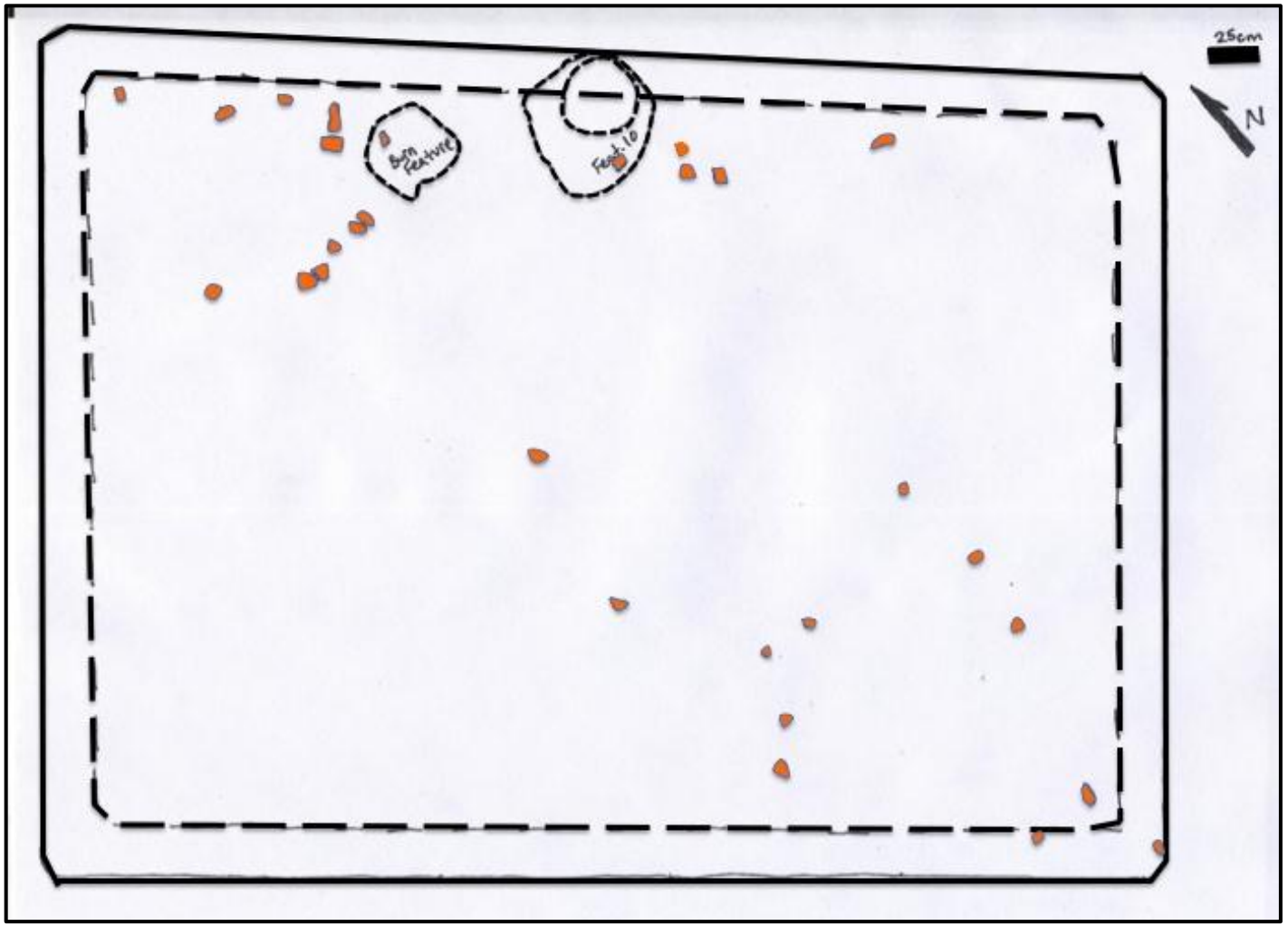

Figure 11. Structure 1 floor plan with ceramics recorded across structure. Dashed line is interpreted interior wall trench measured at an average of .25 m.

Figure 12. Structure 1 at Denmark after removal of plow zone.

Figure 13. Northwest corner of Structure1 exposing semi-subterranean floor.

symbolic/ideological significance and appears at sites throughout the southeast. The biconcave discoidal stone was discovered by the landowner. The discoidal stone was manufactured from glacial outwash material and could have been produced in the vicinity of Cahokia. It is thought that these artifacts were of high importance and that greenstone celts and discoidals, among other things, originated at Cahokia and were redistributed as elite goods to outlier areas (Pauketat 2004:121).

Summary of Results

Topographic mapping and LiDAR data reveal the architectural nature of the three mounds and the location of Denmark on the upland terrace of Big Black Creek and surrounding smaller creeks. Magnetometry data reveals approximately 70 structures, perhaps more, clustered together across Denmark as well as two linear features that may be possible palisades. A targeted excavation of an interpreted wall-trenched structure revealed the subsurface remains of a wall-trenched structure with a semi-subterranean floor. A collected radiocarbon sample yielded a 2σ calibrated date of cal A.D. 1270-1300 and cal A.D. 1370-1380. Artifact scatters at Denmark are sparse, but different surface collections have produced exotic artifacts including a chunky stone and greenstone celt. These exotic goods perhaps originated from the St. Francois Mountain region of southeastern Missouri and were redistributed elite goods from Cahokia. In the next chapter I will analyze and discuss the results. Results of this research are significant for the following three reasons: first, a radiocarbon date places settlement at Denmark during the Early-Middle Mississippian period; second, wall-trenched structures are present;

third, it demonstrates that a town-scale settlement was present; and lastly provides evidence for long distance trade. Implications of these three facets are discussed in the following pages.

Figure 14. Biconcave discoidal or "chunky stone" discovered by landowner.

Figure 15. Broken greenstone celt recovered during magnetometry survey (Photo courtesy of Dr. David Dye).

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6. Analysis and Discussion

Analysis

The results of research at Denmark indicate that (1) Denmark was an Early-Middle Mississippian site, (2) has evidence for 70 possible wall-trenched structures clustered in groups, (3) was a town-scale settlement, and (4) has evidence for long distance trade. Given the results of this study, the five hypotheses presented at the beginning of this thesis are now evaluated.

The data collected at Denmark refutes three of five hypotheses presented in Chapter 1. H_0 posits that the collected data would not be able to determine settlement and is refuted as the data provides ample information to determine settlement at Denmark. H_1, that Denmark was a Vacant Ceremonial Center, is rejected because magnetometry data reveals numerous buildings present across the site. Had Denmark been a Vacant Ceremonial Center, the site would lack evidence for structures and domestic habitation. Instead, the magnetometry data represents 70 or more possible structures across the survey area. The artifacts collected from the excavation of Structure 1 are mostly ceramics and iron-bearing sandstone that create an assemblage similar to the domestic structures at Ames (Guidry, personal communication 2013). H_2 posits that Denmark was a small-scale settlement such as a farmstead or hamlet. H_2 is also refuted as a possible explanation for settlement at Denmark because the number of buildings present is far greater than just a few domestic structures indicative of a small-scale settlement. The presence of multiple structures in the surveyed area means that Denmark was indeed a Mississippian town confirming H_3 and perhaps H_4, but the full extent of the settlement and isolating defensive architecture will require further magnetometry survey and

targeted excavations. Permutations of H_1-H_4 (H_5) is also refuted because evidence for H_1 and H_2 are not seen in the collected data.

The data demonstrate that Denmark was a small Early-Middle Mississippian town. Denmark's settlement was larger than that of a farmstead-scale or hamlet-scale settlement. Structures across the site also refute the Vacant Ceremonial Model for Denmark. Previous surface collections incorrectly indicated a lack of habitation at the site due to the observation of a low-density of artifacts across the surface. A low-density surface assemblage does not provide enough evidence to determine the nature of the intensity of site occupation. Artifacts from the excavation of Structure 1 indicate that habitation was indeed present.

Settlement at Denmark included numerous buildings across the site. The structures interpreted from the magnetometry data form clusters of habitation areas with a few isolated houses in between the clusters. The main area of magnetometry survey was conducted south of the mound group as well as between the mounds. The southern edge of Denmark backs up to the swampy area of the Big Black Creek that would have served as a natural barrier to the site. A palisade may be present in the magnetometry data, but needs further investigation to make a determination. The western or northern edges may also show evidence for a defensive structure, but those areas have yet to receive magnetometry survey.

Archaeologists often use artifact densities to make determinations of settlement at a site. The unobtrusiveness of artifacts on the surface of loess fields, as is the case at Denmark and Ames, cannot be used to determine settlement. Instead, further multiple methods of inquiry, as demonstrated at Denmark, are necessary to delineate a sites

settlement. The surface scatters that Mainfort recorded near the mounds represent localized artifact concentrations that tend to correlate with structures present in the magnetometry data. These scatters can further help to understand subsurface deposits similar to artifact densities did at Ames (Mickelson and Goddard 2011). These sites are the surficial remains of subsurface archaeological features and are directly related to the local settlement that was once present. Since the archaeological record is continuous over the land surface, and hence subsurface, a better understanding of settlement at archaeological sites such as Denmark can be best researched through large magnetometry surveys helping to better understand the depositional processes of surficial archaeological remains.

Research presented in this thesis confirms that Denmark was an Early-Middle Mississippian town settlement and had a sizeable permanent population. Situated on the rolling hills above the swampy wetlands of the Big Black Creek, the population at Denmark would have had easy access to and from the Hatchie River system. Extended family units as documented at King (Hally 2008) would have lived in clusters of houses dotting the landscape with perhaps a palisade encompassing the mounds with groups living inside the confines as well as others living outside the wall limits.

Discussion

Denmark needs to be placed into the greater regional context in order to better understand how it relates to other contemporary settlements. I will compare Denmark to other Early-Middle Mississippian towns in the region, including Ames, Chucalissa, Obion, Jonathan Creek, and Owl Creek, radiocarbon dating has shown these sites to be contemporary with Denmark (Figure 16). Additionally, Denmark will be compared to

two other Early-Middle Mississippian sites (Figure 17) Zebree (Morse and Morse 1983) and Morris (Clay 2006), extending the scope of analysis to a greater area. When viewing Denmark in relation to other Early-Middle Mississippian settlements throughout the region, the site falls within the range of settlement pattern variation for the greater Mid-south region.

Ames. Previous work conducted at Ames (40FY7) in Fayette County, Tennessee (Goddard 2011, Mickelson and Goddard 2011) demonstrates that sites with seemingly low surface artifact densities are often incorrectly interpreted as vacant ceremonial centers. Magnetometry and excavation reveal that Ames (Figure 18) had a palisaded town component in addition to the mound complex (Goddard 2011, Mickelson and Goddard 2011). Unlike Ames, the organization of residential structures at Denmark does not seem to adhere to a planned community. Rather, the buildings at Denmark are in discrete clusters across the site, suggesting distinct extended family groupings.

Chucalissa. The two-mound site in southwest Memphis, Shelby County, Tennessee rests on a large bluff overlooking Nonconnah Creek near its confluence with the Mississippi River (Morse and Morse 1983:296). The site has been thoroughly investigated since its initial discovery by the Civilian Conservation Corps in the 1930's (Morse and Morse 1983:26) and represents a Late Woodland to Late Mississippian secondary center (McNutt et al. 2012). Mound A is the larger platform mound that sits on the north end of the plaza, while Mound B sits on the west end of the plaza with residence areas to the west, south, and east of the plaza (Morse and Morse 1983:296). Chucalissa was a small town-and-mound complex that demonstrates an Early-Late Mississippian town center.

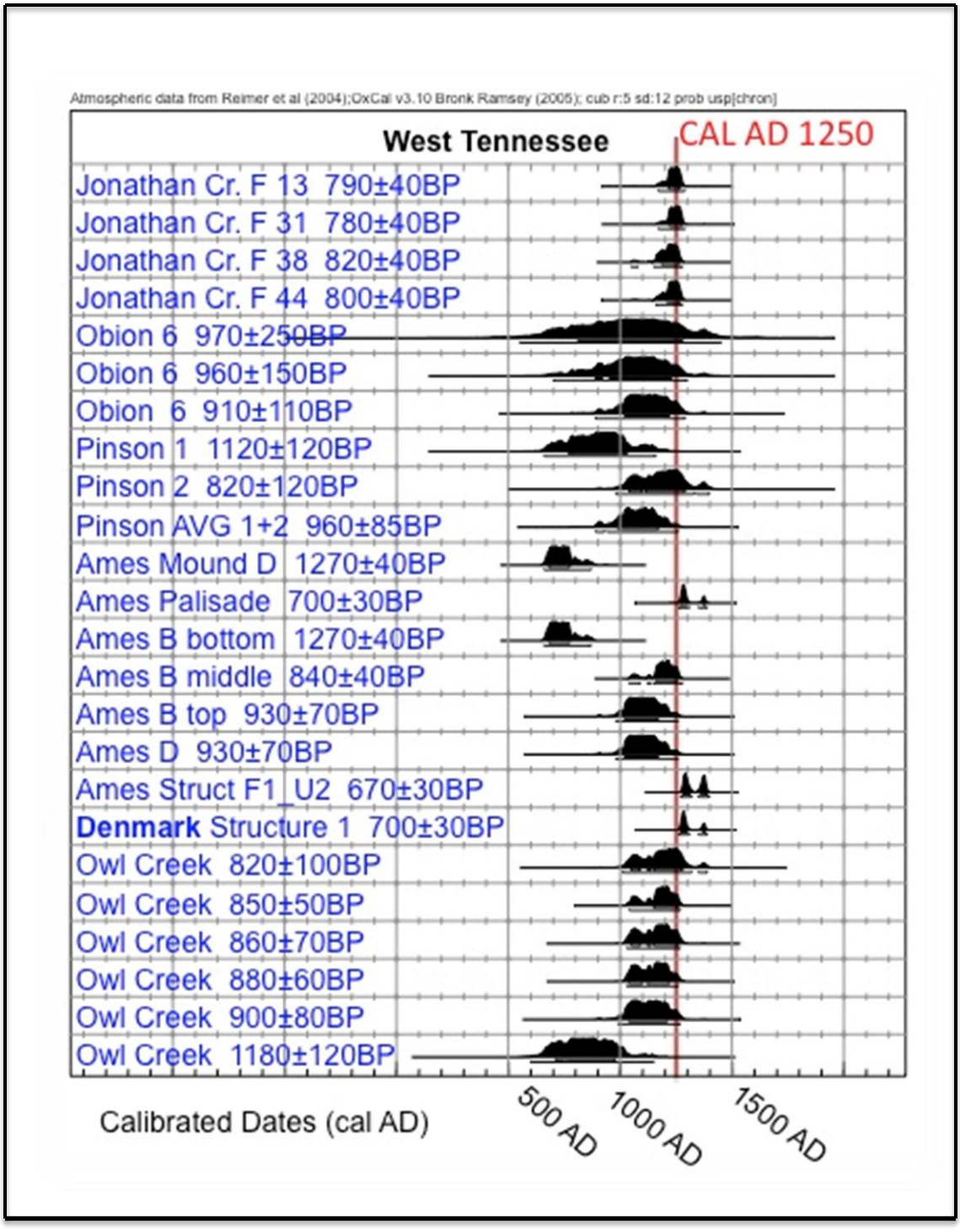

Figure 16. Radiocarbon dates for sites throughout the region (Mickelson 2012).

Figure 17. Denmark and other Early-Middle Mississippian sites in the region.

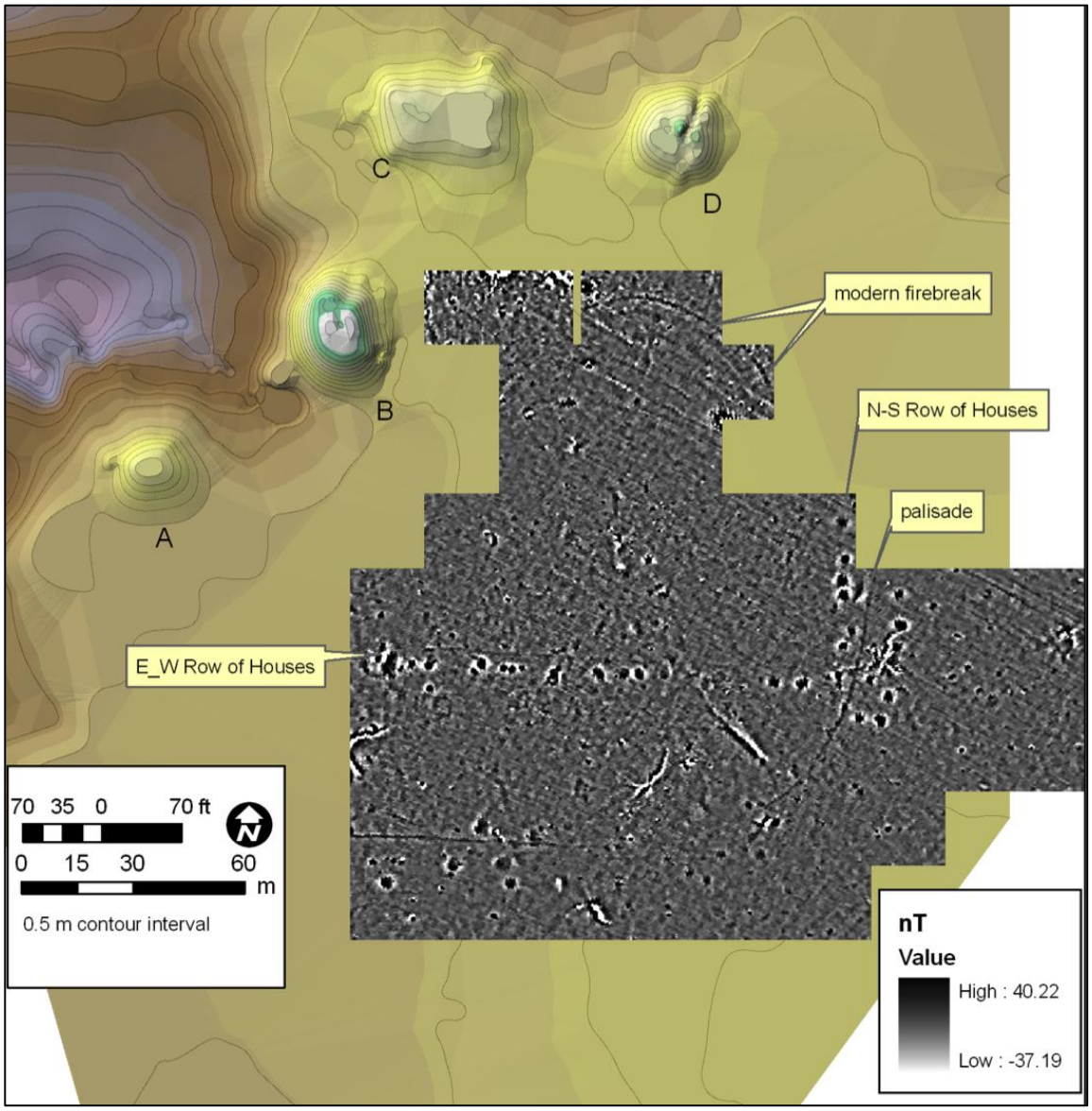

Figure 18. Ames magnetometry data with interpretations (Mickelson 2010).

Owl Creek. Work at Owl Creek (22CS502) located in Chickasaw County, Mississippi by Rafferty (1995:108) seemed to indicate that the mound group site did not have an associated town or extensive habitation. However, when the shovel test pit data from Owl Creek are compared to Ames shovel test data (Goddard 2011:56-57) the two sites exhibit similar low recovery rates of artifacts and similar artifact densities. Thus, the argument is made that artifact density estimates at Owl Creek have been misinterpreted, leading to its incorrect attribution as a Vacant Ceremonial Center. It appears that shovel testing is an inappropriate recovery technique for assessing settlement patterns. When the shovel test pit method is employed in the loess region sites are unobtrusive. In the loess plains area, seemingly low artifact densities are actually indicators of settlement (Goddard 2011:57, Mickelson and Goddard 2011:169). Utilizing original site descriptions reported by Dr. Rush Nutt in 1805 and aerial photographs, Brookes (1985:226) reconstructs Owl Creek as a mound center that was surrounded by a ditch (Figure 19). A site-wide magnetometry survey would hopefully provide the evidence needed to better understand the settlement and defensive ditch that were present at Owl Creek. Owl Creek was probably another Early-Middle Mississippian town center surrounded by a defensive ditch and palisade like Denmark.

Obion. Obion (40HY14), located in Henry County, Tennessee, was first excavated by Bishop and Merwin in 1913, and again by Lewis of the University of Tennessee in conjunction with the WPA in 1940 but little work was actually done. Obion (Figure 20) consisted of seven mounds, and though the excavations mostly focused on the mound areas, it is thought that the site was palisaded had an associated town-scale settlement with wall-trench structures (Garland 1992:37).

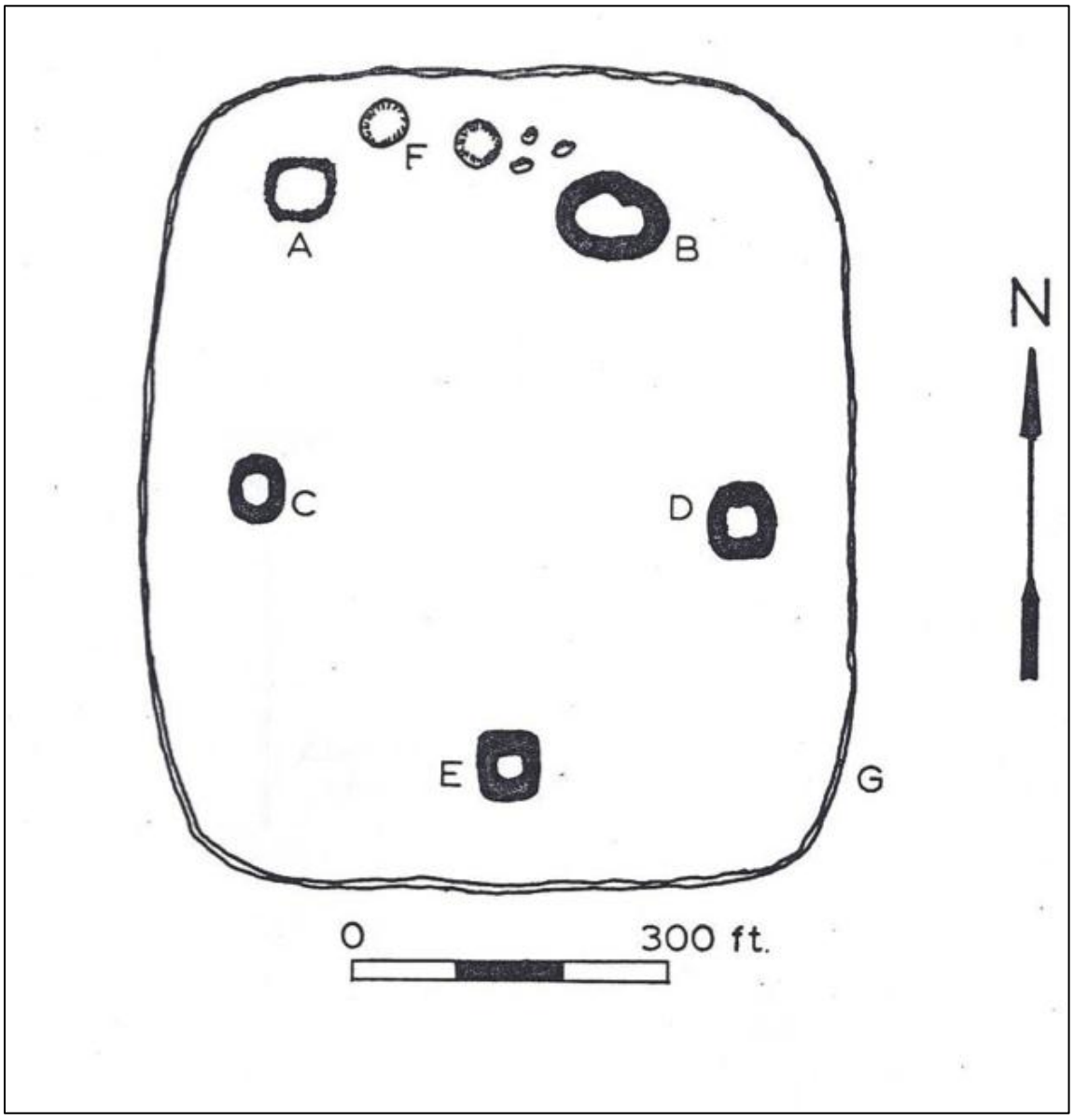

Figure 19. Owl Creek site as reconstructed by Brookes (1985: Figure 1) from Nutt's description. A-E are mounds; F is an area of borrow pits; and G is the ditch.

Jonathan Creek. Jonathan Creek (15ML4) in Marshall County, Kentucky was another contemporary of Denmark that consisted of a palisaded town with seven mounds (Schroeder 2011, Webb 1952). The site (Figure 21) has numerous structures throughout of five varying construction types that cluster into residential groups, as well as numerous palisades that represent site expansion over time (Webb1952, Schroeder 2011). Large pit features are associated with structures at Jonathan Creek (Figure 22). These large pit/structure associations are also evident at Ames (Figure 23), Zebree (Figure 24), and Denmark too (refer back to Figure 9). Denmark closely fits the layout of Jonathan Creek. Both are town-scale settlements, with several mounds, and clusters of structures. If Denmark did have one or more palisades, as is hypothesized from the magnetometry data, the two sites layout would be nearly identical.

Zebree. The Zebree site (3MS20), located in Mississippi County, Arkansas, is an Early-Middle Mississippian town with a ditch surrounding the residential area. Morse and Morse (1983) postulate that this ditch most likely had a palisade or fence within it. This possible defensive structure, like that of Ames, Obion, and Jonathan Creek, may reflect the need for protection around the site. The wall-trenched structures at Zebree are organized in clusters across the site and have associated pits with each structure (Morse and Morse 1983). This town-scale settlement of clustered structures with associated pits is a similar pattern to Denmark's layout as well.

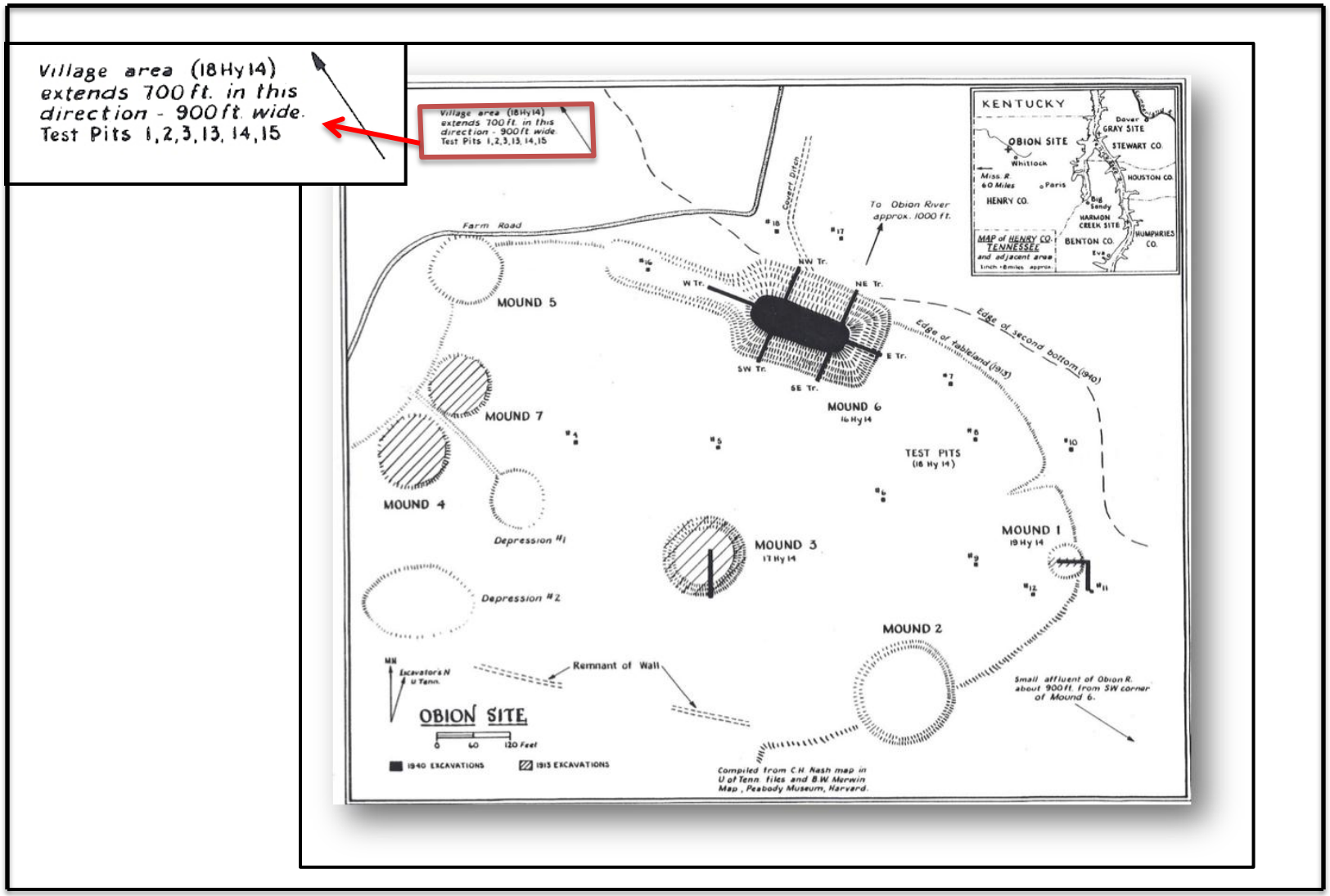

Figure 20. The Obion Site (Garland 1992: Figure 2)

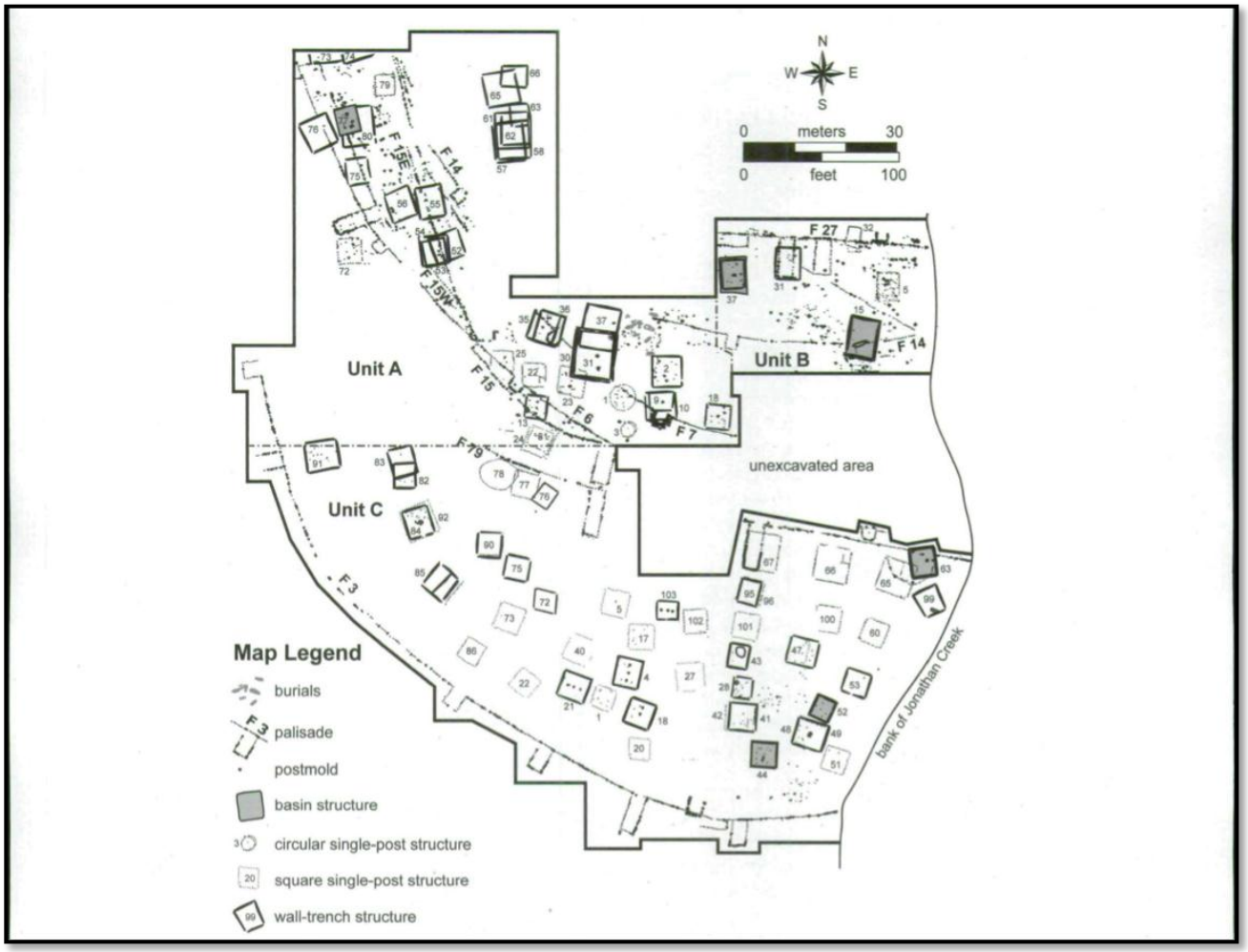

Figure 21. Jonathan Creek (Schroeder 2011: Figure 1).

Figure 22. Jonathan Creek midden pits associated with a structure similar to Ames, Denmark, and Zebree (Courtesy of William S. Webb Museum of Anthropology).

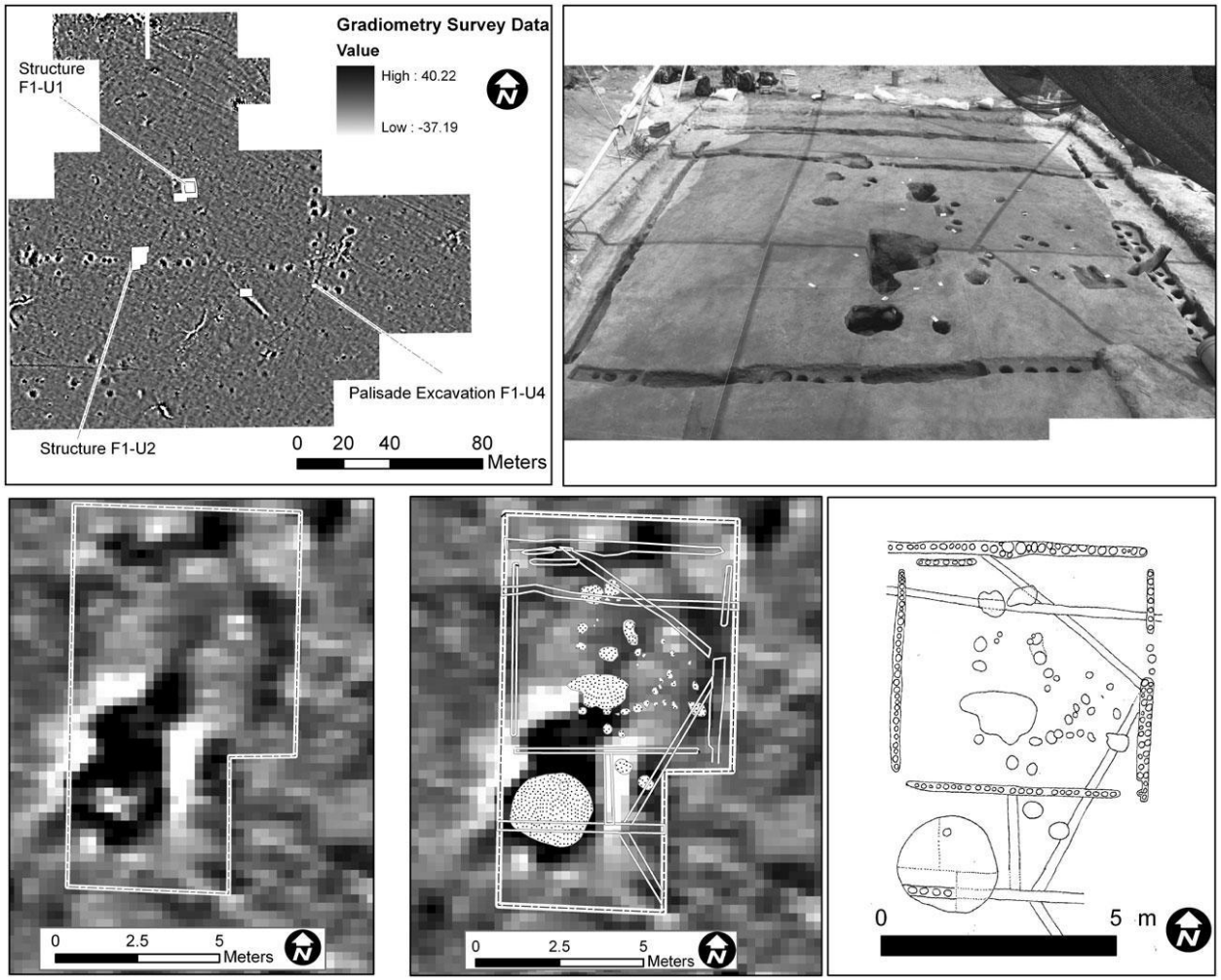

Figure 23. Ames magnetometry data revealing a midden pit associated with a structure (Mickelson 2012).

Morris. The Morris Site (15HK49) is a small, fortified town of approximately 0.9 ha in area located in Hopkins County, Kentucky (Clay 2006). Though the site is multicomponent, a Middle Mississippian (A.D. 1200-A.D. 1400) occupation at the site is plausible. The town at Morris (Figure 26) consisted of wall-trenched structures across the site organized in clusters similar to Denmark. However, no planned community seems identifiable. The palisade may enclose the entire town, though the northwest portion was not identified (Clay 2006).

Summary

Generally, Early-Middle Mississippian sites are situated on fluvial terraces outside of the local river system's floodplain. These areas provided Mississippian populations with the exploitable environments that Mississippians had grown accustomed. Early-Middle Mississippian settlements consisted of town areas with or without an associated mound/mounds encompassed by a defensive barrier. Wall-trenched buildings dominate the structure type for these towns and at the majority of sites buildings are grouped into clusters. The collected data for Denmark demonstrates a town-scale settlement with wall-trenched structures clustered across the surveyed area. Though a ditch, as perhaps mentioned by Haywood (1823:146), may be present at the site, it has yet to be found. Further magnetometry work at Denmark will probably reveal defensive architecture at the site, either in the form of a palisade, defensive ditch, embankment, or all three. Denmark is a town-scale settlement that is typical of Early-Middle Mississippian settlements in the region.

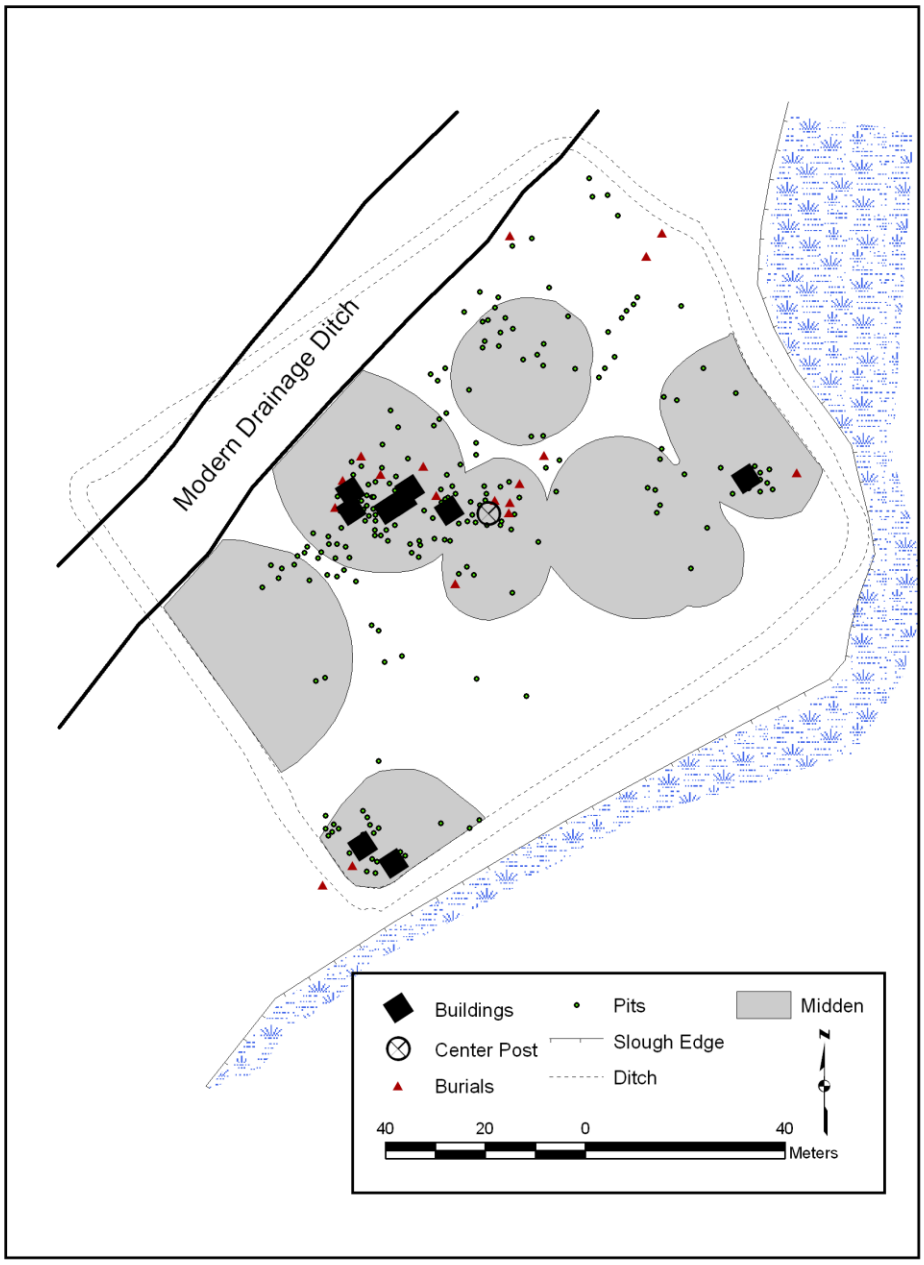

Figure 24. The Zebree Site (3MS20) (after Morse and Morse 1990: Figure 15). Buildings not to scale.

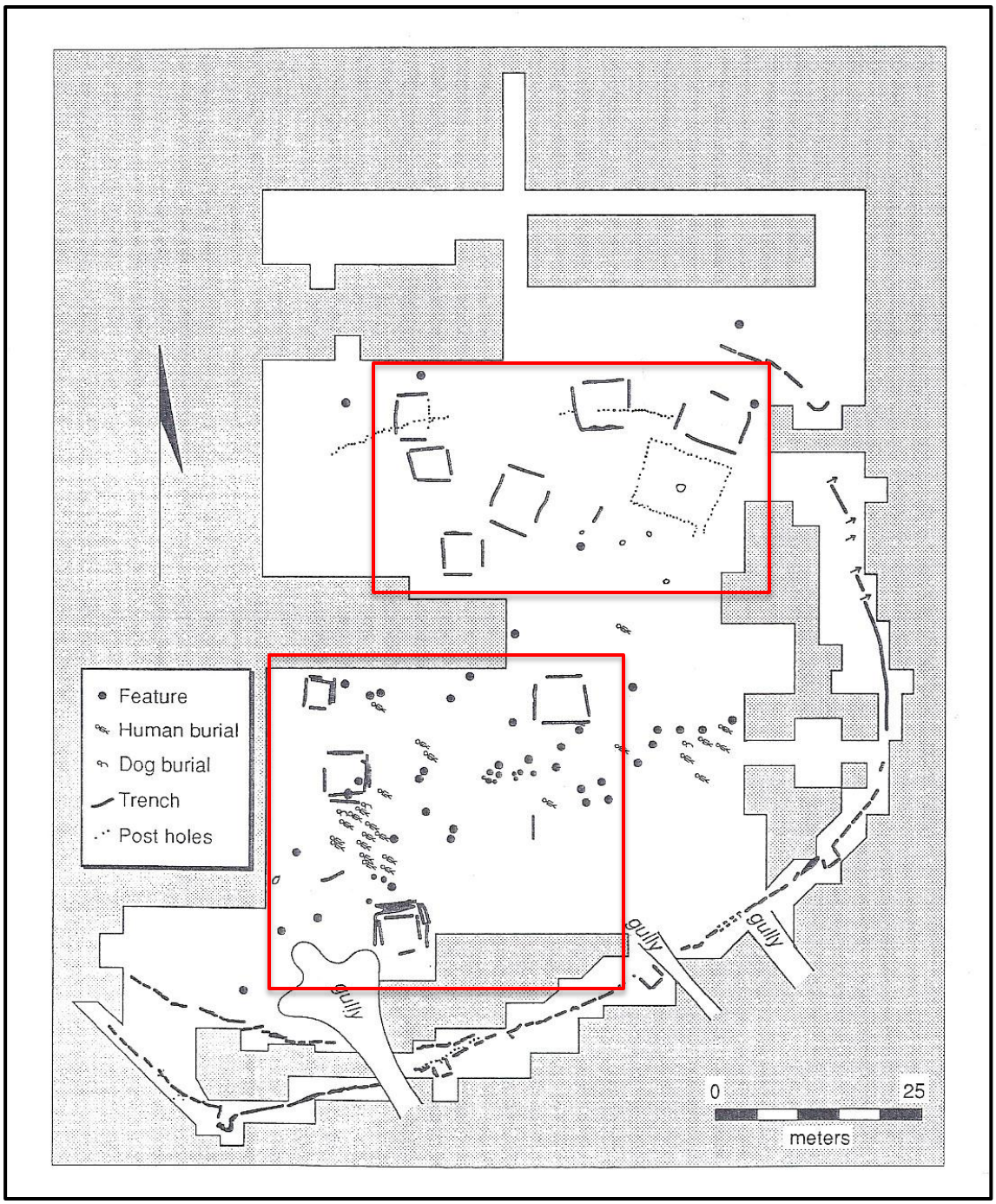

Figure 25. The Morris Site (Lewis 1996:Figure 5.5) with residential clusters similar to Denmark.

7. Conclusions and Future Research

Denmark is typical of Early-Middle Mississippi period towns, possessing several features common with other similar settlements across the Southeast (e.g., Hally and Mainfort 2004; Lewis and Stout 1998). This research concludes that Denmark was not a Vacant Ceremonial Center. Over 70 structures across the site have been identified in the collected data. Through topographic mapping, LiDAR data, magnetometry survey, and targeted excavation, it is known that Denmark represents an Early-Middle Mississippian town-scale settlement.

Early-Middle Mississippian sites across the Mid-South need continued research and assessment to further answer questions of how settlements were patterned for the region. The magnetometry work at Denmark exemplifies how archaeologists can detect subsurface archaeological remains and determine settlement across the landscape. Denmark has been largely preserved and the collected data along with future work at sites in West Tennessee can help to further understand the settlement of Mississippian populations throughout the entire Southeast.

Outside of extensive work at Chucalissa, the lack of settlement data for West Tennessee is an area that needs much refinement. This work, as well as the work of Mickelson and Goddard (2011), has barely scratched the surface on understanding Early-Middle Mississippian settlements and populations in West Tennessee. Regionally, other mound groups such as Desoto, Bolivar, Jerman, Michigan City, and Kenton, to name a few need to be investigated. Not only do mound sites need be investigated, but also local farmsteads and hamlets in the region should be identified and researched. Further work

at these sites and others will greatly enhance the understanding of Early-Middle Mississippian settlement and use of landscape on a micro- and macro-regional level

The success of magnetometry at Denmark in understanding settlement archaeology highlights the efficiency of this particular discovery technique in mapping past human land use over large areas. The unobtrusiveness of surface deposits in the case of Denmark does not accurately portray the continuous archaeological record across the landscape (e.g. Dunnell and Dancey 1983). Though surface collections may be representative of subsurface remains as demonstrated by Binford (1972) and many others, magnetometry allows for a much broader view of subsurface cultural remains that can provide a more accurate understanding of past settlements and archaeological landscapes (Kvamme 2003:453). With this understanding of how magnetometry is able to rapidly and effectively delineate past settlements, work towards regional-scale settlement models should be developed and implemented. Magnetometry surveys need to move beyond the site-scale of inquiry and be used to examine the total extent of human land use on a broader scale. Not only should Mississippian towns be investigated, but magnetometry should be used to identify hamlets, farmsteads, and other activity areas across the landscape. These smaller sites are integral in understanding the true nature of regional settlements and provide a glimpse of Mississippian culture that has seldom been investigated especially farmsteads and hamlets (e.g. Smith 1995).

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Appendix A[1]. Surface Collected Ceramic Analysis

Provenience	Temper Type	Temper Abundanc	Temper Size	Surface	Vessel Section	Count	Weight (g)	Lip Treatment	Rim Orientation	Rim Treatment	Sherd Width	Orifice Diameter	Comments
GSC	clay/sand	moderate to heavy	small to large	eroded	body	64	364						material ranges from Madison to Tishomingo with some abundant small temper Late Woodalnd thrown in as well. Some white clay paste present. Indications of cordage (cord marking? fabric impressed?) on some sherds
GSC	clay/sand	moderate	medium	eroded	rim	1	8.1	variable	und.	thickened to ext.		und.	Madison paste. Some indication of cordage.
GSC	clay/sand	moderate	medium	fabric impressed	rim	1	26.3	variable	slightly outslanting	pinched	6.3	und.	Madison/Tishomingo
GSC	clay	light to moderate	medium to large	eroded	body	9	39.6						Forked Deer paste, white clay
GSC	clay	moderate	medium to large	fabric impressed	body	1	6						Forked Deer paste, white clay
GSC	bone	moderate	small to medium	plain	body	1	2.6						
GSC	shell/clay	moderate to heavy	small to large	eroded	body	12	42.4						
GSC	shell	heavy	medium to large	eroded	body	48	209.6						Most of this material probably plain surfaced. No hematite in paste and some white clay paste.
GSC	shell	heavy	medium to large	eroded	body	51	312.1						Most of this material probably plain surfaced. Hematite present in paste and some white clay paste.
GSC	shell	heavy	medium to large	eroded	rim	1	7.9	flat	inslanting	none	und.	und.	Most of this material probably plain surfaced. Hematite present in paste.
GSC	shell	heavy	medium to large	eroded	rim	1	4.4	rounded	outslanting	none	und.	und.	Most of this material probably plain surfaced. Hematite present in paste.
GSC	shell	heavy	medium to large	eroded	rim	1	3.9	flat	und.	none	und.	und.	Most of this material probably plain surfaced. Hematite present in paste.
GSC	shell	heavy	medium to large	eroded	rim	1	2.7	rounded to interior	outslanting	none	und.	und.	Most of this material probably plain surfaced. Hematite present in paste.
GSC	shell	heavy	medium to large	fabric impressed	body	1	15.3						typical Kimmswick. Hematite present in paste.
GSC	shell	heavy	medium to large	red filmed	body	1	9.1						red filmed on interior. Hematite present in paste.
GSC	BCO fragment					1	8.2						white clay
GSC	flake fragment					1	5.8						
GSC	debris					2	10.7						1 chunk of quartzite pebble,1 chunk sandstone
						198							

[1]Surface collected ceramics analyzed by Shawn Chapman.

Appendix B. Demark Artifact Catalogue

Catalog #	Block	Unit #	Provenience	Depth	Type	Lithic Stage/ Surf. Treatment	Temper	Body/ Rim	Count	Notes
1-1	1		SE 1 x 1m Screen	Lvl. 1	Sandstone				4	Coarse-grained
1-2	1		SE 1 x 1m Screen	Lvl. 1	Lithic	Secondary Flake			2	Possible scraper
1-3	1		SE 1 x 1m Screen	Lvl. 1	Ceramics	Plain	Shell	Body	5	
2-1	1		GSC	Lvl. 1	Daub				4	
3-1	1		GSC	Lvl. 1	Lithic	Tertiary Flake			1	
3-2	1		GSC	Lvl. 1	Lithic	Secondary Flake			1	
3-3	1		GSC	Lvl. 1	Sandstone				8	
3-4	1		GSC	Lvl. 1	Ceramics	Plain	Shell	Body	5	Burned
3-5	1		GSC	Lvl. 1	Daub				6	
6-1	1		Feat. 2	Lvl. 1	Ceramics	Plain	Shell/Grog	Body	3	
8-1	2		GSC	Lvl. 1	Sandstone				3	Fine-grained
8-2	2		GSC	Lvl. 1	Lithic	Primary Flake			3	
8-3	2		GSC	Lvl. 1	Ceramics	Plain	Shell		3	
9-1	2		GSC	Lvl. 1	Lithic	Secondary Flake			3	
9-2	2		GSC	Lvl. 1	Sandstone				2	Fine-grained
9-3	2		GSC	Lvl. 1	Daub				1	
9-4	2		GSC	Lvl. 1	Ceramics	Plain/Unidentified	Shell	Body	10	Some burned
10-1	2		GSC	Lvl. 1	Lithic	Hand Tool			1	Possible scraper
10-2	2		GSC	Lvl. 1	Lithics	Flake			2	
10-3	2		GSC	Lvl. 1	Sandstone				3	Fine-grained
10-4	2		GSC	Lvl. 1	Ceramics	Unidentified			5	
10-5	2		GSC	Lvl. 1	Daub				1	

Catalog #	Block	Unit #	Provenience	Depth	Type	Lithic Stage/ Surf. Treatment	Temper	Body/ Rim	Count	Notes
11-1	2		GSC	Lvl. 1	Lithic	Biface			1	Late Woodland Point
13-1	2	1	SE Corner	Lvl. 2	Cermics	Plain	Shell/Grog	Body	6	
13-2	2	1	SE Corner	Lvl. 2	Lithics	Flakes			2	
14-1	2		GSC	Lvl. 1	Ceramics	Plain	Shell/Grog	Body	16	Some burned
14-2	2		GSC	Lvl. 1	Sandstone				1	Fine-grained
14-3	2		GSC	Lvl. 1	Lithic	Secondary Flake			1	
16-1	2	1		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	5	Ceramic A (broken)
17-1	2	1		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	5	Ceramic B (broken)
18-1	2	1		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramic C (broken)
19-1	2	1		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic D
21-1	2	1		Lvl. 2	Lithic	FCR			1	
23-1	2	2	Feat. 6	Lvl. 2	Ceramics	Unidentified	Shell/Grog	Body	1	Burned
24-1	2	2		Lvl. 2	Lithic	Flake			1	
26-1	2	2		Lvl. 2	Ceramics	Plain	Shell/Grog	Rim	1	Ceramic E/Burned
27-1	2		GSC	Lvl. 2	Lithics	Flakes			4	
27-2	2		GSC	Lvl. 2	Sandstone				7	Fine-grained
27-3	2		GSC	Lvl. 2	Ceramics	Plain/Unidentified	Shell/Grog	Body	27	Small/Mixed Sherds
27-4	2		GSC	Lvl. 2	Daub				3	
29-1	2	7		Lvl. 2	Sandstone	Tool(?)			1	Fine-grained
31-1	2	6		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramic F
32-1	2	6		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic G
34-1	2	6		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic H
35-1	2	7	SE Quad	Lvl. 2	Daub				1	Stick Impression
36-1	2	7	SE Quad	Lvl. 2	Mica				1	Small Flaking
37-1	2	6	NE Quad	Lvl. 2	Sandstone	Flake			1	

Catalog #	Block	Unit #	Provenience	Depth	Type	Lithic Stage/ Surf. Treatment	Temper	Body/ Rim	Count	Notes
38-1	2	7	SW Quad	Lvl. 2	Ceramics	Plain/Unidentified	Shell/Grog	Body	1	Cermaic J
40-1	2	4	SE Quad	Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramic K
41-1	2	7	NE Quad	Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic L
42-1	2			Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic M
43-1	2		West 1/2 Str. 1 GSC	Lvl. 1	Lithics	Flakes			13	
43-2	2		West 1/2 Str. 1 GSC	Lvl. 1	Lithics	Flake Tools			2	Scrapers(?)
43-3	2		West 1/2 Str. 1 GSC	Lvl. 1	Sandstone				21	Size varies sm.-lg.
43-4	2		West 1/2 Str. 1 GSC	Lvl. 1	Daub				2	
43-5	2		West 1/2 Str. 1 GSC	Lvl. 1	Ceramics	Varied	Shell/Grog	Body	30	Small/Mixed Sherds
43-6	2		West 1/2 Str. 1 GSC	Lvl. 1	Ceramics	Plain	Shell/Grog	Rim	1	
43-7	2		West 1/2 Str. 1 GSC	Lvl. 1	Ceramics	Fabric Impressed	Grog	Body	1	
44-1	2			Lvl. 2	Ceramics	Unidentified	Shell/Grog	Rim	1	Burned
45-1	2			Lvl. 2	Ceramics	Plain	Shell/Grog	Body	6	
46-1			S. of Mound A	Surface	Ceramics	Plain	Shell/Grog	Body	4	Eroding out of mound
47-1	2	15		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramic N
48-1	2	11		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	3	Ceramic O
49-1	2	11		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	6	Ceramic P (broken)
50-1	2	12		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	3	Ceramic Q
51-1	2	12		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramic R
52-1	2	12		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic S
53-1	2	15		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	3	Ceramics T

Catalog #	Block	Unit #	Provenience	Depth	Type	Lithic Stage/ Surf. Treatment	Temper	Body/ Rim	Count	Notes
54-1	2	15		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramics U
55-1	2	15		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	1	Ceramic V
56-1	2	14		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	3	Ceramics W
57-1	2	15		Lvl. 2	Ceramic	Plain	Shell/Grog	Body	1	Ceramic X
60-1	2	28		Lvl. 2	Ceramics	Fabric Impressed	Shell/Grog	Body	1	Ceramix Y (Vertical in Floor)
61-1	2	26		Lvl. 2	Ceramics	Unidentified	Shell/Grog	Body	2	Ceramics Z (Horizontal on Edge)
62-1	2	26		Lvl. 2	Ceramics	Plain	Shell/Grog	Body	2	Ceramics AA
63-1	2	26		Lvl. 2	Ceramics	Unidentified	Shell/Grog	Body	2	Ceramics AB (Burned)
64-1	2	25		Lvl. 2	Sandstone	FCR			1	Fine-grained
65-1	2	25		Lvl. 2	Ceramics	Unidentified	Shell/Grog	Body	1	Ceramic AC
66-1	2	25		Lvl. 2	Ceramics	Unidentified	Shell/Grog	Rim(?)	2	Ceramics AD
67-1	2	28		Lvl. 2	Lithic	Flake			1	
69-1	2	28		Lvl. 2	Lithic	Flake			1	
70-1	2	28		Lvl. 2	Ceramics	Unidentified	Shell/Grog	Body	1	Burned

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