THESIS

AN EXAMINATION OF MIDDLE WOODLAND PRE-MOUND CONTEXTS IN THE OHIO AND SOUTHEAST REGIONS

Submitted by

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In partial fulfillment of the requirements

For the Degree of Master of Arts

Colorado State University

Fort Collins, Colorado

Spring 2023

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ABSTRACT

AN EXAMINATION OF MIDDLE WOODLAND PRE-MOUND CONTEXTS IN THE OHIO AND SOUTHEAST REGIONS

Mounds are one of the oldest forms of monumental architecture in North America and have been the fascination of archaeologists and antiquarians for centuries due to their large scale and association with intricate craft goods. However, much research into mounds has focused on their use as repositories for human remains or as potential platforms for elite housing and other architecture. This is true of the Hopewell archaeological culture of the Middle Woodland period, 300 BCE-500 CE, which has been the focus of archaeological inquiry due to its large ceremonial sites and material network of items coming to the Midwest and Southeast from as far as the Rocky Mountains or the Gulf Coast. Using legacy data for 13 sites throughout Ohio and the Southeast, I examine variability in pre-mound contexts to expand on mound research by focusing on this pre-natal stage which represents the activities that people conducted before the construction of the monument itself. Using a binary model of presences and absences, I look at 26 pre-mound attributes found across the 13 sites and 64 mounds in the study and use multivariate analysis in ArcGIS as an exploratory and pattern revealing tool. I argue that these contexts are incredibly varied, and that this lack of homogeneity is material evidence of the decisions made by people to overcome dissonance created by encountering varying cultural values for these important ritual events as well as evidence for a lack of a clear Hopewell model in either the Ohio and Southeast regions, instead arguing that both regions should be included in

the larger discussion of Middle Woodland ceremonialism and exchange, rejecting a core and periphery model.

ACKNOWLEDGMENTS

I would first like to thank my advisor Edward Henry, who guided and pushed me through this process, and was patient with me as I finally settled on a research topic. I would also like to thank my committee members Dr. Heidi Hausermann and Dr. David Riep, who not only offered their time but their kind words, encouragement, and advice in finishing this final version. I would also like to thank Dr. Mary Van Buren, who was a voice of reason and calm, and helped keep me accountable during the hardest parts of this process.

I want to thank my parents, Diana and Wil King, who encouraged my curiosity of the world from a very young age, were always supportive in any path I chose, and were always eager proofreaders throughout my academic journey.

Last but certainly not least, I'd like to thank my partner Seth, for always being my biggest supporter, proofreader, and emotional rock while we went through this graduate school journey together. Thank you for believing in me when I struggled to believe in myself.

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CHAPTER 1: INTRODUCTION

Archaeologists have always been drawn to investigating monuments embedded within social landscapes, not in small part because of their durability at sites. What has been lacking in studies of past monuments is a focus on what people did in that space prior to a monument's construction. One of the most widespread forms of monuments in North America, especially in the Midwest and Southeastern United States, are Indigenous earthen mounds. While widespread in the Late Archaic and Early Woodland, mounds further proliferated during the Middle Woodland Period (300 BCE-500 CE), an archaeological period most famous for the Hopewell archaeological culture, known for its large ceremonial sites and material network of items coming to the Midwest and Southeast from as far as the Rocky Mountains or the Gulf Coast. The tradition of building earthen mounds in North America goes back at least 5,500 years, evidenced by the construction of the Watson Brake mound complex in northeast Louisiana during the Middle Archaic Period (Saunders et al 1997; Saunders et al 2005). There are other Middle Archaic mound sites, although these have not been dated as extensively and cannot serve to push the tradition any further back in time. This paper focuses on earthen mounds built by Indigenous Americans during the Middle Woodland Period (300 BCE-500 CE), a time which saw earthen monuments spread across what is now the United States, east of the Rocky Mountains.

Past archaeological research on mounds has focused primarily on mounds serving as platforms for the houses of leaders or ceremonial buildings, or as containers for some deceased members of society (Sherwood and Kidder 2010) —focusing on their utilitarian function rather than their sociality. The consequence of this has been that most of the archaeological research on these features has focused on remnant foundations of summit buildings, ceremonial and status-

indicating artifacts, and even human remains. What was in, or on top of, mounds across the eastern U.S. became the focus of archaeological study, the mounds themselves largely ignored; this omission stemmed in part from the belief that mound building was a relatively simple process that did not require much skill or forethought on behalf of their prehistoric builders (Sherwood and Kidder 2010). Now, largely due to advances in geoarchaeology, there is renewed interest in the processes and decisions that go into the building of an earthen mound and consideration of the building of mounds as a form of religious and ritual practice (Kidder and Sherwood 2017). As a result, archaeologists now know that mound construction required greater planning than first assumed, and that many of the choices made by the builders are both functional and symbolic, reflecting "cultural choices that encode information about the society, economy, politics, and culture of the builders" (Sherwood and Kidder 2011:69). Mounds were planned and structured, including alterations of the landscape prior to their building (Kidder and Sherwood 2017).

In this thesis I examine the ways in which Middle Woodland communities throughout Ohio and the Southeast prepared space for mounds in terms of landscape alteration such as the removal or leveling of topsoil, pre-mound architecture and other constructed features, as well as the placement of individuals and items important enough to build a mound over. I use multivariate clustering analyses in ArcGIS to investigate patterning in 26 attributes I compiled across 64 pre-mound contexts. These attributes were examined across sites that include Hopewell, Mound City, Taylor, Tremper, Newark, Seip, Pharr, Ingomar, Bynum, Helena Crossing, Pinson, Marksville, and Crooks (Figure 1). In doing so, I test whether patterns exist that distinguish local versus regional trends across broader Middle Woodland geographic and social contexts. Past research into the Middle Woodland era and Hopewell societies have shown

that they are varied and diverse from region to region (Anderson and Mainfort 2002; Wright 2016). Thus, my research into pre-mound practices seeks to determine whether similar variation in pre-mound features and artifacts are present in the 13 sites and what this says about cooperation, dissonance, and ascribing cultures to ancient peoples Through this study, I show that even sites that have historically fit solidly under the Hopewell label are incredibly varied in the events that took place prior to the construction of mounds.

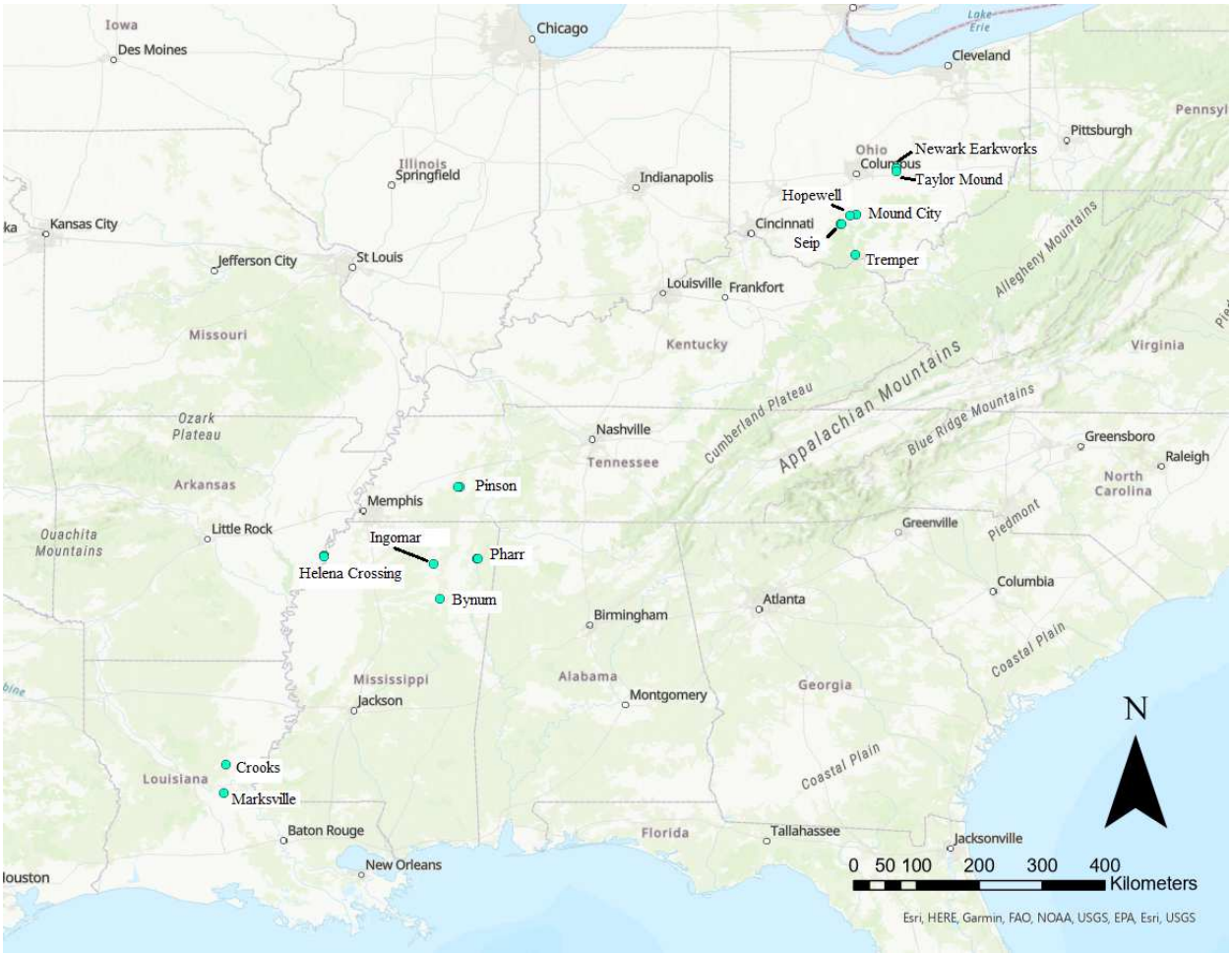

Figure 1: Map depicting the locations of the thirteen sites discussed.

My thesis is structured around 7 chapters. Chapter 2 is a literature review for the Middle Woodland Period, Hopewell and its implications, mounds and monumentality, and the theory of dissonance that guides this research. Chapter 3 describes the methods used in this paper, such as the pre-mound attributes I compiled for further statistical analyses. Chapter 4 describes the sites I

examined in this research, including the pre-mound features used as the focus of this study. Chapter 5 describes the results of multivariate clustering analyses I performed in ArcGIS for intra-site analyses, intra-regional analyses, and inter-regional analyses. In Chapter 6, I discuss the results of my statistical analyses as they relate to my research questions and theoretical framework. Lastly, I conclude my thesis in Chapter 7.

For my analysis of pre-mound contexts, I examined the initiation of each mound's lifespan. In doing so, I attempted to summarize the activities that took place before the construction of Middle Woodland mounds in my study and argue that their incredible variation stems from social dissonance created during the gathering of dispersed communities that had different ways of doing necessary rituals and other types of preparation. In the process of negotiating and building relationships, they left a varied and diverse pre-mound archaeological record. There is no one set of practices that define a Middle Woodland community or mound, and archaeologists' understanding of the period and its people are constantly shifting as new evidence is uncovered and terms such as the Middle Woodland and Hopewell undergo scrutiny as the variability of the archaeological record defies simple labels. This thesis adds to this conversation by compiling pre-mound data from 64 Middle Woodland mounds and quantifies variability in this context through the use of absences and presences of 26 attributes, discussed later. First, I will revisit how archaeologists have viewed Middle Woodland societies and how that has changed through more recent research.

CHAPTER 2: LITERATURE REVIEW

Hopewell and the Middle Woodland

The Middle Woodland Period in the Eastern and Southeastern United States generally lasted from roughly 300 BCE to 500 CE although this time frame differs throughout regions, extending to 600-800 CE in certain areas of the southeast (Wright and Henry 2013). While the beginning and ending of the period can be debated, it is commonly defined by the widespread presence and elaboration of pottery types (Yerkes 1988), varied levels of plant cultivation (Mueller et al 2017), small semipermanent dispersed settlements (Wright and Henry 2013), the creation of large ceremonial complexes, and the widespread proliferation of earthen mounds. This period in the Ohio Valley was historically divided between two archaeological "cultures", the Adena in the early Middle Woodland, and Hopewell in the later Middle Woodland, and some archaeologists assert that there are clear cultural delineations between the two in domestic and symbolic items (Everhart 2020) However, this view is contested for the following reasons: the absence of a clear chronology that strongly correlates the cultures to different temporal spans (Clay 2014), the extensive variation found in both Adena and Hopewell contexts (Abrams 2009; Clay 2014), and the anthropological concerns of trying to create two cultures which may not have existed to the people themselves (see Feinman and Neitzel 2020). Since my own research supports this variability and lack of clear cultural bounds, I do not make a distinction between the two, opting for descriptions of a Middle Woodland period when referring to communities and sites that fall within the provided timeframe above, and Hopewell or Middle Woodland ceremonialism to refer to sites that a fit a certain expected suite of traits when referring to the broad network of ideas and material culture identified throughout the Midwest and Southeast

United States. These identifiers make "increased intensity of negotiation and contestation" evident (Charles et al 2004, 43) during the Middle Woodland period.

Originally researchers believed that most food resources available to Middle Woodland societies were wild, with heavy reliance on wild nuts, goosefoot, sumpweed, and knotweed, along with meat from hunting and fishing (Ford 1979; Yerkes 1988). This led to archaeologists placing Middle Woodland communities into a pseudo- "hunter-gatherer" social category with little evidence to support agriculture (Smith 2001). At most it was believed that communities cultivated and tended to local seed-bearing plants (Abrams 2009), with at least goosefoot, marsh elder, squash and gourd, and sunflower being domesticated by the Middle Woodland period (Wright 2016). Evidence has since pointed to the fact that subsistence patterns were just as complex as Middle Woodland people's trade and ceremonial complexes. Mueller et al (2017) discusses the existence of an agricultural complex that is much older and more complex than previously recognized. While archaeologists knew squashes and sunflowers had been domesticated for thousands of years, flotation techniques have revealed a high concentration of seeds in pits and other archaeological features that indicate that Native groups in the Eastern United States domesticated sumpweed, goosefoot, maygrass, erect knotweed, and little barley earlier than previously estimated, making up what is called the Eastern Agricultural Complex (Mueller et al 2017).

The importance of maize cultivation is being currently investigated and questioned, with previous research (Smart and Ford 1983; Yerkes 1988) noting that, while it was significant in the Middle Woodland diet, it was most likely only used for ritual activities. However, recent re-analysis of the few sites where maize was found has revealed that samples were incorrectly identified as maize or post-date the Middle Woodland period (Simon 2017; Simon et al 2021).

While the consensus was largely in favor of maize being nutritionally unimportant to Middle Woodland peoples, its ritual importance has also been put on shaky ground with new research that questions its presence at many Hopewell era sites. While domesticated plants played a larger role in the lives of Indigenous Middle Woodland societies than prior research might have indicated, the roles of such domesticates likely differed between geographical regions, with warmer regions supporting the viability of wild plant collection for longer in the year (Gremillion 2002). Investment in cultivation versus collection of wild resources also likely varied between groups, both in what their local environment could support as well as the ever-present cultural realities that may alter the choices of subsistence.

A current model for Middle Woodland settlement—at least for communities in the Ohio River Valley—is a dispersed sedentary model. This model includes three components: "(1) a small-sized local community, (2) a dispersed settlement of these communities around a central earthwork complex, and (3) relatively sedentary local communities that tend to be economically self-sufficient through horticulture and hunting and gathering" (Abrams 2009, 176; also see Dancy and Pacheco 1997; Prufer 1965). The Licking River Valley in Ohio shows small communities were affiliated with larger earthwork centers, such as the Newark Earthworks, and smaller more local earthworks (Abrams 2009). In the Wabash Valley in Indiana, the Mann site is a permanent residential site but there are also 51 smaller sites in the area which were likely seasonally occupied if not just short temporary stops (Ruby 2006). Middle Woodland communities were not all "sedentary" or "nomadic" and each community choose somewhere along the spectrum to suit their needs and wants, while being bound by what their environment could support (Abrams 2009). In the upper and middle Tennessee River Valley there are sites with clusters of homesteads, representing seasonal base camps (Wright 2016), and evidence for

structures that could have supported permanent or semi-permanent residences in the Southeast potentially stretches back to the early Archaic (Anderson and Mainfort 2002). Due to a historic precedent with modern repercussions, the settlement data to officially analyze this dispersed model is largely lacking.

The dispersed community model also usually assumes the existence of a vacant ceremonial center model, where residential areas were associated with but not necessarily spatially close to ceremonial centers. In the Middle Woodland Southeast, however, this is not always the case. Some residential villages co-occur with "platform mounds, burial tumuli, plazas, and/or earthen embankments" (Wright 2016:47). Residential data is still largely lacking for most sites however (2016), and at Pinson Mounds, a large earthwork center in Tennessee containing the largest Middle Woodland mound, there is thus far no evidence for permanent or semi-permanent domiciles (Mainfort et al 2013). What we might see in settlement patterns for one region, or even one site or set of sites, will likely not account for the whole Middle Woodland period, a label that applies both to a great geographical range, as well as several centuries in time. At any given point there was no one way of Middle Woodland living, both in daily and ceremonial life, as this study will show, but the term is used nonetheless because it relates to a series of generalizations that give this study context among larger archaeological discourse.

What is Hopewell?

What Hopewell is and how it can be discussed separately from other Middle Woodland communities has been a matter of contestation for the several past decades (see Carr and Case 2005 for a review of early Hopewell archaeology). Hopewell is best defined as an archaeological phenomenon that was the result of Middle Woodland societies, although generally referring to

those in the Ohio River valley, participating in interregional interaction (Abrams 2009), an interaction that is materially evident from a number of archaeological material that is *generally* associated with these traits:

> "burial in log-covered tombs beneath earthen mounds or cremation; well-made pottery decorated with toothed stamps; polished stone smoking pipes of the 'platform' type; certain styles of pottery figurines; construction of grand-scale geometrical earthworks; and various objects crafted from materials traded from distant regions—earspools and celts hammered from copper mined near Lake Superior; designs cut from mica from the Appalachians; spear points chipped from obsidian quarried in Wyoming; certain types of projectile points, scrapers, and flake knives of high-quality Indiana, Illinois, and Ohio cherts; river mussel pearls from Illinois; and shark teeth from the Gulf of Mexico" (Hall 1997, 155).

This given trait list is neither comprehensive nor accurate for every but it gives a general idea of what drew archaeologists to the idea of a previously unseen scale of interaction in North American Pre-Columbian history, referred to as the Hopewell Interaction Sphere, and what archaeologists expect of the Hopewell label.

The Hopewell Interaction Sphere

The primary focus regarding the Hopewell Interaction Sphere has been the presence of non-local materials, elaborate iconography, and large earthwork centers. Since these features that were used in defining Hopewell are more common in the Ohio River Valley, archaeologists have historically ignored other Middle Woodland regions such as the Midsouth and Southeast (Caldwell 1964; Struever 1965; Wright 2016). The emphasis on mound monumentality and artifacts made of exotic materials grabbed the attention of archaeologists who were much more interested in the graves and grave goods than the people that interred them (Yerkes 1988).

Understanding what Hopewell is, or who the Hopewell people were, remains a priority to North American archaeology, although the ways this is done has greatly changed throughout the past century and a half, beginning with Squier and Davis's survey of the Ohio River Valley in

1848. There is debate regarding the purpose of large earthwork complexes and their relationship with the detailed iconographic artifacts for which Hopewell is famous for. Namely, if these were the places where said artifacts were being created (Baby and Langlois 1979) or if they were being created by specialists elsewhere and brought to these places for distribution (Struever and Houart 1972) or deposition (Cinadr and Genheimer 1983). As will be discussed later, many archaeologists now see these complexes as facilitating social integration for dispersed communities.

Caldwell (1964) and Struever (1965) differentiate between the local and interregional relatively simply: the domestic and non-mortuary is the sphere of the local, while the ceremonial and funerary sphere belongs to the interregional. Carr and Case (2005) distinguish between the two differently and note that the same practice can be included in both categories. Pilgrimages, they argue, fit into both the local and interregional realms, either to ceremonial sites or to acquire non-local materials to bring home. Pilgrimages fit into the category of interregional Hopewell because of the widespread practice and vast distance covered, but are also regarded as local Hopewell because the purpose and practice is determined by a person's local community and culture. While Struever's (1965) focus was more on the artifacts, he noted that the items associated with mortuary contexts, those that he would categorize as belonging to that interregional Hopewell, had lives prior to deposition in the communities that made and used them, lives and uses that were important on the local scale. Not long after, Griffin (1967) saw Hopewell on the local scale, and similarities being the product of idea flow and exchange. He also noted that Hopewellian ceramics, associated with interregional Hopewell, were deposited in domestic as well as funerary contexts. Smith (1992) makes no distinction between a local and interregional Hopewell, referring to both as just Hopewell. While Carr and Case (2005:53) note a

distinction between the two for archaeological semantics, they do not view interregional Hopewell as having one origin that radiated outward, but rather as a composite of multiple ideas and practices "which had their origins in multiple differing regional traditions and were shared or operated at multiple, different supraregional scales".

Hopewell in the Southeast

One thing that should be avoided regarding the Hopewell Interaction Sphere, or Middle Woodland interaction in general, is treating the Ohio River Valley as a core and the Midsouth and Southeast as peripheries which inherited cultural leftovers. For one, such a view implies that the Southeast is backwards and undeveloped in comparison and assumes that cultural interaction was unidirectional. Considering the Ohio Valley as a Hopewell core infers that the Southeast inherited ceremonial behavior from the Core but did not contribute to Hopewell in any meaningful way. Such a view ignores the fact that one of the most impressive Middle Woodland ceremonial centers in the Eastern Woodlands is in Tennessee, with the largest mound for its time, Saul's Mound, at 22 meters. In addition, the Southeast is home not only to enclosures and conical burial mounds, but also to platform mounds which appear at a much greater frequency than in the Midwest, where they are largely absent from the large earthwork centers (Lindauer and Blitz 1997; Rolingson and Mainfort 2002; Wright and Henry 2013). In addition, many of the exotic Hopewellian materials originate in the Southeast or its periphery, such as marine resources like shark teeth and shell; the minerals mica, galena, and quartz; and potentially some copper sources (Wright 2016). Equally important is to avoid treating the Hopewell Interaction Sphere as inevitable, but rather as a process of cultural exchange that people chose to create and participate in (Wright 2014). The creation of an Ohio Hopewell core and a Southeastern periphery may have also been the result of simply when European archaeologists turned their attention to these sites.

As a general pattern, much of the Ohio sample in this study was first excavated officially much earlier than those in the Southeast, with the first large inquiry into the Ohio River Valley Hopewell conducted in the mid-1800s (Squier and Davis 1848). As such, the baseline of Middle Woodland ceremonialism was created from sites in Ohio, from which everything else was compared. Greater value was given to different types of monuments and exotic materials found at these sites based off what archaeologists at the time thought highly of. In this regard, it is fruitful to use modern cultural critiques of development and the core-periphery relationship, and to remind ourselves who is making these terms and from what they are comparing to and from (Escobar 2012).

In addition, mound building has a much longer history in the Southeast that stretches back into the Archaic period (Ortmann and Kidder 2013; Saunders et al 1997; Saunders et al 2005), so to assume that kind of ceremonial behavior was inherited or learned from the Ohio Hopewell is simply not true. A larger turn to collaboration and cooperation in comparison to previous periods is evident during the Middle Woodland, considering the rapid proliferation of earthen monument creation, and evidence for the participation in larger cultural spheres is evident by nonlocal ceramics found in both locales (Wright 2016), showing that people as well as their materials and ideas are going back and forth. At the same time, the Hopewellian label should not be forced onto every Middle Woodland site. In the Ohio River valley, it is evident that the acquisition and deposition of exotic materials is a ritually significant practice, meanwhile "Hopewellian" materials are largely absent or limited in many Southeastern Middle Woodland sites (Anderson and Mainfort 2002), even though some of these materials originate in the region, as discussed earlier (Wright 2016).

There are limits to the usefulness of the Hopewell Interaction Sphere, of course. When taken all together, a trait list, such as those created by Webb (*e.g.,* Webb and Baby 1956 and Webb and Snow 1945) for Adena societies, might create the picture that the Eastern Woodlands had a strong cultural identity, especially in terms of a shared ceremonial behavior by way of the construction of earthen monuments, off-mound ritual activity, and the intentional deposition of exotic materials and symbolic artifacts (Henry and Miller 2020). However, as the rest of this paper will show, Middle Woodland groups had variously different ways of engaging with "Hopewellian" ceremonialism, evident in the different amounts and kinds of exotic materials deposited (Wright 2016), types of mounds and earthworks built, and even distinct differences in how mounds were built and prepared.

Archaeologists have begun to push for the analysis of the Middle Woodland period to be understood through the ongoing manifestation of social "situations", rather than overarching regional and homogenous traditions, such as the Hopewell Interaction Sphere (Henry and Miller 2020; see Ethridge et al 2020 for a discussion on how archaeologists are now trying to understand local versus regional traditions). One way of understanding this difference between local variation and larger trends in regional traditions is through the lens of assemblages and situations (Henry and Miller 2020). In the case of the Middle Woodland, assemblages could refer to sites or the communities responsible for their creation, which taken together create and participate in the Middle Woodland or Hopewell Interaction Sphere situation. This approach allows the ability to discuss the diversity of outcomes while also acknowledging shared activities, being able to appreciate interconnection while not reducing it to culture history terms (Henry and Barrier 2016). Mounds, for example, are present at every site discussed here, but what occurred prior to their construction, the rituals and activities people partook in vary.

Anderson and Mainfort (2002) argue that the Middle Woodland in the Southeast consisted of several diverse cultures that at time times had the name Hopewell forced on them, while Wright (2016) argues that Hopewell is a "global" tradition, one that expanded beyond and between regions and people, therefore other regions should be given their due alongside the Midwest. Neither is incorrect, and there is no one standard by which Middle Woodland communities participated in the interregional exchange of materials and ideas called the Hopewellian Interaction Sphere. The most useful view of the Hopewell Interaction Sphere is one that takes into consideration both the "global" phenomenon and the magnitude of variability in local contexts. The Hopewell Interaction Sphere the materialization marking a period of the intensification of social relationships throughout the Midwest and Southeast that occurred among the general context of Middle Woodland ceremonialism. The Hopewell Interaction Sphere was the social relationships that helped to spread, create, and participate in Middle Woodland ceremonialism through certain forms of monumentality, ritual, trade, and other activities lost to the archaeological record.

Feinman and Neitzel (2020) point out that the problematic history regarding the culture-history approach and how it forces intra-group homogeneity and strict delineations of biological and geographical boundaries. The culture-history paradigm is meant to, through the use of materials found, delineate a site or a component of a site into neat and discrete "cultures". A site may be considered Hopewell because of the burial mounds found with a specific type of pottery or exotic material that link it to the Hopewell "culture". It enforces a boundary and an identity that past members of said archaeological culture would very likely have not identified with. Even in the Scioto Valley, the heartland of the Hopewell where a great number of ceremonial sites are found within short distance of each other, there are enough differences that, archaeologically,

they could be considered different cultures, a sentiment expressed by Rafferty (2005) in regard to Adena mortuary variability, and Hays (2010) who noted that Adena mortuary variability differed between regions. Feinman and Neitzel point out several obvious facts, such as the fact that change is incremental, that people in that past, just as in the present, take into consideration several factors during decision making, and that individuals have more than one identity, all of which influence what they do and how they might affect the archaeological record. They argue that the labels such as "Adena" and "Hopewell" should only be used to situate groups in time and space, and this paper uses the term to place context within a large exchange of materials and ideas (2020).

While it is not entirely clear what defines the Middle Woodland, or what the implications and extent of the Hopewell Interaction Sphere are, it is clear from the burst of monument creation in the forms of geometric embankments and burial mounds, along with networks evident in the movement of exotic materials and items, that the Middle Woodland is special in terms of widespread interaction (Henry and Barrier 2016). While mound building was not a new form of monumentality to North America, particularly in the Southeast, it spread throughout the Eastern and Midwestern states during the Middle Woodland period to become one of the most widespread monuments, and why I chose it as the focus of this study. Before I discuss the importance of mounds, I will discuss their monumental nature and how I treat them theoretically in this paper.

Monumentality

Monuments, as archaeologists often understand the term, usually refers to a large or ornate constructions with intended longevity and a "non-functional" or "non-practical" element, (i.e., not directly serving a purpose to keep people alive; Everhart 2021; Furholt et al. 2012); in

the case of Middle Woodland earthen monuments such as geometric embankments, enclosures, ditches and mounds, these elements can be associated with size, the types of activities associated with them (e.g. rituals and burials), and even soil color symbolism (Charles 2012; Kidder and Sherwood 2016). Like all else in archaeology, theories of monumentality and what they mean for societies that invest in constructing monuments, are highly contested. A more traditional view of monumental architecture has been through the lens of the rise of state power or elite control in "complex" societies, specifically as direct evidence for an elite group with the power to direct and use the energy of their lessors to create permanent markers of their power (Trigger 1990).

A thermodynamic method is not the only means of understanding monumental architecture, another example being the phenomenological approaches taken to understand the creation of monuments as a means of formulating particular sensory and emotional experiences (e.g., Tilley 1994). While there is an acknowledgement that monuments are not functional in the traditional sense, they are understood as having a social function, through the building as bodily practice, to create, preserve, and formalize social relationships within and between groups as well as between people and place. A clear example of these differing views of monuments is offered by Trigger (1990, 119), whose definition of monumental architecture focuses on physical attributes, such as a scale that exceeds "the requirements of any practical function,", and Furholt et al. (2012), who focuses on function:

> "a monument could be defined as a tool for the memorial, i.e. the transmission of socially relevant meanings: one that is durable in its material and form and its spatial context, that has a special non-utilitarian aspect, a surplus of meaning, that is achieved through its size, elaboration, its uniqueness or its resemblance to a special standard or its position in the landscape; a monument of intentionality created as such and has a form serving its visibility and an accessible position due to its collective relevance" (14).

These two definitions offer some insight into the divergent trajectories theories of monumentality have taken, with form being secondary to the social functions monuments serve (e.g., Osborne 2014).

Monuments, at least in their completed form, are a means of preserving and transmitting memories, an especially important function in societies that do not use written language (Furholt et al 2012; Henry 2017; Osborne 2014). While the physical aspects of monuments—their scale, their material components, and their spatiality—cannot be understated, their monumentality is created from relationships, both between person and monument, between the people who labored in its creation (Osborne 2014), and between people and the place itself. Place, here, has the same meaning as in Whitridge (2004), as "a *spatialized imaginary,* a nexus of imaginary significations at the site of its intersection with the real" (214, emphasis original). The real, in this case, would be the physical mound, the dirt and the labor that comprises it. The imaginary is the relationships that the mound is created from and enforces.

In the Middle Woodland context, mounds serve to act as events and loci that socially integrate dispersed communities comprised of people that do not see each other often (Wright 2016), as well as allowing groups to commemorate and remember ancestors, both serving to strengthen ties and create kinship between groups and coalitions (Henry and Barrier 2016). Broader social coalitions like clans and/or sodalities, rather than individual biological kin groups, were likely responsible for the construction of larger monuments such as platform mounds and extensive burial mounds (Henry 2017); these groups were likely not within close geographic contact year-round, making cooperative monument creation and revisitation a necessity to formalizing and preserving relationships and ritual knowledge (Giles 2010).

History of Middle Woodland Archaeology

Archaeologists and antiquarians originally had a very disparaging view of Native American monumentality. The large intricate earthworks, grave goods, and exotic materials of the Eastern Middle Woodlands, specifically the Hopewell "Core" region or those large sites in the Scioto River Valley in Ohio, were believed to be too complex to be Native American in origin, and several other ethnicities were attributed their construction under the moniker of the "Moundbuilders," whose origins varied from Mesoamerican to various European and Southwest Asian groups. It was assumed that this culture was then ran out or killed by the colonizing groups of northern Native Americans, an idea with obvious political motivations (Byers 2015; Yerkes 1988). This myth was disproven by the late 19th century (Thomas 1894), but this only led to other issues in archaeology, such as the view that mounds were relatively simple constructions that entailed the dumping of sediment into large piles (Sherwood and Kidder 2011), which was partly based on a prejudice against Native American communities not being complex (Alt 2011). More recent work, pushed by geoarchaeological methods, has disproven the simplicity of mound building while acknowledging it is a feat of intense labor and sophisticated engineering that often involved the preparation and clearing of land prior to construction, as well the purposeful inclusion of certain sediments that sometimes required transport from up to a kilometer away (Kidder and Sherwood 2016; Sherwood and Kidder 2011).

The archaeological understanding of mounds has developed as well. Archaeologists focused primarily on the purpose of a mound, what it achieved in its completed state. Conical burial mounds were relatively straight forward in that they covered the remains of the interred, and usually it was the items associated with these burials that drew more attention than the mound itself; platform mounds, defined as an "elevated, quadrilateral flat-topped earthen pyramids that are typically raised in stages" (Sherwood and Kidder 2011:71), were largely

analyzed in terms of what the served as substructures for, the summit being the focus of most archaeological investigations. Based on ethnohistorical accounts as well as archaeological investigations, platform mounds served five functions: to elevate elite residences; to house temples or mortuary facilities; placement for non-residential buildings such as meeting houses or sweat lodges; lastly to be open courtyards or stages; and to facilitate large-scale feasting and food storage (Lindauer and Blitz 1997).

Before the chronology of platform mounds was fully understood, and when platform mounds were nearly always associated with the Mississippian period (Mainfort et al 2013; see Kassabaum 2019 for a review of pre-Mississippian platform mounds), the "shift" from conical burial mounds to platform mounds was seen as a materialization away from egalitarianism to increasing levels of inequality in social organization. This idea also largely stemmed from using ethnohistorical analogy of platform mounds being utilized for chiefly residences in the 16th and 18th centuries, where they were an obvious sign of power and hierarchy, at least to the Europeans who wrote about it (Kassabaum et al 2011). Of course, because these mounds were now permanent fixtures of the landscape and became subject to reinterpretation as cultural ideas changed through time, some of these mounds did become platforms for elite houses, which further skewed their interpretation by archaeologists (Anderson and Mainfort 2002). While ethnographic data is often used for archaeological interpretation in North American archaeology, especially when it comes to religious practice and ritual, there is an issue assuming little to no change in the symbolism of mounds over as much time as a millennium.

Middle Woodland platform mounds show little evidence of mortuary activities or even summit structures beyond large post holes (Knight 2001), so activities that took place would have been available for public view (Lindauer and Blitz 1997). Middle Woodland platform

mounds are assumed to have served as loci for the gathering of dispersed communities to participate in feasting events (Anderson and Mainfort 2002; Lindauer and Blitz 1997). The ritual turn in archaeology serves to appreciate the creation of monuments as a ritual process, seeing mounds as ritually charged deposits. Many of the choices made by the builders are both functional and symbolic, reflecting "cultural choices that encode information about the society, economy, politics, and culture of the builders" (Sherwood and Kidder 2011:69). The places chosen for mound construction were not random, and many sites show evidence of use prior to construction. As such, these sites can be deemed persistent places (Wright 2013). Persistent places are best understood as "places that were repeatedly used during-long term occupations of regions... they represent the conjunction of particular human behaviors on a particular landscape" (Schlanger 1992:97). These persistent places can be "natural" features that would have been important to the humans a part of that landscape (e.g., places for hunting, collecting timber, and horticulture) or "cultural" features, such as campsites, shelters, and even mounds. Once social attachments are made to these cultural features, they attract "reuse and reoccupation" and structure the "activities associated with those various occupations" (Schlanger 1992:97). Under this view, the "prenatal" state of a mound, including both the immediate preparation and landscape alteration prior to construction, as well as the longer history of people and place, is deserving of attention.

Who built Middle Woodland Monuments?

A matter of contestation in Middle Woodland archaeology has been who built the monuments, in this case the mounds, in terms of both group size and group hierarchy. Part of the problem with earlier conceptions of the Hopewell and the Hopewell Interaction Sphere is that it made religious and ceremonial expressions seem widespread and homogenous, with variability

existing in domestic and economic contexts (Carr and Case 2005). However, even looking at the characteristics that define Hopewell—the exotic artifacts, monumental architecture, and craft products that invoke a common iconographical theme—it becomes clear that there is great variability in what represents "Hopewell" between sites within the same region, and even within mounds at the same site. For example, Coon (2009) notes that even within the Ohio Hopewell there is evidence of differing political economies between south-central and southwestern Ohio sites. Using the eponymous Hopewell site and Seip Mounds site for the south-central group, and the Turner mounds and Fort Ancient site to represent the southwest, there is evidence of the former groups using more exclusionary political strategies while the latter shows less evidence of aggrandizement and were likely more corporate (Coon 2009). What exactly this means at a larger geographic scale is ambivalent. One could argue, as Graeber and Wengrow (2021) do in other parts of the world, that it is an example of schismogenesis, that people in southwestern Ohio were making a clear distinction between their more aggrandizing south-central neighbors. However, the main point argued here is that each group represents Hopewellian communities that engaged in communal labor projects to create monumental works—mounds and earthen enclosures—but the amount of power or status individuals had over one another was varied.

Examining 39 individuals from the Peter Klunk Mound Burial Group in Illinois, Bolnick and Smith (2007), using mitochondrial DNA analysis, give some insight on the relationships that comprised the labor of mound building. As will be the theme throughout this paper, this one site cannot tell us much about the extent of "Hopewell" as a whole, but it does illuminate possibilities that other communities share similarities with it. A recurring question for understanding the Middle Woodland is who built the mounds and other earthen monuments the archaeological "culture" is famous for: lineage-based descent groups, local communities

comprised of multiple kin groups, non-kin based religious sodalities, or perhaps a conglomeration of diverse communities? The DNA evidence from the Peter Klunk site implies that at the very least matrilineal descent was not taken into consideration when it came to burial type or position. While researchers at the site have identified at least two and up six different forms of mortuary activity—which may represent differing social status—that said status or wealth was not inheritable on the biological line. The greater mtDNA in males also implies that Peter Klunk had matrilocal residence, so inherited wealth materialized as grave goods could have been tracked through mtDNA analysis. While this does not prove that the people who created the mounds at Peter Klunk were not cajoled or coerced into building these monuments and burials on behalf of elites, it does show that elite status was not inherited along lineage lines (Bolnick and Smith 2007). The lack of correlation between funerary treatment and mtDNA may also speak to other DNA studies, which support the idea that social connections at this time extended past biological connections.

Bernardini's (2004) energetic analysis of five Hopewell geometric enclosure sites argues that in such a low population density region labor-catchment areas would have likely been much larger than the dispersed community model assumes. A variant of the dispersed community model assumes that autonomous polities are dispersed around earthwork centers that act as symbolic villages to facilitate the meeting and communication of communities. Based on soil volume from these enclosures, the labor pool could necessitate a few hundred to a few thousand depending on how quickly the monuments were built. Bernardini argues that the labor catchment sites would have 1) overlapped in such a manner that communities would not have been tied to only one earthwork center but also 2) that their riverine locations would have likely extended the distance from where people coming from (2004). Lithic tools created from raw materials sourced

up to 600 kilometers away were found at the Hopewell earthworks, indicating the distance people were coming from to visit if not help build these monuments (Artusson et al 2015). As noted by Everhart (2021), Bernadini's (2004) assessment of labor does not include the energy necessary for altering the landscape prior to the construction of monuments. While both authors were interested in embankments, this can also refer to the activities that took place prior the mound and whether a substructure was present. This only adds to Bernadini's argument that labor-catchment areas for ceremonial centers were large, and that coalitions, not single communities, were responsible for the construction of large monuments and sites.

The importance of communal centers in dispersed populations is further argued by Artusson et al (2015), however they argue for its importance in the creation of land ownership rights and channel resources for the benefit of select individuals. Monuments, they argue, would have been a means of tethering largely mobile and dispersed populations to symbolically important places. They argue that coercion was likely not a strategy employed by leaders because people still had the freedom to leave, and instead were rewarded with feasting. Feasting and labor direction would have required some amount of direction by people in authority, likely by people who had ritual knowledge and experience. However, an issue with their analysis is it assumes that monuments are means of creating tethers to land by making it religiously significant as opposed to the other way around. Monuments, I argue, serve as a means to formalize relationships with people, but also with people and place. Sites are often devoid of evidence indicating long-term domestic residence, implying importance beyond living human occupation (Henry and Barrier 2016).

Part of the reason past researchers assumed a hierarchical, or at the very least stratified, conception of Hopewellian and Middle Woodland communities is due to presence and placement

of intricate craft goods. Items like copper headdresses that have been found at sites such as Hopewell site (Coon 2009; Shetrone 1926) have been interpreted as evidence of shamans or other religious leaders (Carr 2005). Bernardini (2004) assumes that copper celts, for example, were personal items and that a large deposition of celts was evidence of individuals (specifically individuals who had access to these status items in the first place) coming a fair distance to be a part of the event. Carr (2005) argues that the material record of the Hopewellian Interaction Sphere is representative of individuals participating in exchange networks, and Hopewellian objects were status symbols owned by specific individuals. This view has been contested (Byers 2011, 2018), and has instead been argued that the artifacts and burial assemblage is representative of heterarchical sodalities in charge of mortuary rites that invoke world-renewal. These views are not inherently incompatible with one another if we understand Carr's individuals as people who are proving their accountability and worth to their community and achieving heterarchical, or situational, leadership because of it (see Henry and Barrier 2016). The existence of monuments proves that the Hopewell idea is not the creation of significant individuals alone, that multiple groups through large geographical ranges came together to create monuments to preserve memory and their relationships with one another, and that this process was different every time, explaining the variability of Middle Woodland archaeological record.

Dissonance as a Means of Explaining Variability in the Middle Woodland

Berle Clay (1998, 2014) is one of many authors that has noted the great variability of Middle Woodland sites. In his review of Adena ritual features, he argues against the earlier works of Webb (1942; Webb and Snow 1945), which attempted to understand Adena mounds through a list of 90 traits. While he noted their variability, Webb used this variability to create a taxonomy of the types of mounds, rather than appreciating the diversity of Adena ritual. Webb

(1942) believed that Adena burial mounds implied the existence of social classes, with the elite or "special" individuals interred in burial mounds while commoners were cremated and buried elsewhere. The first clause may be correct on the basis that there is a limited population represented by people who were interred in mounds, making it clear that they were different from their peers, but in what manner still remains unclear. Henry and Barrier (2016) argue that these individuals may have been those that had proven their worth and accountability through heterarchical leadership positions. Clay (1998) discusses the possibility that the differences in burial that Webb noted may be less an issue of their status in life, that burial and the processes associated with the interment of individuals is an open and negotiable process between the living.

Previous research and this paper show that Middle Woodland sites are diverse in terms of pre-mound activities and construction. Clay's (2014) examination of Middle Woodland mortuary contexts in the Ohio Valley notes that mortuary regimes are different in the same site, and my own research shows that different mortuary treatments can coexist in the same mound. Clay (2014) argues against the idea that varying mortuary regimes are the result of diachronic change or the result of multiple cultures interacting with one another, but rather the groups responsible for the burials were faced with unique social situations each time, and therefore the variability is result not due to larger cultural traditions, although these surely were important, but the individual agents that came together to complete a task.

Archaeology has previously focused on competition, especially in regard to the construction of monuments. However, shared architecture such as monuments and ritual locations can also be considered archaeological evidence of coalitions. Using the definition from DeMarrais (2016), coalition is the "union or combination of separate parts or elements into one

mass, body, or whole" (1), and in the case of monument construction a coalition can be understand as numerous groups or communities coming together to act as whole in construction. To complete a task, coalitions must come to a consensus, consensus that requires a foundation of similarity which can take place in the form of a "social glue" such as kinship or a shared cosmology (2). Recounting stories and partaking in ritual creates communal identity and ownership over shared spaces, while also reinforcing or creating an imagined community. While the participation of monument creation and the activities that had to take place prior are cooperative, this does not explain the variability in Middle Woodland contexts unless the manner of creating consensus is understood as diverse ideas and customs coming together and negotiated through the process of these activities.

Henry and Barrier (2016) take the approach to understand the variability in Middle Woodland assemblages by using Stark's (2009) idea of dissonance. Simplified, dissonance is the tension created when two competing or different societal elements come into contact with one another. In a heterarchical society where one's individual worth is created through accountability to the group, and multiple communities with their own arrangements and assessments of accountability come into play, these ideas of leadership must be resolved (Henry and Barrier 2016). In addition, as multiple communities came together in the construction of large burial mounds (Henry 2017), dissonance was likely created from the communities' different rituals, or ways of doing rituals, and different forms of how things should be done regarding to land preparation before and after those activities occurred and primary mound construction began: should the topsoil be removed, replaced, leveled, should a structure be built, and what activities should take place in that structure? While this meeting of groups that are not within close geographical range of one another for the majority of the year and are likely compromised of

new individuals each time they meet as people are born and die, can create awkwardness and tension, dissonance, this creates an opportunity for situational leaders to prove themselves both to their own communities as well as their coalition. This tension and consequent negotiation of ideas and practices may materialize archaeologically in the variability of "architectural forms, mortuary treatments, trade networks or style within craft items" (Henry and Barrier 2016: 92). Archaeological sites and assemblages are the result of past humans making decisions, especially in the context of mounds and other ritually important contexts where things are interred with a purpose. Variability is evident in the Middle Woodland situation and assemblages, from within regions and even sites, and dissonance may be a way of understanding this variability from a more agentic view of the past.

Complications in Research and Directions for the Future

While archaeologists are shifting their focus to the entire lifespan of a mound, this does not make up for the historical precedent where mound summits were of greater focus, and often in-depth stratigraphic profiles are missing simply because past researchers did not record such data (Wright 2016) or that data has been lost over the years. In addition, summit studies are usually easier to conduct through non-invasive techniques using geophysical instruments than the sub-mound deposits, for example. Sub-mound deposits are crucial for understanding the full lifespan of a mound, including the events that took place prior to its construction that show the relationship created between people and place and with each other. Legacy data is the main source regarding sub-mound contexts, although in rare cases there is modern work done, sometimes under a salvage context, that fully illuminates the pre-mound stage. As much of my data comes from early 20th century sources, some crucial information may be missing. For example, there are obvious differences in information available for mound investigations done at

Pinson Mounds in Tennessee and Mound City in Ohio, with the former having more recorded geoarchaeological data, such as the placement of certain mounds on natural knolls, while the latter focused primarily on the artifacts recovered and features associated with the sub-mound post structures. Both data sets are immensely helpful in understanding the prenatal state of mounds, but a notable problem is that recorded absence is not the same as actual absence.

Earlier work paid less attention to geological context that would have told more about the importance of the place itself, including landscape alteration (e.g., topsoil removal) prior to construction. Taking this into consideration, consolidating information regarding the premound contexts can give information that furthers the archaeological project of understanding the entire lifespan of a mound, not just what purpose it served in its completed state. Understanding premound activities serve as another means to examine the global versus local trends in Middle Woodland context, by defining any universals in pre-mound rituals and preparation—if there are any—versus understanding the more local contexts between regions and even sites.

This paper examines a total of 64 Middle Woodland mounds (Table 1) in Ohio and the Southeastern U.S. that have been excavated to such a degree that there is published data for sub-mound contexts, which is the most exclusionary factor for inclusion in the study as most mound studies in the past have concerned themselves with summit activity or were only tested rather than fully excavated. The 64 mounds are examined for 26 pre-mound features, which are the presence of absence of: burials; placement of burials in a log or stone tomb, on the floor, platform, or pit; non-local material; domestic debris; artifact caches; killed artifacts; crafted objects; fire or crematory; substructure; number of substructures; non-structural posts; pre-mound pits; topsoil removal; topsoil replacement; surface leveling; pre-mound cap or floor; substructure prepared clay floors; colored sediments; construction on a naturally elevated

feature; non-local sediment over one kilometer from the site; enclosed by another monument; and the presence of a construction platform; these variables will be further explained in the following chapter. Examining sites in Ohio and the Southeast gives me a chance to examine differences in the Hopewell "core" and the larger Middle Woodland situation. GIS multivariate clustering analysis is used to uncover patterns that would have been missed, which will be further described in the following chapter. By interpreting the presence and absence of features as a binary, I continue the conversation on variation within Middle Woodland ceremonialism, both in the great geographical and temporal range that it encompasses, as well as on a more miniscule site-based level. The focus on these chosen features is to try and built a picture of how people were interacting in that space prior to the construction of the mound and to investigate if there were clear cultural trends among areas for placemaking or ritual activity prior to the space being interred by a mound. In addition, while not the main focus of this study, the presence of human interments and mortuary treatments is both to explore whether there is a clear difference in treatment between mortuary and non-mortuary spaces, as well as to further test Clay's (2014) claim about the variability in these contexts.

Table 1: List of Mounds with given number, site location, and arbitrary ID number for this project

State	Site	Mound Number	ID #
TN	Pinson	5	1
TN	Pinson	6	2
TN	Pinson	10	3
TN	Pinson	12	4
TN	Pinson	29	5
TN	Pinson	31	6
OH	Mound City	1	7
OH	Mound City	2	8
OH	Mound City	3	9
OH	Mound City	4	10
OH	Mound City	5	11
OH	Mound City	6	12

OH	Mound City	7	13
OH	Mound City	8	14
OH	Mound City	9	15
OH	Mound City	10	16
OH	Mound City	11	17
OH	Mound City	12	18
OH	Mound City	13	19
OH	Mound City	14	20
OH	Mound City	15	21
OH	Mound City	16	22
OH	Mound City	17	23
OH	Mound City	18	24
OH	Mound City	19	25
OH	Mound City	20	26
OH	Mound City	21	27
OH	Mound City	22	28
OH	Mound City	24	29
OH	Mound City	25	30
MS	Ingomar	1	31
LA	Marksville	4	32
LA	Crooks	A	33
MS	Bynum	A	34
MS	Bynum	B	35
MS	Bynum	D	36
OH	Newark	Eagle	37
OH	Taylor	1	38
OH	Tremper	1	39
OH	Seip	S1	40
OH	Seip	S2	41
OH	Seip	S3	42
OH	Seip	S4	43
OH	Seip	S5	44
OH	Seip	S6	45
OH	Seip	S7	46
AK	Helena Crossing	C	47
AK	Helena Crossing	B	48
OH	Hopewell	2	49
OH	Hopewell	4	50
OH	Hopewell	7	51
OH	Hopewell	11	52

OH	Hopewell	17	53
OH	Hopewell	20	54
OH	Hopewell	23	55
OH	Hopewell	24	56
OH	Hopewell	26	57
OH	Hopewell	33	58
OH	Hopewell	25	59
MS	Pharr	H	60
MS	Pharr	A	61
MS	Pharr	D	62
MS	Pharr	E	63
OH	Seip	1	64

My research, as well as previous research mentioned, shows that Middle Woodland mound construction and the activities that took prior were heterogenous in nature, even within sites such as Pinson Mounds and Mound City. As previously discussed, research on monumentality and sociopolitical organization in the region suggests that, at least for the larger earthwork centers, people were drawn from long distances to interact with communities they did not see often and, in some cases, may be meeting for the first time. This interaction of communities which have their own localized cultures and traditions would have been a time of uncertainty and cultural dissonance as traditions regarding ritual were undergoing processes of negotiation. While my research and past research shows that pre-mound contexts are varied, I am using the idea of dissonance as discussed by Henry and Barrier (2016) to understand *why* premound contexts are so varied, even within the same site. A lack of standardization among mound preparation techniques may be viewed as the consequence of overcoming dissonance by the creation of a new custom or consensus, rather than the complete adoption of one group's method among many in a corporate group. Variation in mound creation shows that while a general form is being reproduced over and over, the exact steps and details may be less critical than the maintaining of social relationships among the builders themselves.

This paper turns further attention to the monumentality of mounds prior to their final construction, focusing instead on the relationships that created the mound and that the mound was created for. Many of these spaces, if not all, likely had ceremonial significance before the first basket of mound fill was placed. By using pre-collected data to examine pre-mound contexts and site histories, the materializations of interaction under the Hopewellian sphere may become distinct from more local variability and the archaeological project of understanding mounds as a social and ritual process, rather than a finished project, can be furthered and hopefully expanded upon in future research. This thesis attempts to handle this issue by using multivariate clustering to assess underlying patterns throughout the Middle Woodland.

CHAPTER 3: METHODS

The sites and mounds I included in this study, gathered through reading books, site reports, and articles detailing past excavations from sites that fit within the chosen boundaries, had factors that limited their addition in my analysis. First, the previous excavations needed to excavate enough of the mound to reveal the pre-mound features, which usually included an entire dissection of the mound down to sterile soil, or soil where there is no obvious cultural alterations or objects. Some mounds, such as Mound 23 at Mound City, were not included because the pre-mound features had been stripped away during excavation by bulldozing. Other mounds from sites I analyzed were not included because test excavations did not reveal enough of the pre-mound surface or did not have pre-mound features mentioned in the report. This limited the mounds and sites that could be included into the final data set, but by including sites of various sizes in both Ohio and the general Southeastern region, this study hopes to understand general trends in and between regions. Multivariate clustering was used as an exploratory tool to understand any underlying patterns in the data between the 64 mounds included, and the 26 unique attributes included.

The benefits and issues of pre-collected data

There is already an abundance of archaeological data for the Middle Woodland period in the eastern United States that allows for larger scale analyses to consider patterns among multiple sites spanning a broad geographic area. Using data collected by professional and avocational archaeologists from the past century allows for a larger synthesis than collecting my own data would have. Differences between one or two mounds is not variability, but differences found among 64 mounds of within regions and sites, and between regions and sites tells a clearer story of diversity of pre-mound activities, which then can be used to question assumptions about

past cultures and why such variability might exist. In addition, applying new questions to pre-existing data furthers archaeological standing of even well-studied sites and collections. There is also an ethical concern when it comes to the data examined here, in that excavation is a destructive process and all archaeological materials are a finite resource. In addition, there is a fear of disturbing Indigenous American remains. It is also a legal concern under the Native American Graves and Repatriation Act (NAGPRA) of 1990, since almost half of the monuments discussed here have burials in their pre-mound contexts, and even more have burials included in various layers of the mound fill or were interred after the final deposition event. While Middle Woodland platform mounds do not seem to be built with the intent of interring humans, excavating only platform mounds is not a safeguard as later populations may have used the mounds to bury their dead as perceptions of the monuments changed through time. It can be argued that much of the information here was excavated unethically, especially that from the early 20th century when there was no attempt at collaboration or cooperation with Indigenous Americans. This, however, is not a reason to abandon these older data sets, and instead try to give them new life while being mindful of their past

Of course, there are also other drawbacks to using pre-collected data, especially older data sets, which includes most of the Ohio River Valley data which was gathered in the 1920s and the Southeast samples, the majority excavated in the 20th century. Only recently has there been a push in archaeology and geoarchaeology to appreciate the whole lifespan of earthen monuments such as mounds, and older data from the early 20th century does not detailed records of stratigraphy that archaeologists invest in today; this creates the problem of time-controlling a site, and its often ambiguous whether the pre-mound activities discussed here are nearly concurrent with the construction of the primary mound or predate it for as long as centuries In

addition, there are often differences in the terminology and interpretation of certain features. An issue that arose in this study was the nature of clay-basins found in Mound City and the Hopewell Mound Group, as well other Middle Woodland sites, which are identified differently by the researchers who worked at these sites. Squier and Davis (1848) called them altars due to a perceived similarity to Aztec structures of the same label, while later researchers like Mills (1922) would call them "crematory basins," tying them directly to the mortuary activities that took place prior to the construction of the mound, regardless if there was evidence of cremation or burial prior to mound construction. Since it is not always clear in the literature whether these features are hearths, crematory basins, or other types of fire ceremonialism, they are all combined into one feature class and referred to as "fire activity" for the purposes of this analysis. Along with differences in how certain archaeological features are recorded and identified, excavation methods have changed within the past half-century, as heavy machinery for excavation below the plow-zone has become less common due to its destructive nature.

There are cases of ambiguity about the placement of certain artifacts and features, the writing making it unclear whether the floor referenced is the pre mound surface or the floor of a different construction event. Sometimes a floor is not referenced at all, leading to more confusion. In cases where the context was not clear, those instances were not included in the sample.

Variables

There are 26 variables included in the study: burials; placement of burials in a log or stone tomb, on the floor, platform, or pit; non-local material; domestic debris; artifact caches; killed artifacts; crafted objects; fire or crematory; substructure; number of substructures; non-structural posts; pre-mound pits; topsoil removal; topsoil replacement; surface leveling; pre-

mound cap or floor; substructure prepared clay floors; colored sediments; construction on a naturally elevated feature; non-local sediment over one kilometer from the site; enclosed by another monument; and the presence of a construction platform. These variables were created and accumulated through the reading of published site reports, adding a new variable each time a new feature was mentioned as present at an individual mound, explaining why some variables show up only within a few mounds. As such, these are most certainly not the only notable features in all Middle Woodland pre-mound contexts, but they account for all of the ones mentioned in the sources used to create this study. While I spoke somewhat disparagingly about trait lists in the earlier literature review, I am under no misgivings that I have created is a trait list for Middle Woodland pre-mound contexts. Trait lists, in and of themselves, are a neutral tool for archaeologists, but they should be used to explore archaeological cultures and contexts, not to define them. These variables were created from the published data I read for this study, and as such they do represent a reality of this specific context I am exploring, but no set of traits can be used to explain every mound in this study, and no mound has all 26 variables present, even when these criteria were kept intentionally broad. Rather than define Hopewell or Middle Woodland ceremonialism, I use a trait list to show similarities between sites while also showcasing their many differences, which are also present among sites.

One of the questions for this analysis beyond site and regional variability is if there are notable differences between mounds built with the intention to house human remains and those that were not; while the data to further explore this question was gathered, this is something that feel out of the scope of the regional analysis and would be better suited to its own investigation, perhaps in the future. Another reason this was gathered was to understand differences in mound use among regions, and if mounds that covered interments were more common in one region or

the other All the burials discussed here are placed prior to the construction of the primary mound, as every other criterion is, so the mound was built in part with the intention to serve as a covering for the burials. Identifying the frequency of these will allow me to assess whether they are more common with burial mounds than non-burial mounds. Types of burial placement were then designated into five categories: burial in a log tomb, stone tomb, earthen platform, in a pit or basin-like feature, or on the floor of a substructure or ground surface. Log and stone tombs refer to crypts or small structures built around the body of wooden or stone material, the former largely implied by impressions left in the surrounding soil as the logs rotted. Platform burial refers to the placement of human remains on elevated earthen platforms built on the floor of a substructure or ground surface; pit and basin burials refer to human remains placed in a subsurface or subfloor grave, including crematory basins; and floor burial refers to instances where the individual was placed on the floor of a substructure or ground surface with no crypt surrounding them. If one interment fits into multiple categories, such as a log tomb built around an earthen platform, both categories are marked for that mound, since this study is less concerned about the quantity of each of these features, and only about the presence of those features in the pre-mound contexts.

The "non-local material" category, sometimes referred to as exotic in archaeological literature, is very broad and is included in the study to indicate the movement of goods and people that the Hopewell Interaction Sphere implies. This category is useful because it will help determine how common non-local materials are outside of the "Hopewell Core" area, or whether it is more common in the Southeast than previously assumed. The raw and modified materials included in this category include galena, mica, obsidian, copper, shark teeth, grizzly bear teeth, marine shell, and non-local ceramics.

Domestic debris includes broken animal bones, charcoal, utilitarian sherds, and other types of debris that are primarily associated with eating. These may be indications of pre-construction feasts or the necessary cooking of food for those participating in or watching the activities that took place prior to primary mound construction rather than evidence of people living in the exact space. As all the domestic debris was found in clear context with the pre-mound activities, it can be inferred that they represent activities directly related to handling dissonance between the participants.

The artifact caches criterion refers specifically to the deposits of items outside of graves, and therefore separate from grave goods. Ritual deposits of artifacts, often containing non-local or finely crafted items, may have served as another way to mark the importance of the place of the mound, the mound itself, or even the participants who participated in the act of deposition.

Killed artifacts refer to artifacts assumed to have been purposefully broken or burned, in this study often being found in association with fire or crematory activities, another clue to the types of ritual agreed upon by the mound's builders or those who used the space before them. A crafted object is an artifact that has been significantly worked or an item with iconographic significance, such as a mica cutout, a copper ferrule, effigy pipes, headdresses, and other detailed works.

The presence of a hearth, a rounded and burned portion of earth or a basin with evidence of burning, is included because it may represent a type of fire-ceremonialism or simply prove that the space was being used prior to construction. Unfortunately, due to a variety of terms applied due to the varying opinions and hypotheses of past researchers, it is difficult to determine from the data what type of fire activity is taking place. I account for this by including the presence of fire in the category of "fire activity" regardless of what kind, since for many mounds

it is impossible to tell why fire was used from the reported information. Some are true crematory basins, such as those uncovered in Mound City, some are puddled clay hearths, and some are floor hearths that are simply circular areas of burned earth. Others are basins that were used for the purposeful ceremonial deposition of important items and materials after being used for burning. The Indigenous peoples of what is now the United States have a longstanding history and tradition of sacred fires, and the association of these fires with the sun (Giles et al 2020). A separate project could be dedicated to understanding the fire features of these pre-mound surfaces alone. In addition, some fire basins had bones that were non-human, and may represent non-mortuary ceremonialism and/or feasting prior to mound construction. I consider mortuary activity specifically as relating to humans.

The presence of a pre-mound post-structure or substructure was defined by clear post-mold plans that have rectangular or circular patterns. These may represent charnel houses or partitions for rituals and other important spaces. The number of structures gives an idea to how long people were utilizing that space before the mound, as well as what type of activities may have been occurring. The number of structures is determined by the floors uncovered (e.g., Mound 18 in Mound City), or the number of post structures, connected or not, that are underneath the mound (e.g., Tremper).

A pre-mound pit refers to a pit excavated into a structure floor or old ground surface prior to the construction of the mound. A non-structural post, as referred to in this study, is a post mold not associated with a larger structure plan. Differentiating between the two is difficult and even more experienced researchers (Burks and Greber 2009) have trouble interpreting, especially if the feature's size leaves room for ambiguity. Context was crucial for these cases, but in no way perfect as I must make a call about the primary use of these features without seeing them in

person. Burks and Greber (2009), in their discussion of features discovered during the 1971-1977 excavations at Seip, note that feature 1971-3 could either be a small circular pit or large post-hole. Considering that it was located near a large interior post but was not a part of the structure plan, I have decided it is a pit for the purposes of this study. Non-structural posts are more confidently identified when researchers noted scattered posts or stake holes that were not associated with an outline that could indicate a substructure.

In some cases, the creators of the mound would remove the topsoil, creating an activity surface that the mound would later be built upon. Less common, they would remove the topsoil and then replace it with new soil to create a new surface, a clear sign of landscape alteration and place-making. Leveling or compacting the surface is another way in which people altered the land prior to mound construction. A pre-mound floor or cap refers to the practice of laying down a layer of clay or purposefully hardening the soil with fire before the construction of the primary mound or to create an activity surface for ritual. A prepared floor for the substructure was a similar concept, except limited to and associated with the creation of a substructure floor. The colored sediment category refers to the purposeful deposition of sediments based on their color; this criterion was one the hardest to determine. There are a few instances of a mound being placed on a naturally elevated surface such as a knoll. On occasion mounds were enclosed by other features, such as embankments, and constructed from soils located over a kilometer away from the site. The former shows the importance of relationships between the placement of mounds with other features, while the latter shows the importance of connecting one place to another through the materials of construction. Lastly, some mounds were built over a constructed earthen platform that served as the base of the mound.

The subjective importance of each feature or variable listed is not the subject of this study. For example, I do not probe into why the presence of a pre-mound pit is significant, or what exactly it may have been used for by those that dug and used it after. Instead, I am simply recording what is present without trying to interpret their individual meaning, a task I am not equipped to do for a project of this size. I am simply noting what people were doing, not why they did it in order to make a broader claim about heterogeneity in these contexts.

Multivariate Clustering

GIS, or geographical information systems, is a data management system meant to acquire, manage, and display geographical or spatially based data (Aldenderfer 1996), in this case largely to display. The adoption of GIS technologies into archaeology started to become mainstream in the early to mid-1990s. Archaeologists at this time were beginning to apply GIS to questions regarding human activity and the space they occupied, such as testing associations with site location and use based on environmental (Kvamme 1990) and geomorphological parameters (Leusen 1993). A critique of applying GIS to answer archaeological questions is that it has a tendency to oversimplify and dehumanize the archaeological past; however, the broad questions that GIS allow interrogation of, can promote diversity and prompt new insights or understanding underlying patterns in the data (Connolly and Lake 2006).

Abrams and Freter (2005) compiled one of the first volumes of GIS analyses applied to the Ohio River Valley. Researchers have used GIS to examine settlement trends and patterns in the Ohio River Valley through the Archaic and Woodland period as agriculture and cultivation became more common in the region (Stump et al 2005 and Wakeman 2005), examining artifact density to assess the use of a site (Pecora and Burks 2005), and trying to understand population aggregation and settlement through productivity and defense (Heyman *eta al.* 2005), to name a

few examples. Geospatial technology has also been applied to questions surrounding monumentality, such as Howey et al (2016), who examined the placement of Late Precontact (1000-1600 CE) mounds and earthwork enclosures in Michigan and determined that mound placement was dependent on proximity to lakes and enclosures were sited based on their proximity to rivers.

In this study I use Multivariate Clustering in ArcGIS to explore patterns I may have otherwise overlooked in my data, in this case using ArcGIS primarily as a means of data visualization to test whether there are certain patterns or types of pre-mound activities or preparations that unique to a region, more common to a region, or if the data shows relative similarity between regions (see Baxter 1994 for a more in-depth look of multivariate analysis in archaeology) This type of analysis can only work with numerical data, so all attributes were made into a binary of whether it was absent or present at a particular mound. For example, one of the attributes was "substructures", if a substructure was present then it was marked as "1", if absent it was marked as "0". It should be noted in most cases ESRI recommends proportional data rather than binary (ESRI 2022), and in a larger project it may be worthwhile to use the actual number of occurrences, for example, how many fire basins were constructed before the mound or how many objects were made of obsidian.

Cluster number and seed location were not chosen, instead allowing the algorithm chose the optimal numbers and locations, since the purpose of using Multivariate Clustering in ArcGIS was to see what patterns the program saw in the twenty-six attributes for the sixty-four mounds. As such, when ran more than once there was usually a new number of clusters with different mounds paired together, although this is not always the case, and in several iterations identical clusters were replicated.

Clusters were identified using the Calinski-Harabasz pseudo F-statistic, which determines intra-group similarity and inter-group difference, used here analyze among sites, regions, and between regions. I used the K-means clustering method, which is the default method used by ArcGIS. The K Means algorithm minimizes the differences within clusters. The first seed chosen is always random and the other seeds are chosen by what is furthest in data space. The random selection of the seed locations explains the variance in clusters if ran multiple times. As will be seen, running this program often creates clusters that are difficult to replicate in smaller samples and generally creates less but large clusters in bigger samples. This lack of replicability is often a testament to the high variability in the features that it is working with. This variability is described in the next chapter, which details the pre-mound contexts of each of the 64 mounds included in the study.

CHAPTER 4: SITE AND MOUND DESCRITPIONS

This chapter gives a brief overview of the 13 sites I examined in the study and the premound features I could across the 64 mounds at this sites. This chapter will give a brief history at the work done at each site and a discussion of patterns between the mounds if any, but the majority of the information will be in a simplified table in Appendix A. This chapter is meant to give a more qualitative understanding of what is then reduced to the presence and absence binary and to show, in detail, the ways potential dissonance was overcome at these sites and at the very least to challenge ideas of a set culture or cultures in the Middle Woodland.

Ohio Sites

Hopewell Mound Group

The eponymous Hopewell site, located within the Scioto River Valley in Ross County, Ohio, was mapped and described by Squier and Davis (1848), but the first in-depth investigation was done by William C. Mills (1922) and Shetrone (1926) in the 1920s, where most archaeological knowledge of this site comes from. The site is composed of forty mounds, four earthen enclosures, and a woodhenge (Giles et al 2020). Obsidian hydration dates from Mound 11 give a range from 258±119 BCE and 607±94 CE (Stevenson et al. 2004) as well as two calibrated (at 2-sigma) radiocarbon dates of 217-411 CE and 94-340 CE (Cowan and Greber 2002).

The Hopewell site sample contains 11 mounds, and there's very little in terms of common patterns. Five mounds had burials, four had substructures, 6 had fire activity, and non-burial caches were found in burial and non-burial mounds. There is very little commonality between the mounds and perhaps the only notable commonality is all pre-mound contexts that do

have artifacts, 8 of the 11, have non-local materials included. For more detailed information on the individual mounds, see Appendix A.

Mound City

Located in the Scioto River Valley in Ross County, Ohio, the Mound City group was first mentioned in the archaeological literature by Squier and Davis (1848) who investigated the mounds in 1846. While they were able to remark on the presence of "altars" or burned basins in a few of the mounds they did not detail the construction of the mounds or other pre-mound features, instead focusing largely on the exotic artifacts they uncovered. Mound City was central to the Moundbuilder argument and myth, argued by Squier and Davis to be evidence of a Mexican culture in the Eastern United States, something quickly dismantled in the early 20th century when greater understanding of the variety of mound types was beginning to be uncovered, and when excavators were doing more than sinking a shaft to the base of the mound. After their investigation the land was brought under cultivation before being sold for the construction of Camp Sherman. The first full investigation was done in 1922 by William Mills and Henry Shetrone, after the construction of Camp Sherman on the site which had damaged some of the mounds, although all pre-mound surfaces seem to have been left largely undisturbed, even where Shetrone excavated. The site was investigated more recently by Raymond S. Baby and John L. Cotter in 1963 to 1972, and this is where the majority of the data from this site discussed here comes from. The site consists of twenty-five conical mounds within an encompassing square-like embankment. Grave goods and other offerings at Mound City imply long-distance relationships to the Appalachians as well as the Florida Peninsula, and further west as evidenced by obsidian (Brown 2017).

A large deposit of pipes found in Mound 8 were very similar to those found in the large cache in the Tremper mound, and the two shared the fire basins that, first believed to be altars, were hypothesized by Mills (1916) to be crematory basins. Mills hypothesized that the two mounds shared the same purpose and came to the conclusion from his work in Tremper and Mound City that substructures were connected to the preparation of the dead. However, not all substructures in Mound City contained any evidence of human burial or body preparation, as will be discussed later. In addition, while not discussed here, there is a difference in the axes of the substructures, with newer superimposed substructure being built with a different axis to their predecessors. As of 2017, there are nine viable dates for Mound City, the average of the dates being 1711 BP or 239 CE and the median of the dates being 1767 BP or 183 CE (Brown 2017).

Of the 24 mounds from Mound City included in this study, 23 of them had at least one substructure. Mounds 7, 8, and 13 had two substructures and this site and Tremper are the only sites in this study that have multiple substructures under the same mound, although these are superimposed, suggesting either a long term of use or perhaps a change in purpose, while Tremper has segmented structures attached to one another. That the majority have substructures makes Mound City the most uniform site among the 13, the only other universal among sites is usually the mounds themselves. For more detailed information on the individual mounds, see Appendix A.

Newark

The Newark Earthworks in Newark, Ohio are famous for being the largest geometric earthworks known to be constructed in the Eastern U.S. The site includes a nearly perfect circle twenty acres large, octagonal enclosure, platform mounds, a large oval with an interior area of forty-nine acres, a square enclosure encompassing twenty acres (Hively and Horn 2013) and a

supposed effigy mound called the Eagle Mound, which is what has been included in this study. The site was first mapped in by Squier and Davis (1848) and later surveyed by James Middleton in 1887 through 1888 for the Smithsonian Institution, which was then published by Cyrus Thomas (1984). A great deal of focus on this site is on the geometry of the earthworks and how they may correlate to celestial cycles (Hively and Horn 2013).

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

Seip

The Seip site is located in Ross County, Ohio, on Paint Creek. The site consists of at least thirty mounds of varying sizes, a small earthen circle, and a large geometric earthwork that encloses most of the mounds (Greber 2009). Briefly mentioned by Squier and Davis (1848), investigation of the Seip mounds began with William C. Mills (1909) in 1906 and 1908, who excavated Seip Mound and Seip-Conjoined, both later renamed Seip 2 and Seip 1 by Henry Shetrone (Shetrone and Greenman 1931) respectively, who visited the site in 1925. Both investigations found that the mounds covered the remains of structures, interpreted by the investigators as charnel houses. The large central Seip Mound was restored by 1930 after Shetrone's excavations were complete (Otto 2009). The Seip site is famous for its large quantity of textiles compared to other Middle Woodland sites, which has made past researchers interpret it as a place of textile production (Baby and Langlois 1979), although work done in the 1970s on seven off-mound structures indicates that this is unlikely (Burks and Greber 2009). The site was investigated by the Ohio Historical Society in 1966 which focused on non-mound settings, and again in the 1970s, which excavated a cluster of small mounds that covered structures (Otto 2014). The uncalibrated Seip dates are about 1,055 CE for structure 6, 590 CE for structure 5,

and 105 for Mound 1. If the dates are accurate or near accurate, they show long use of the site through time (Armitage and Jakes 2016).

Seip 1 represents a large burial mound, full of ritually important deposits including 3 non-mortuary deposits. It shares little in common with the other 7 mounds included, which were low mounds that covered one substructure each. The other commonality being they all had at least one sub-mound pit, including Seip 1. For more detailed information on the individual mounds, see Appendix A.

Taylor Mound

The only mention of the Taylor mound, named after the landowner, is by Othniel C. Marsh (1866) in the American Journal of Science and Arts. The Taylor mound is a large conical burial mound, measured by Marsh as being 3 meters tall and 24.4 meters in diameter. The mound is about three miles from Newark Earthworks and about a mile from the closest known mound at the time. While the description is not as detailed as later descriptions of other sites, the mound covers graves that were excavated into the original ground surface, the grave goods include non-local materials, and animal bones suspected by the researcher to have been broken open for marrow. There are no radiocarbon dates for this mound.

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

Tremper

The Tremper mound in Scioto County, Ohio is located on a plateau on the west side of the Scioto River and is named after the landowner at the time. The family was hesitant to allow examination of the base of the mound and was examined by the sons of the family in the early

1900s who only tested the top of the mound. Like most of the sites in the Ohio sample, this mound was first officially recorded by Squier and Davis (1848), although they do not go into any great depth about its construction or pre-construction history. The data from this mound was from the first in-depth examination done by William C. Mills (1916) for the Ohio Archaeological and Historical Society. The single mound at the site was very large, measuring 250 feet (76.2 meters) long with a maximum width of 150 feet (45.72 meters), and was enclosed in a rectangular embankment. The mound has an odd shape and was called by both Squier and Davis (1848) and Gerard Fowke (1902) an effigy mound, the latter calling it a. In his excavation, however, Mills notes that the odd shape was due to the addition of charnel houses that were then covered, with a large central structure and three smaller additions on the east side. Mills (1916) claims that the structures prior to the construction of the primary mound served as sacred spaces, where the dead were cremated and interred based on the large number of crematories and communal depositories of cremated individuals. In addition, an almost two meter (recorded as six feet) in diameter artifact cache was deposited in the central east addition, including over a hundred platform pipes, mica, beads, burned bone and wood objects, and "boat-shaped objects of copper" (285), equaling more than 500 objects total. This mound is believed to be among one of the earliest earthworks of the Scioto Hopewell, with the newest calibrated dates (Emerson et al. 2005:195) ranging from 4 to 21 CE.

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

Southeast Sites

Pinson

Located in Madison County in west Tennessee, Pinson Mounds is on the South Fork Forked Deer River. It is comprised of at least thirteen mounds and an earthen embankment along with activities areas that are contemporaneous with the monuments. It is a large and spread-out site, covering 160 hectares, much larger than the Hopewell and Mound City sites. The site was first mapped in 1917 by Smithsonian archaeologist William Myer, who portrayed several earthen embankments and thirty-four mounds, although many of these mounds were found to be natural features by Robert Mainfort Jr., although Mainfort acknowledges that geophysical survey may be able to reveal some now invisible anthropogenic features. The first in-depth evaluations were in the 1960s, decades after Myer's map (Mainfort 2013a)

Pinson Mounds was one of the sites used to prove that Middle Woodland communities built and used platform mounds, which were originally attributed to Mississippian and later groups. Pinson Mounds was originally assigned a Mississippian affiliation due to the presence of platform mounds the exposure of a Mississippian house, despite the artifacts that pointed toward a Middle Woodland use and construction (Mainfort 2013a).

Compared to other Middle Woodland sites, Pinson has a large amount of radiocarbon dates assigned to it, totaling thirty-nine. The dates help prove that the site was largely used in the Middle Woodland period, and that all earthworks were Middle Woodland constructions, even if they dates come from different proveniences within the mounds (Mainfort and McNutt 2013).

Of the 6 mounds included from Pinson in the study, 3 of them are conical mounds and 3 of them are platform mounds. The 3 platform mounds, Mounds 5, 10, and 29 are all absent of burials, fire activity, and any crafted objects or non-local materials. The 3 conical mounds, Mounds 6, 12, and 31 are all burial mounds and all non-local materials or crafted objects are found in association with these burials. All 6 mounds show intentional and intense landscape

alteration prior to mound construction, all showing evidence of topsoil removal. Pinson is a fascinating case study of conical and platform mound dichotomy in the Southeast, and unfortunately there is not more sites with both types of mounds included to see if this is a larger regional pattern or a site-based oddity. For more detailed information on the individual mounds, see Appendix A.

Helena Crossing

By the time of the first archaeological excavation in 1960 by James Ford, three of the conical five mounds were destroyed, leaving only B and C; the former mound was constructed of bottomland clay while the latter was created from upland loess. The site is located on terraces that overlook the confluence of the Mississippi and St. Francis Rivers on the edge of the geological feature called Crowley's Ridge. The four radiocarbon dates have caused confusion for researchers due to their large range, spanning from 150 BCE ± 75 to 335 CE ± 75 (Giles et al. 2010). Mainfort (1996) has suggested that the later date must be incorrect partly because of the associate ceramics which would indicate an earlier Middle Woodland date, and a more accurate uncalibrated range is likely 150 BCE- 210 CE ±75. Ford (1963) described Helena Crossing as being in a 400-mile-long gap of Hopewell sites, noting the presence of non-local materials usually associated with the Hopewell Interaction Sphere. In addition to potential connections up north, ceramics found at the site connect it to the Marksville site to the south (Toth 1988).

Both mounds at Helena Crossing were burial mounds with crafted objects interred with them, and both had log tombs although Mound C also had pit burials. For more detailed information on the individual mounds, see Appendix A.

Bynum

Another site on the Natchez Trace Parkway in Chickasaw County, Mississippi, Bynum covers eight hectares and is comprised of six (A-F) conical burial mounds in addition an early Middle Woodland habitation area. While a Middle Woodland affiliation dominates the site, there is also a historic Chickasaw component. Five mounds were excavated in the late 1940s under the direction of the National Park Service, and Mound A in particular was damaged by a modern cellar that was built into the monument (Cotter and Corbett 1951). Three uncalibrated radiocarbon dates place, all from the structure beneath Mound B, Bynum in the late first century BCE or even earlier in mid second century, 60, 160, and 250 BCE; all three dates were obtained from the structure underneath Mound B. Originally Bynum and Pharr were assumed to be contemporaneous, but dates suggest that Pharr proceeded Bynum by a few centuries (Walling *et al.* 1991).

The mounds included from Bynum are all burial mounds and three have substructures, although the one under Mound A is halfway outside of the mound, and Mound D's substructure is 4 large posts that largely supported a canopy. Mound A was built on top of a large earthen platform which is rare in the overall sample and is absent in the other two. In addition, it also had a floor made of sandy clay, while the others did not have any distinguishable floor. All three had signs of a pre-mound fire activity. All three had subfloor pits, with Mounds B and C being constructed over large pits with a subpit within them. For more detailed information on the individual mounds, see Appendix A.

Pharr

On the Prentiss-Itawamba County line in northeast Mississippi and one of the many sites on the Natchez Trace Parkway, Pharr Mounds was investigated by the National Park Service in the summer of 1966, supervised by Charles Bohannon. Pharr consists of eight (A-H) conical-

shaped mounds and is located on the "Pharr Flats," a terrace that overlooks the confluence of the Mackeys and Little Brown Creek on the Tombigbee River (Bohannon 1972). The assumed habitation area on the site did not reveal a strong Middle Woodland affiliation, instead several burials and a few Middle Woodland houses were uncovered (Kardwesky 1980). All radiocarbon dates come from Mound E contexts, and gave uncalibrated dates for the early first millennia, from 10-120 CE, all three from sub-mound contexts.

There is little similarity between all four mounds at Pharr, with 3 of them, Mounds A, D, and E being burial mounds and Mound H being a non-burial mound, but all four contain artifacts of some kind, or at least copper stains that suggest the past presence of artifacts that have sense deteriorated. Mounds D, E, and H have fire activity, and there is no distinguishable difference between non-burial and burial mounds. For more detailed information on the individual mounds, see Appendix A.

Ingomar

Ingomar was first excavated in 1855 by Gerard Fowke under the direction of the Smithsonian. It contains one platform mound and eleven conical mounds of Middle Woodland affiliation and has a later Chickasaw occupation. Ingomar is in Union County of northeast Mississippi within the Tallahatchie-Mississippi River drainage system (Rafferty 1987).

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

Crooks

The Crooks site is located in La Salle Parish, Louisiana and consists of two conical burial mounds, A and B. The site was first described by Clarence B Moore (1909) who briefly described its location and his inability to find any artifacts or features within one of the two

mounds. The 1938 excavations were directed under the state-wide Archaeological Project of the Louisiana Work Progress Administration. The principal investigator was J.A. Ford, working for Louisiana State University, who was sponsoring the project while the excavation itself was undertaken by William T. Mulloy and Arden King who offered the original site reports that were then edited by Ford and Gordon Willey. Middle Woodland association is largely from the typology of ceramic types. One date from this mound is much later than expected (Griffin 1951), but is not only an older date, but it was also from charcoal in the secondary mantle and the security of its context is unknown.

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

Marksville

The Marksville site in Avoyelles Parish, Louisiana, contains eight mounds, three other earthworks, and some large structures. Gerard Fowke was the first to investigate the site and describe its main features in 1926. Excavations by Fowke (1928) on five of the eight mounds determined that the site had an earlier Poverty Point component and a later historical occupation. Frank M. Seltzer, analyzing the pottery motifs uncovered by Fowke and two other archaeologists that visited the site in the early 1930s, argued for a connection between Marksville and Ohio Valley Hopewell. Seltzer and his assistant James A. Ford further investigated the site in 1933 to investigate a potential Hopewell connection, of which they found a similar burial vault in Mound 4 to those in Ohio Valley, along with a large structure off-mound. A Works Progress Administration excavation in 1939 uncovered another structure off-mound. Alan Toth (1974, 1988) in the 1970s, looking at previous work, came to the conclusion that while the site was multicompetent that the main occupation was Middle Woodland (Thomas and Weed 1981).

No overall patterns since there is only one mound. For more detailed information, see Appendix A.

As this chapter illuminates in great detail, the premound contexts of each of the 64 mounds included is incredibly diverse, even within the same sites. Also worthy of noting once again is the level of detail in pre-mound descriptions is largely due to who excavated the mounds and what they were focused on. Mound City has a large and detailed list of artifacts but not much information on the geoarchaeological context of the mound since earlier excavations were more interested in amassing a collection of art and antiquities. The information here is expanded upon in the following chapter, where it has been reduced to an absence or presence binary for the multivariate clustering analysis.

CHAPTER 5: DATA ANALYSIS

I use multivariate clustering as an exploratory tool to help visualize patterns within the sixty-four mounds in the sample and to examine variability within and between sites and regions. Multivariate analysis was run with K-means and optimal cluster size and seed locations at least two times for each of the following sets of data: the Mound City Group in Ohio, Pinson Mounds in Tennessee, all Ohio Mounds in the data set, all Southeast mounds in the data set, and lastly all mounds together. I used these five scales of analysis to do comparisons on an intra-site, intra-region, and inter-region basis. I chose to use optimal cluster size because it allowed the program to determine what cluster size it felt was most appropriate and did not confine the data based on my own expectations. I chose K-means, rather than K-medoids, because upon testing they resulted in similar results and K-medoids is best used to take care of noise and outliers, and issue that does not matter for this binary data set The Southeast sample is smaller than the Ohio sample in terms of mounds due to the larger amount of pre-mound data in that area, as well as the fact that there are more sites with larger clusters of mounds that can be used in this study. Future studies can expand on the sites included to make it more even or to simply increase sample size. In addition to multivariate clustering finds, general trends in data will be discussed, such as what attributes are most present or absent at sites.

Mound City Intra-Site Analysis

The Mound City group was chosen for the Ohio intra-site analysis over other sites in the area—including the eponymous Hopewell site—for its much large size in the sample, comprising of twenty-four mounds in the study while the Hopewell site only makes up eleven mounds, easily outweighing other sites in terms of number and therefore serving as the best

choice for an in-depth site overview. In addition, it is all enclosed by one embankment, suggesting that the builders of the site, saw all of the mounds as belonging to one group so greater intra-site similarity is expected. The Hopewell Group mounds are much more spread out and less spatially cohesive. Of the twenty-five mounds in the Mound City group, all but Mound 23 was included in the study. While there are differences in data resolution for each mound, Mound 23 was excluded because in Brown's (2017) review of previous excavations done at the site, he noted that floor features were likely destroyed in 1968 by the bulldozers used in the excavation. While the presence of a substructure was noted, I did not include it in the study as it was clear that no other questions could be answered, and its inclusion would have skewed the overall analysis.

A General Examination of Mound City Features

Of the 24 remaining mounds, all but Mound 24 had at least one substructure present (Brown 2017; see figure 2). The fact that there is only one known mound on the site without a substructure-including Mound 23 which is excluded from the overall analysis- is odd. While Mills (1922) identifies basins and a burial, he did not provide a plan of any structure and therefore no substructure at Mound 24 is included in the analysis.

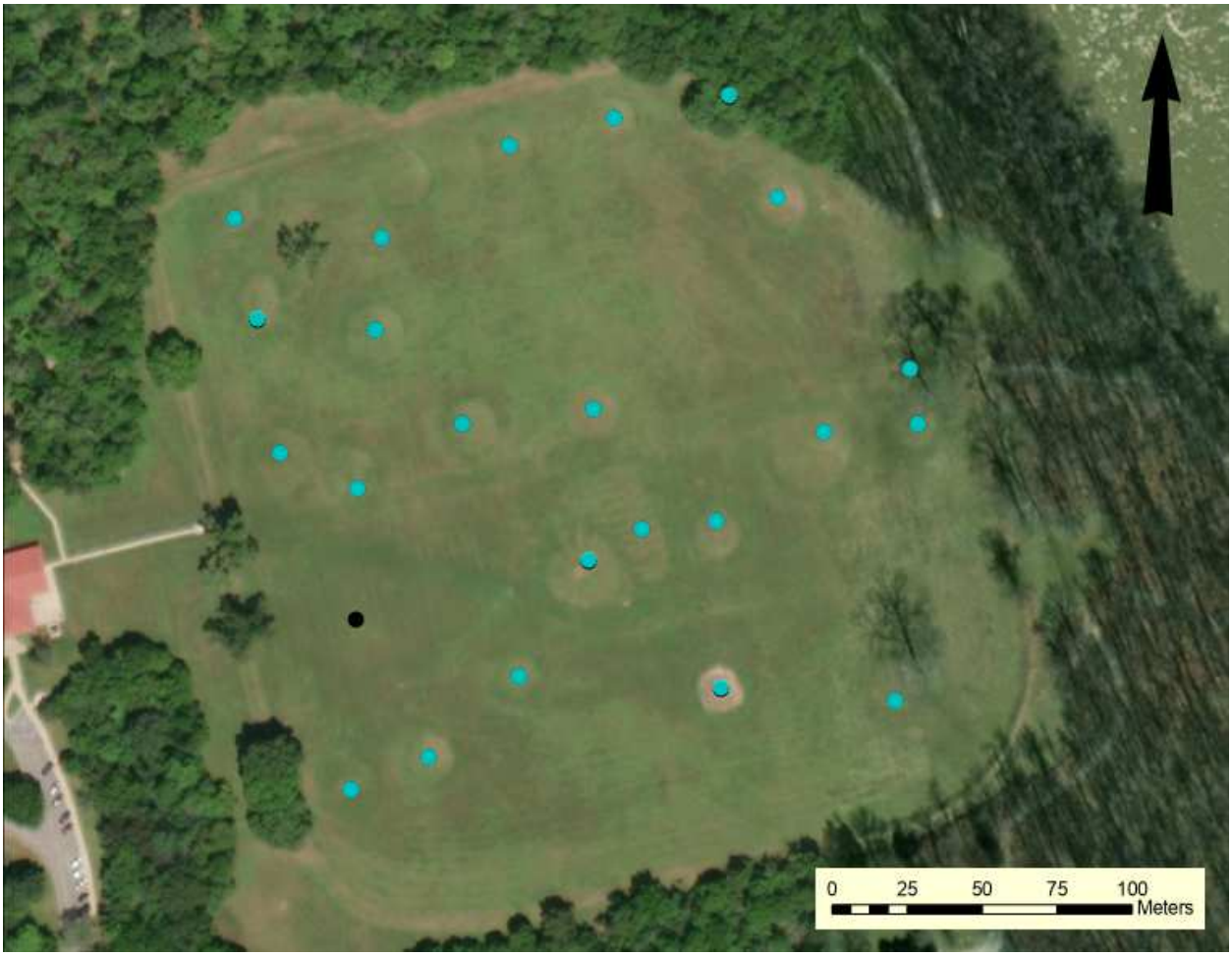

Figure 2: A map of Mound City, showing the mounds with at least one substructure highlighted in blue.

Mounds 7, 8, 13, and 18 show evidence for at least two substructures, with posthole patterns superimposed over one another. While there is no clear spatial pattern to this phenomena, multiple substructures show a potentially longer period of use and importance to the people who built the mounds or at least engaged in the activities prior to the mound's construction. It may also imply that the early structures supported different activities than the later structures, and once completed were removed to make way for other necessary tasks. In Mound 7, the crematory basin of the upper structure was placed directly over that of the lower structure, created with the same orientation. This suggests that the second structure was an homage to the first, echoing a very similar placement and orientation of a key ritual feature, and

may have been intended to replicate the structure rather than replace it, as suggested by Mills (1922).

Of the twenty-four mounds at Mound City, fourteen of them had sub-mound human burials (see figure 3). While this is the majority of the mounds, it leaves nine mounds with substructures and no clear evidence for mortuary activities taking place within them. These structures could have served as meeting places for participants or other non-mortuary ceremonies and activities. Many of them have so called "crematory basins" and may have served as places to process human remains while they were interred elsewhere.

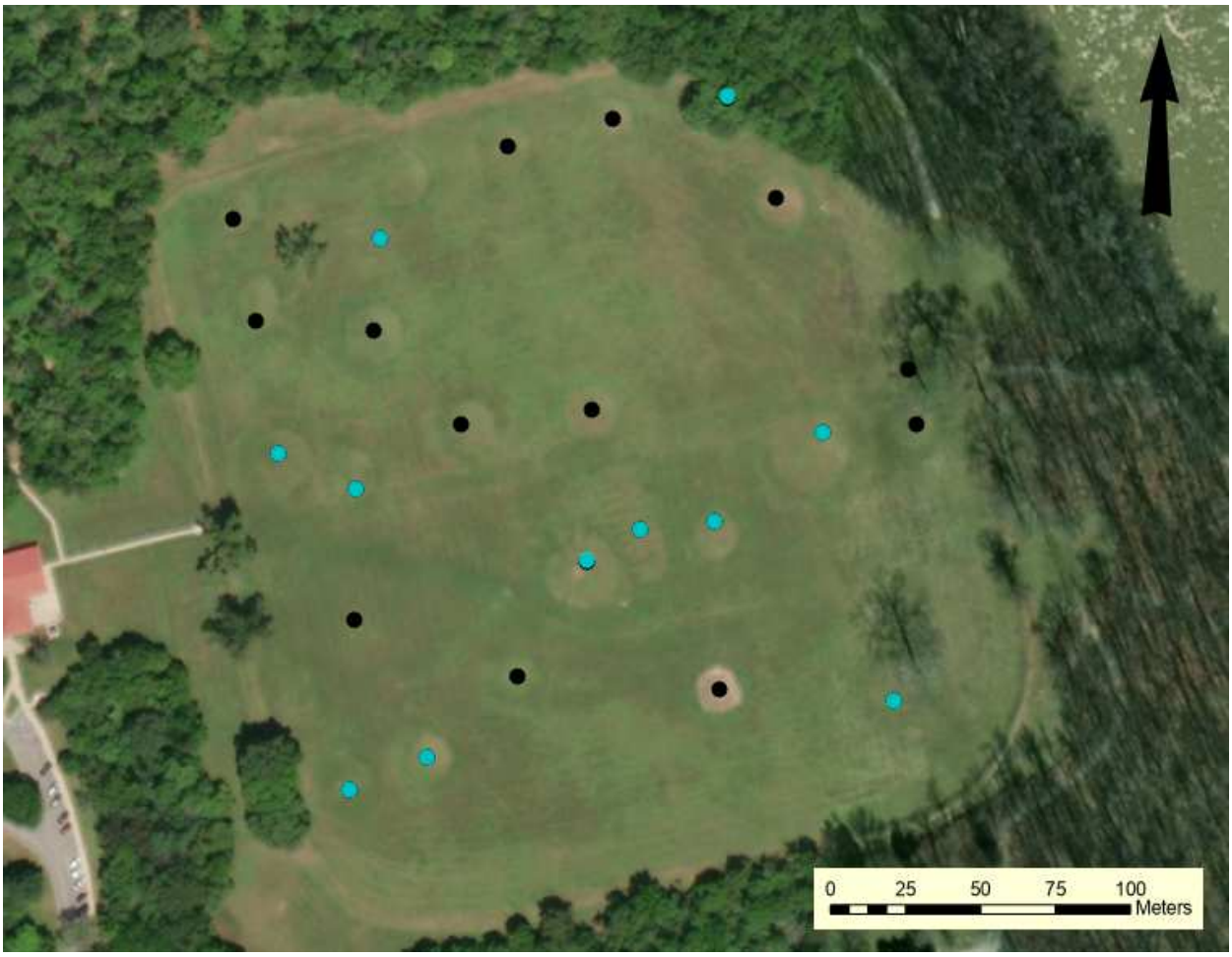

Figure 3: A map of Mound City, showing the mounds that have both burials and fire features highlighted in blue.

Fourteen of the twenty-four mounds contained some form of pre-mound fire feature. In Squier and Davis's (1848) as well as Mills' (1922) excavation notes they are usually called crematory basins, although Brown (2017) notes that this was sometimes a misnomer, as some of the features would have no evidence of human cremations deposited in or around the features. Of the fourteen that share a fire feature however, eleven of them are associated with burials (Mounds 1, 2, 3, 7, 8, 9, 10, 12, 13, 18), and all but one of them (Mound 9) have at least one burial in a basin. The burial in Mound 1, recorded by Squier and Davis (1848) is just noted as a burial on top of sheets of mica which were placed on top of the crematory basin; whether or not the burial is cremated is unknown. All the other mounds that fit this category have exclusively cremated burials or undefined burials in addition to cremated individuals. In the case of Mound City, the term "crematory basin" has some merit.

The three mounds that have a pre-mound fire event but are not associated with burials are Mounds 4, 5, and 20, all in the northwest corner of the site. The Mound 4 basin contained burnt shell; according to Squier and Davis (1848) the basin in Mound 5, which touches Mound 4, contained a large galena cache; the Mound 20 basin contained ash and cremated bones, but was not included in the burial containing sample since the bones are not identified as human.

There is no mention of log-covered tombs at Mound City, despite the fact this is among one of the more classic Hopewell traits (Hall 1997: 155), so it is surprising to find a large ceremonial site in the Hopewell Core where it is absent. Timber "cribwork" is mentioned in Mound 7; however, this is in the context of cribs surrounding platforms that cremations were placed on top of, rather than burials being covered by logs, and therefore while they count as platform burials they do not qualify as log tomb burials. Instead, burials in basins or pits seem to be most popular, accounting for burials in ten mounds. Floor burials were present in six mounds

while platform burials were present in only three. Stone tomb burials, which are only present in two of the total sixty-four mounds in the study, are not present at Mound City.

There is no mention of topsoil removal, replacement, or surface leveling prior to construction, or whether any of the mounds were intentionally constructed on a pre-elevated surface, although the latter is unlikely given the relatively small flat area of the site. Whether this reflects reality is unknown, as relying on pre-recorded data, especially at a site which has also been disturbed by construction and older excavations before any in-depth analysis could take place, requires researchers to take a leap of faith. However, Mound City does not completely lack information regarding the alteration of the land prior to the creation of the substructure and other ritual activities, as at least three mounds have substructures where a puddled clay floor was placed, which likely served as an alternative to leveling the surface by packing topsoil or removing it.

Mounds 2, 3, 5, 8, and 13 have artifact caches outside of grave goods which likely served as offerings or another type of ritual deposit (see figure 4), although these varied in extravagance. The Mound 2 deposit consisted of a restorable vessel and pearl and shell beads placed in a basin and Mound 5 had about thirty pounds of galena deposited in a basin. The other three mounds had caches of exotic materials as well as finely crafted goods, such as effigy platform pipes. Mounds 8 and 13 have artifacts that are interpreted as having been purposely killed from being broken and burned.

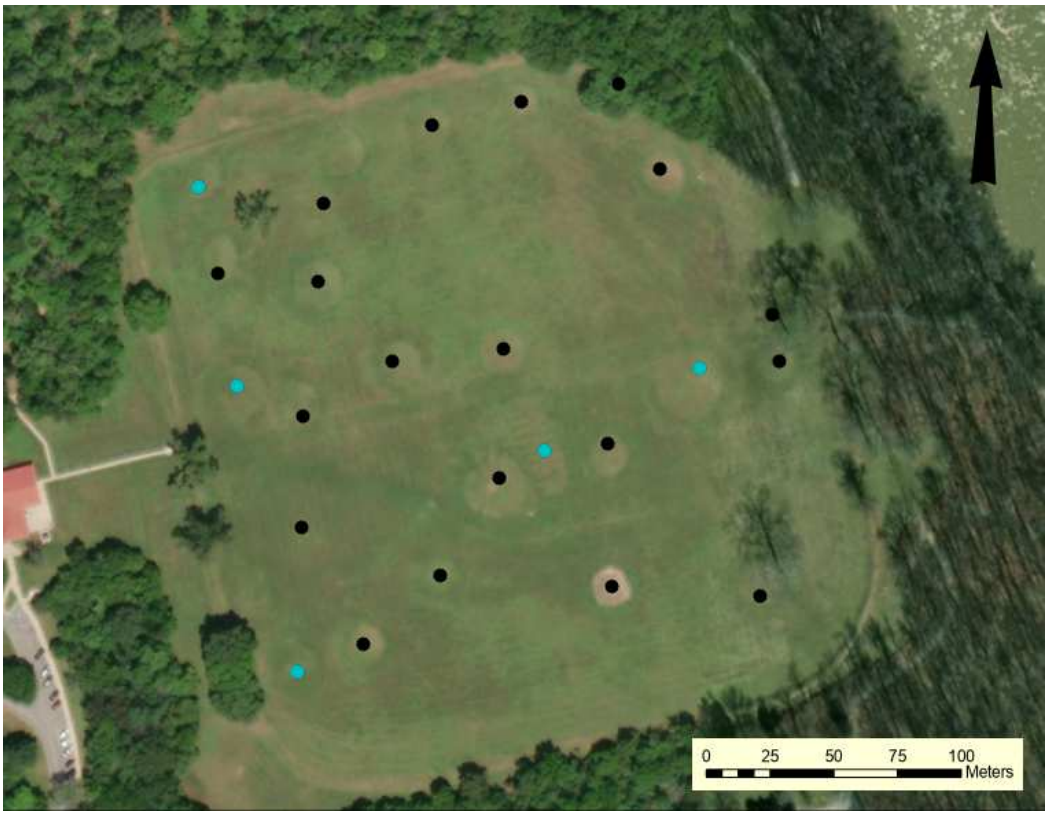

Figure 4: A map of Mound City, showing the mounds that have non-burial associated artifact offerings in blue.

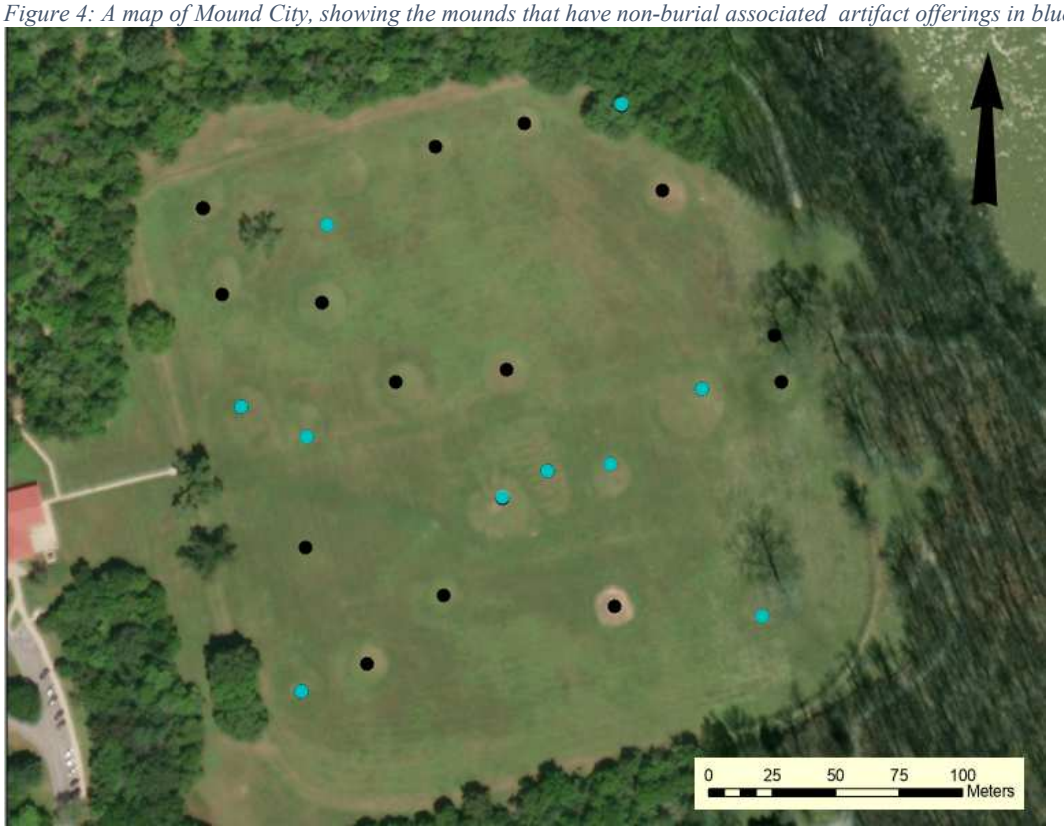

Figure 5: A map of Mound City, showing the mounds that have non-local materials in blue.

Ten of the 24 sub-mound surfaces have non-local material, such as copper, galena, obsidian, mica, certain shell, and certain animal teeth (see figure 5). While ten is a substantial amount, it is a smaller number than expected considering the importance of the long-distance exchange networks underlying how we conceived of Hopewell as a cultural manifestation. The differences in materials interred with or outside of graves may be representative of differences in status, or at least connections, between the deceased and the people who built the mounds. Assuming that the building of these mounds was less cohesive or planned on a site-scale, then particular groups could have been responsible for the construction of individual mounds and the materials interred would have reflected their status and networks. If all mounds at the site were a construction of groups engaged in an open decision process with each other as a means of overcoming dissonance, then it may be that the mounds that did not have exotic materials were simply meant to serve a different purpose. As nearly all mounds have a substructure, usually of rhomboid or sub-rectangular shape, there seems to have been some sort of site planning and organization, or at least a notion of cultural coherence that determined what sort of activities were appropriate for the time. Having selected some features to further examine within the site, I now turn to the use of multivariate clustering to examine patterns that ArcGIS has identified and discuss why those clusters exist.

Multivariate Clustering and Patterns

Multivariate clustering was run twice, and the algorithm created the exact same results each time: twenty clusters representing all individual mounds except for one cluster of five mounds: Mounds 6, 16, 17, 21, and 22 (see figure 6). These five mounds are, according to the simplified binary of traits, identical in their pre-mound activity. They are identical due to what can be considered a common problem in this study: they represent data poor mounds in which

not a lot was found. They have one substructure and are enclosed by a monument, the former trait shared by nineteen of the twenty-four mounds, and the latter shared by all. Whether this is because of issues with data collection or that the structures that existed prior to these mounds were not used for activities with obvious archaeological signatures is unknown.

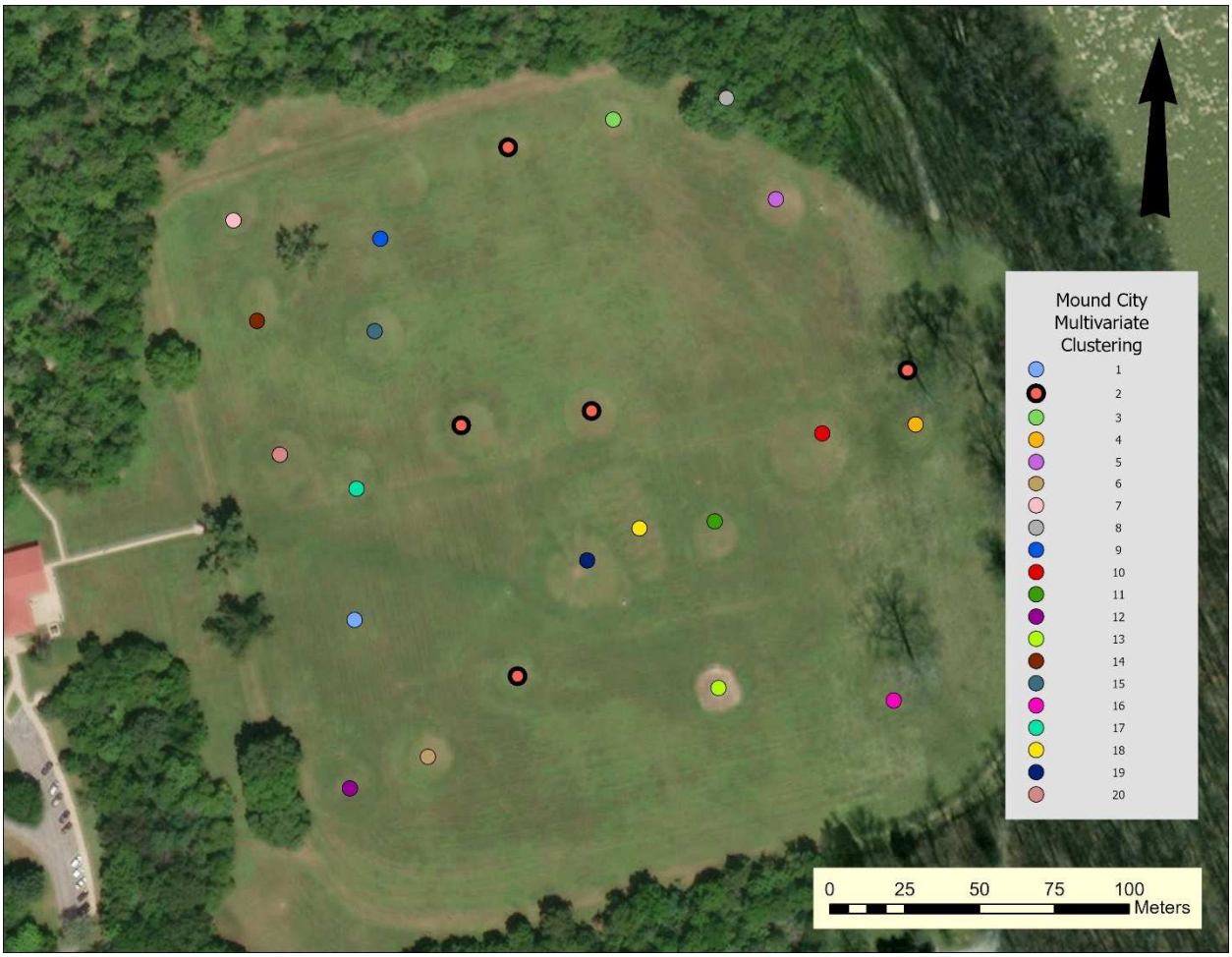

Figure 6: Map of Mound City showing the mounds separated into clusters from multivariate clustering.

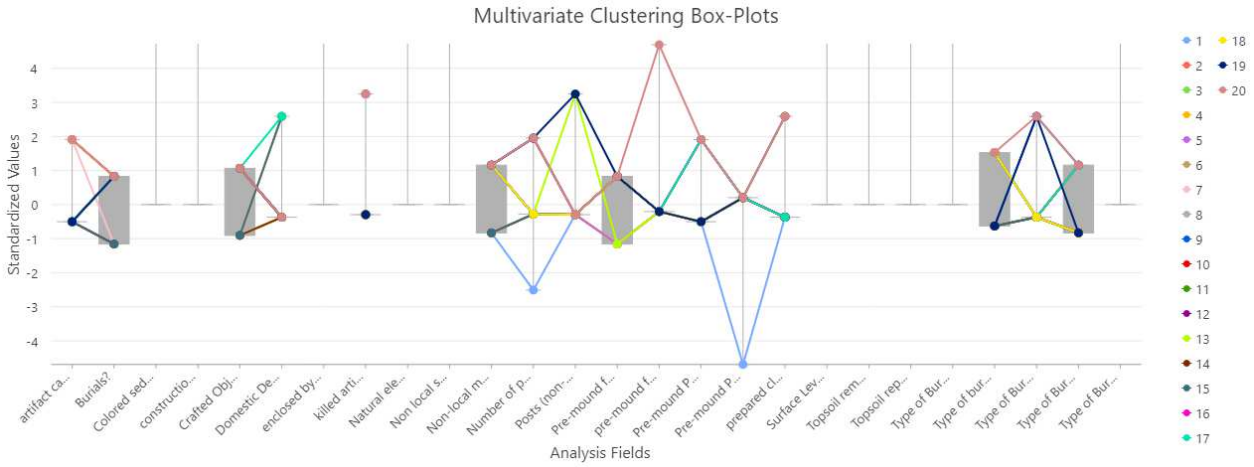

Figure 7: Box-plots created from the Mound City multivariate clustering, the gray bars representing the "weight" of the total variable in the site, and the lines showing how each cluster relates to each of the variables.

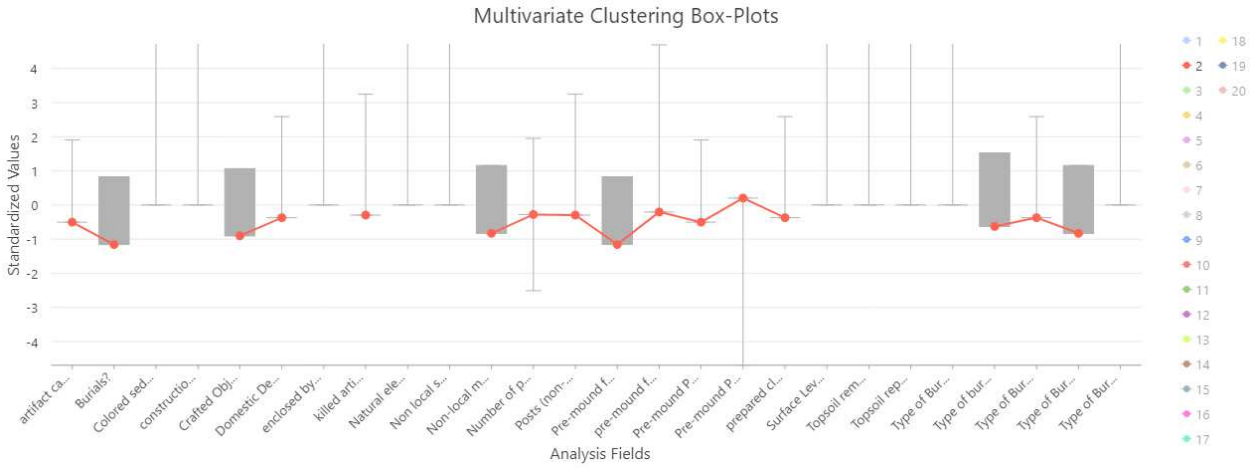

Figure 8: A close-up on the box-plots for cluster 2 from the Mound City multivariate clustering.

None of the burial mounds are identical to one another, if not differing in where they place their dead, then differing in at least what type of materials were interred within the mound. Burial mounds in Mound City are more data "rich" in terms of what is being looked at here, since burials are more likely to be associated with pre-mound fire basins, non-local materials, and specialized crafted artifacts. Within Mound City, all artifact caches not interred with burials are found within burial mounds, meaning they may have been a part of mortuary activities.

Pinson Intra-Site Analysis

Figure 9: A Map of Pinson Mounds, with the mounds discussed labeled.

A General Examination of Pinson Mounds Features

The Pinson Mounds sample pales in comparison to the Mound City sample in quantity, comprised of only six mounds with enough data to be incorporated into the study (see figure 7). Of the six mounds, exactly half are conical burial mounds, and the other half are non-burial platform mounds. All non-local material is found in Mounds 6, 12, and 31, the three burial mounds, but not all the non-local material was directly associated with burials, such as in Mound 12. In addition, these non-local materials are not the same as the ones in Mound City. While there are some mica fragments in Mounds 6 and 12, most non-local materials in Mound 12 are non-local pottery and chert, and a Flint Ridge chert bladelet was the only exotic material found in Mound 31.

In comparison to Mound City, Pinson lacks the exotic goods that created the Hopewellian archaeological culture, but it is comparatively rich in geoarchaeological information regarding

landscape alteration prior to mound construction. People removed topsoil before construction of all six mounds, creating an activity surface. After the topsoil was removed, it was either replaced with different soil (mounds 5 and 10) or leveled by placing a sandy layer to create an even surface on a knoll (Mound 12). Five of the mounds, all but Mound 5, had a layer of sand or clay cap the activity surface prior to the construction of the primary mound.

Three of the mounds had a pre-mound fire feature present: Mound 5 which is a non-burial platform mound, and Mounds 12 and 31, which are burial conical mounds. These fire features represent fire created on the activity surface and are very much unlike the crematory basins of Mound City, at least in form. Mound 12 has cremated individuals within one of its fired areas and Mound 31 has calcined bone placed around the periphery of an extended burial, although Mainfort (2013) believes that these were cremated elsewhere.

There are no substructures at Pinson. The postholes under mounds 6 and 31 have no apparent plan that would imply a standing structure, except for a small circle of posts around a burnt area in Mound 6. Now that general trends regarding features have been discussed, patterns found by multivariate clustering can be examined.

Multivariate Clustering and Patterns

I ran the multivariate clustering process with optimal seed locations and cluster numbers twice. I did not expect much in terms of patterning considering the incredibly small sample, but nonetheless both times mounds 10 and 29 were placed together in a cluster. The first run created three clusters, separating them into groups of three, two, and one (see figures 8 and 9). The first cluster included Mounds 5, 10, and 29, the second included Mounds and 6 and 31, and third cluster put Mound 12 by itself.

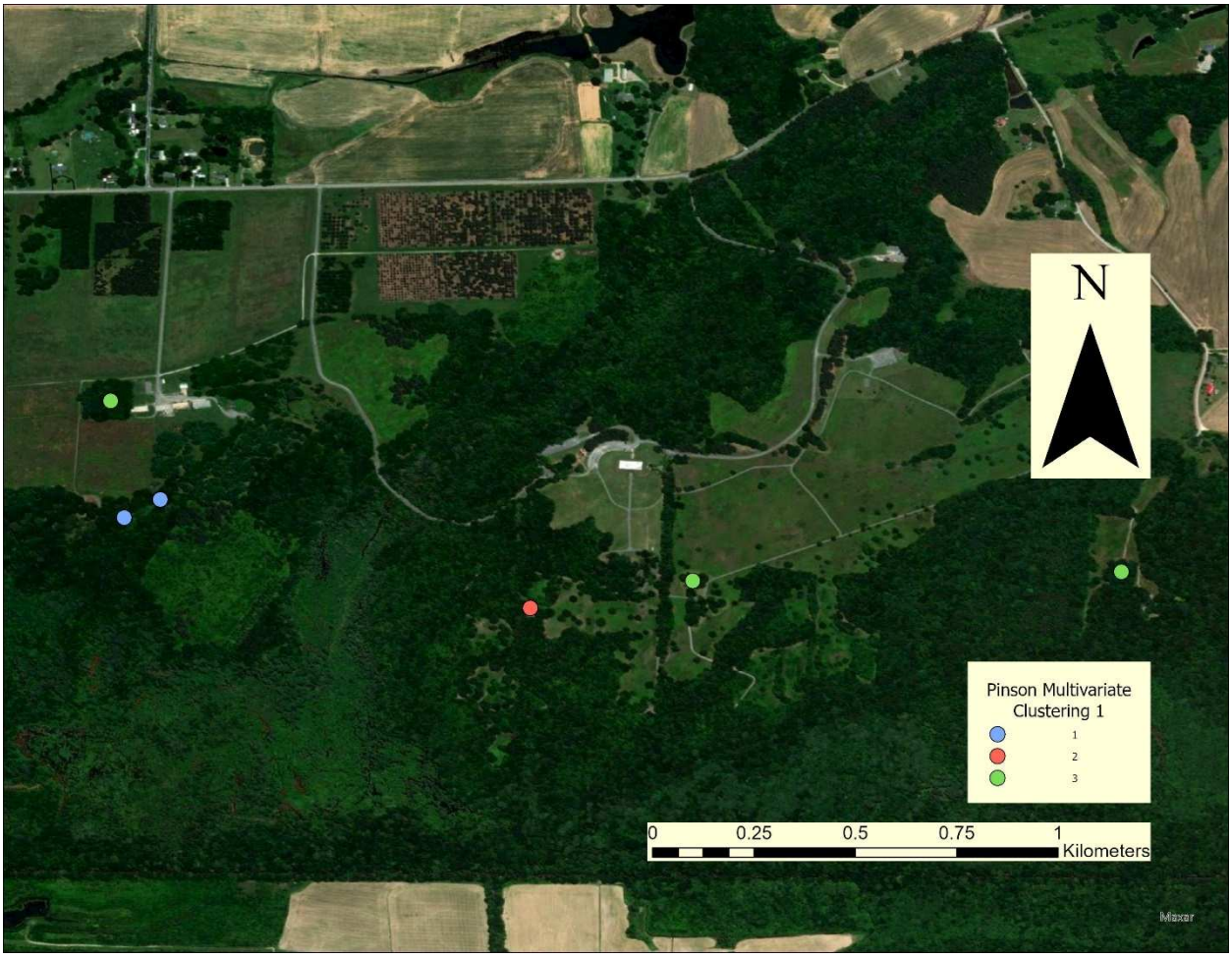

Figure 10: Map of Pinson showing the mounds separated into clusters from the first multivariate clustering.

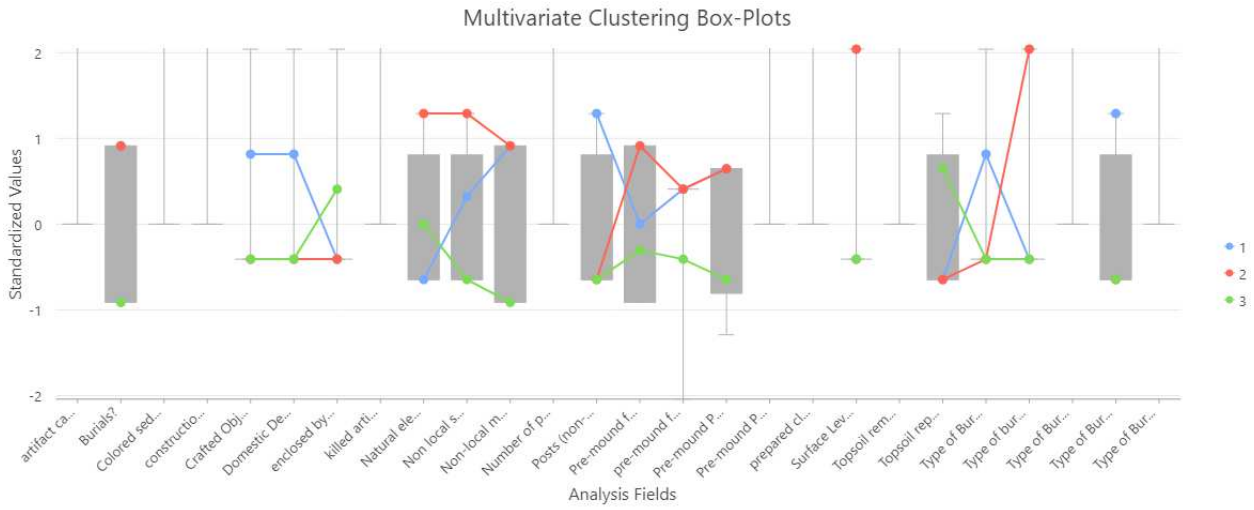

Figure 11: Box-plots from the first Pinson multivariate clustering

The second run created five clusters, with only Mounds 10 and 29 clustered together (see figures 10 and 11). The algorithm likely kept putting 10 and 29 together because they are nearly identical, their only difference being that Mound 10 was built on a naturally elevated surface and had its topsoil replaced after removal, and Mound 29 is enclosed by another monument. Clustering the Pinson sample is difficult and cannot tell us much considering the small sample size. However, it shows that even within the same site people were conducting different pre-mound activities and rituals, including differences in burial and landscape alteration.

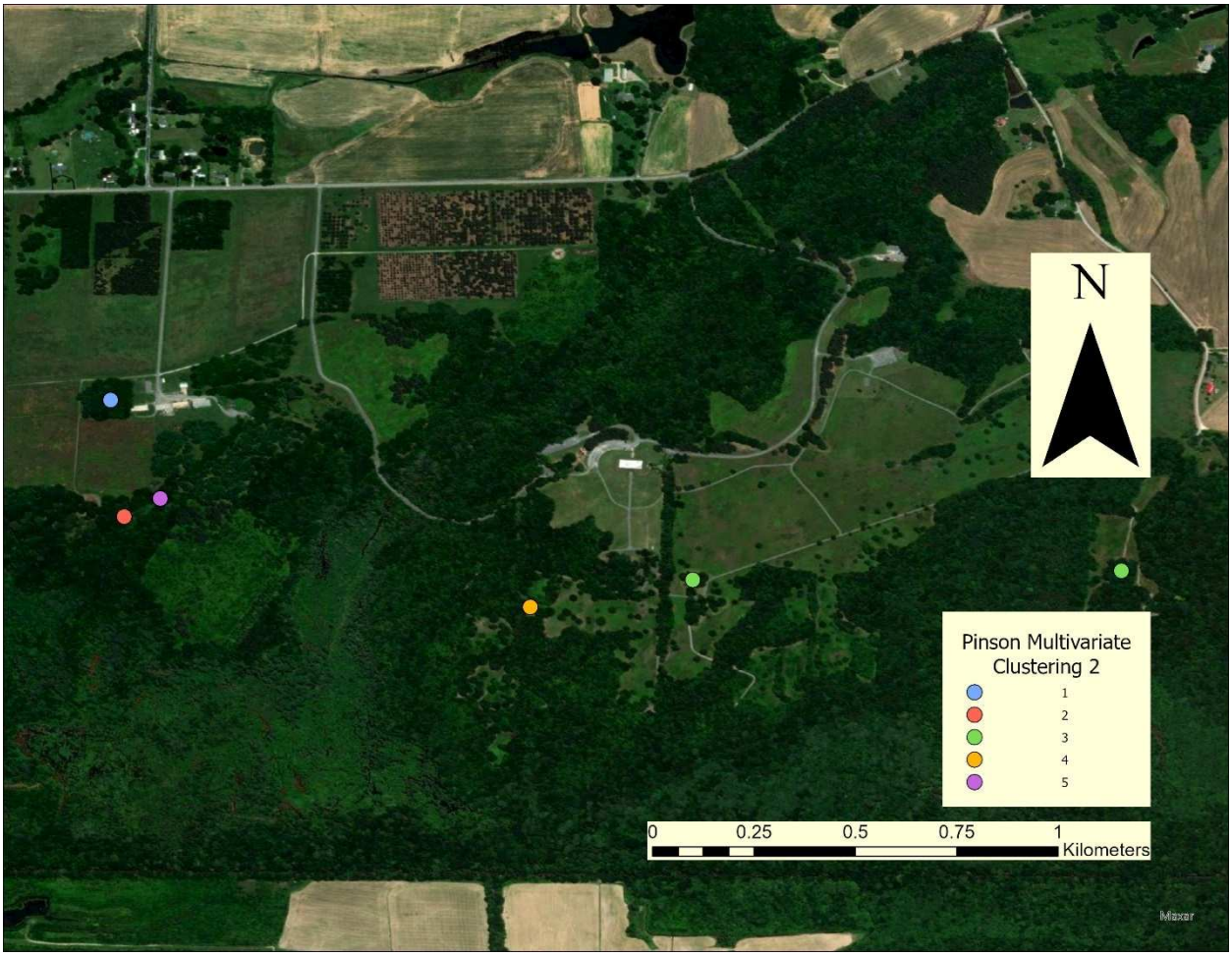

Figure 12: Map of Pinson showing the mounds separated into clusters from the second multivariate clustering

Figure 13: Box-plots from the second Pinson multivariate clustering

The Ohio Hopewell "Core" Intra-regional Analysis

Figure 14: A map of the six Ohio sites in the sample.

The Ohio sample contains forty-six mounds spread out over six sites, offering a mixture of sites from large ceremonial centers such as Mound City, Hopewell, and Seip, and more isolated mounds such as Taylor and Tremper (see figure 12). The Newark "Eagle" mound, while from a large and famous site, is the only mound able to be included in the sample as having enough sub-mound information. It should be noted that Mound City accounts for over half of this sample and therefore will account for many of the attributes discussed and weigh heavily on the patterns distinguished by the ArcGIS multivariate clustering, as Mounds 6, 16, 17, 21, and 22 are identical to one another. While the Hopewell group has more mounds than Mound City, only eleven of them had their floor excavated and were not destroyed by previous excavations and construction at the time of Henry Shetrone's (1926) examination.

A General Examination of Ohio Mound Features

The most common attribute present in the Ohio mounds was at least one pre-mound substructure which accounts for 36 of the 46 mounds in the Ohio sample. Of the ten that lack substructures, the majority are from the Hopewell Mound Group site which accounts for seven of the 10, consisting of Hopewell Mounds 4, 7, 11, 17, 20, 23, 24. Seip Mound 1, the Taylor Mound, and Mound 24 at Mound City also lack substructures.

Twenty-one mounds have non-local material in their pre-mound deposits, less than half of the total sample. Considering the association with Ohio Hopewell and the larger Hopewell Interaction Sphere and exchange network, I expected more than 46% of mounds to contain non-local material, although these materials may present elsewhere in the mound-fill. The lack of non-local material in some mounds is likely a difference of purpose. Not all mounds simply needed non-local materials, or they represent differences in access between those building. Twenty mounds had crafted objects and eleven had non-funerary artifact deposits.

Twenty-three mounds, exactly half, are burial mounds. While not a rule, burial mounds are often associated with a greater number of pre-mound features than non-burial mounds. Of the 21 mounds with non-local material, 19 had burials; 16 of the 20 mounds with crafted objects had burials; nine of the 11 mounds with non-funerary artifact deposits still had burials interred within them. Of the 36 mounds with substructures, seventeen were associated with burials; while the majority, the presence of substructures does not imply mortuary activities. The exception to this rule is that the six mounds with more than one substructure (Mounds 7, 8, 13, and 18 at Mound City, Mound 25 at Hopewell, and the Tremper Mound) all have burials. Eighteen of 26 mounds with pre-mound fire features are burial mounds.

There is very little data regarding the ways Ohio Hopewell people were altering space prior to the construction of the mounds. Of the 46 mounds in the sample, only five had data for the "place-making" attributes. Its builders placed Taylor on a naturally elevated feature; Seip Mounds S4 and S6 had alternating layers of colored sediments and rocks incorporated into pit features; Hopewell Mound 33 had its surface leveled by compaction; and Seip Mound 1 had evidence for topsoil removal and replacement. The Southeastern sample, while much smaller overall, still has more data on place-making and space alteration prior to the construction of mounds.

While general patterns can be identified through this method, such as burial mounds generally being more feature rich than non-burial mounds, multivariate clustering can help determine patterns otherwise not easily seen by looking at a spreadsheet or even the attribute selection feature in ArcGIS, such as some mounds in Mound City being identical.

Multivariate Clustering and Patterns

The first clustering separated the mounds into two groups, with the first cluster being comprised of nineteen mounds and the other twenty-seven (see figure 13). The first cluster is more "data rich," having more presences than absences in comparison to the other cluster. All mounds have non-local material and all but one mound have burials and pre-mound fire features. In comparison, the second feature only outweighs the first in terms of colored sediment, domestic debris, naturally elevated surface, substructures (occurrences, not number), and surface leveling. Across these criteria, the second cluster just barely has more occurrences, and besides substructures, the attributes previously mentioned are rare in the Ohio sample, with colored sediment deposits being present in two mounds, domestic debris in seven, construction on a naturally elevated surface only in one, and surface leveling also only present in one mound of forty-six.

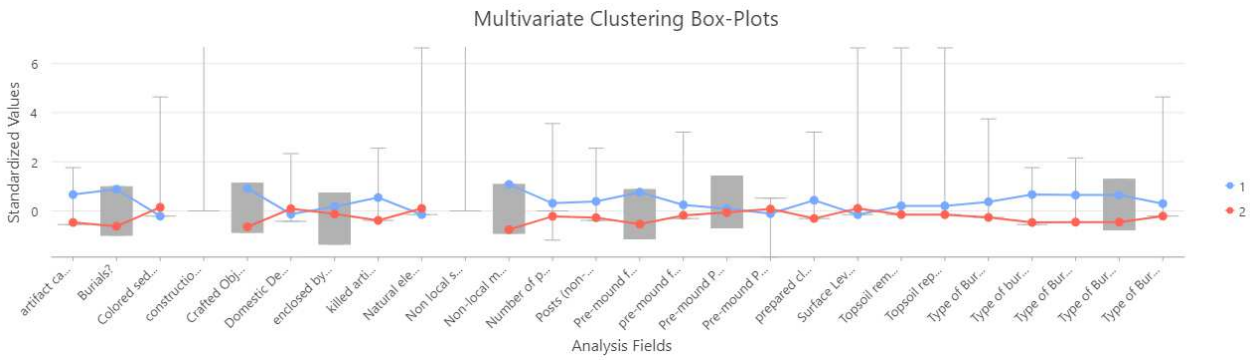

Figure 15: Box-plots from the first Ohio region multivariate clustering

The second clustering is much different from the first, creating twenty-nine clusters out of the forty-six mounds (see figures 13 and 14). While most mounds are separated into their own clusters, nine clusters contain two more mounds. Clusters that contain two mounds and the one cluster of three mounds are usually nearly identical, containing about one to four differences. Cluster 27, which contains Mound City 4, Seip S2, Seip S3, Seip S5, and Hopewell 4, is likely clustered due to the lack of attributes, with most marked as absent, with a pre-mound pit being

the only attribute they all have present (see figure 17). Seip S2 and Seip S3 are completely identical to one another, having only one substructure, and a pre-mound pit. Cluster 26, the largest cluster containing six mounds, includes Mound City mounds 6, 16, 17, 21, and 22, which are all identical to one another as well as Mound City 11, which differs from them only in that it has crafted objects (see figure 16).

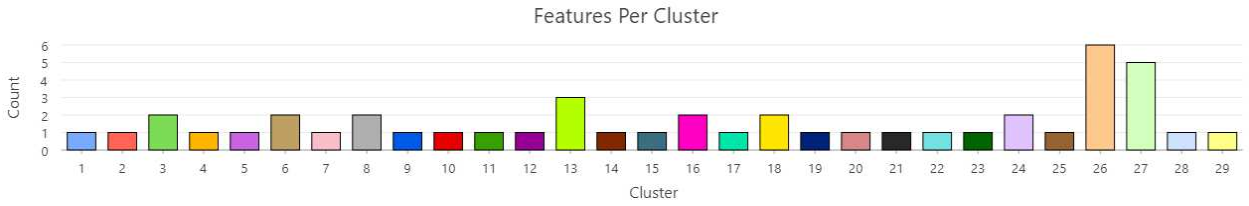

Figure 16: The number of features per cluster in the second Ohio region multivariate clustering, showing

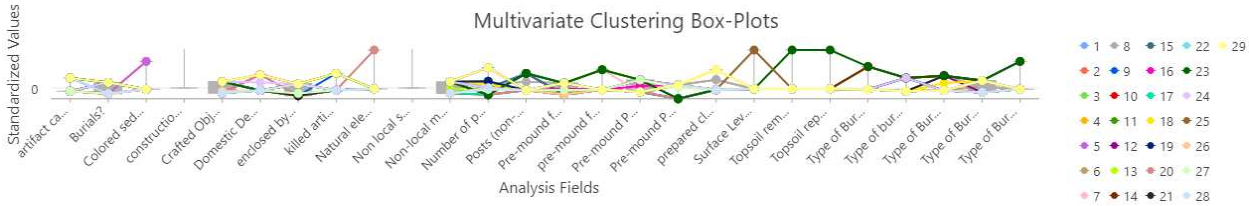

Figure 17: Box-plots from the second Ohio region multivariate clustering.

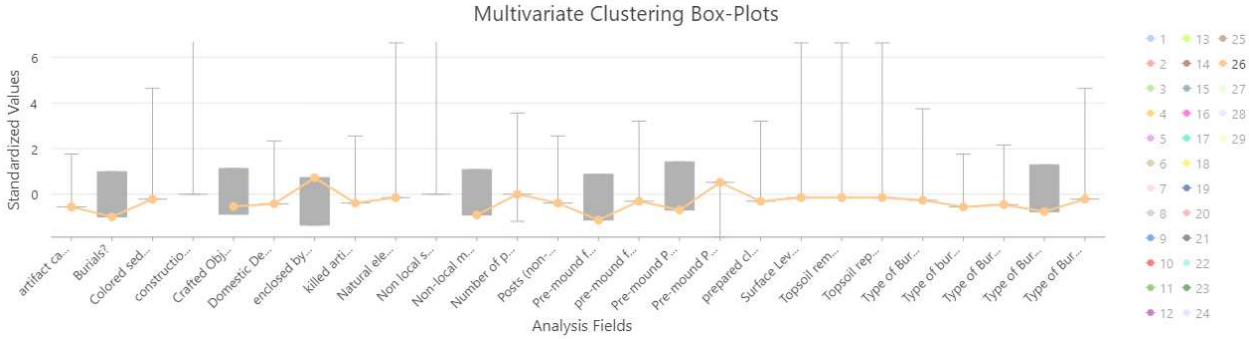

Figure 18: Box-plots from the second Ohio region multivariate clustering, cluster 26.

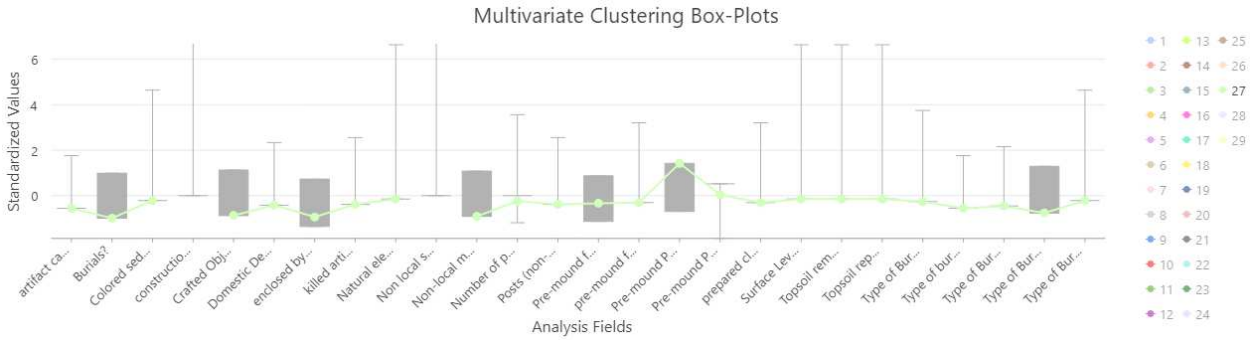

Figure 19: Box-plots from the second Ohio region multivariate clustering, cluster 27.

Southeast Intra-regional Analysis

Figure 20: A map showing the seven Southeastern sites in the sample.

The Southeast sample is much smaller than the Ohio sample, comprised of only 18 mounds (see figure 18). Even with its smaller mound count, it does account for seven sites as opposed to the six in Ohio. The site sample is larger for the Southeast, although not by much, to account for the lesser number of mounds. Ohio, the birthplace of Hopewell from a researcher's point of view, has had more archaeological attention leading to a greater amount of information on pre-mound surfaces than for sites in the Southeast.

A General Examination of Southeastern Mound Features

Substructures are much less common in the Southeast sample compared to Ohio, present in only four of the 18 mounds and two of the six sites. These mounds are Mound 4 at Marksville and mounds A, B, and D at Bynum. The "structure" at Bynum Mound D was only a four-post canopy, so large standing structures are only represented at the former three mounds. The under Bynum Mound A was half outside the base of the mound, and therefore may not have been directly connected to the mound or the activities that took place just prior to its construction, assuming a direct relation between the people who used the subsurface area and built the mound.

While Middle Woodland sites in the Southeast are noted for their comparative lack of non-local materials in comparison to sites in Ohio (Wright 2016), twelve of the 18 mounds noted here have nonlocal materials, although in smaller quantity than sites in the Ohio sample. As mentioned in the Pinson analysis, the nonlocal materials were in small quantities, consisting of a few flakes of chert of gin, some mica fragments, and non-local sherds. Non-local materials at Bynum included copper spools, a particle of galena, and a copper bead. Helena Crossing Mound C contained marine shells, including cups crafted from *Busycon*, a copper ferrule, copper jacketed panpipes, copper spools and sheets of mica, while Mound B contained Indiana flint and

marine shell. At Pharr Mound A contained some copper salts, indicating the past presence of copper, Mound D had three copper spools, and Mound E had a piece of silver plating. There are no artifact caches that are large deposits outside of grave goods. While Mounds 3, 8, and 13 at Mound City have more volume of exotic materials than all 18 of the mounds included in the Southeast sample, this does not mean that the Southeast was the periphery or backwater of the Middle Woodland. Rather, differences between the Ohio sample and Southeast sample should be understood as differences in the ways people choose to engage in Middle Woodland ceremonialism and monumentality.

There is more evidence for the alteration of space prior to mound construction in the Southeast sample than the Ohio Sample, with nine of the 18 mounds either showing signs of topsoil removal, replacement, or surface leveling, including all six mounds from Pinson, Bynum Mound B, Helena Crossing Mound C, and Pharr Mound D. As mentioned with Mound City, the comparative commonality may be an issue may be a matter of data collection and site history in the Ohio sample rather than a reflection of reality. Only Pinson 12 has surface leveling and Pinson 5, 10, and Pharr D show signs of topsoil replacement following topsoil removal. While the exotic materials that drove antiquarians and archaeologists to Middle Woodland sites is lacking in the Southeast, the Middle Woodland groups at these sites clearly cared about the space they were creating.

Multivariate Clustering and Patterns

The first run of multivariate clustering separated the results into 17 different clusters for the 18 mounds included. Difficulty clustering is likely based on the small sample size, since the earlier Ohio and later Inter-regional analyses do not have that same issue. The only two mounds clustered together were Ingomar Mound 1 and Pharr Mound H. It is not entirely clear why these

two mounds were clustered together and why the rest were clustered separately. Of the 26 attributes, both have most of them as absent, only sharing the following present traits: fire events, non-structural posts, and the presence of colored sediments deposits. The differences between the two are that Mound H at Pharr crafted objects present and Ingomar Mound 1 has pits and a pre-mound clay cap. That the 18 mounds were separated into 17 groups, and that the one group that had more than one mound in it still has notable differences indicates that no two mounds in this sample are the same.

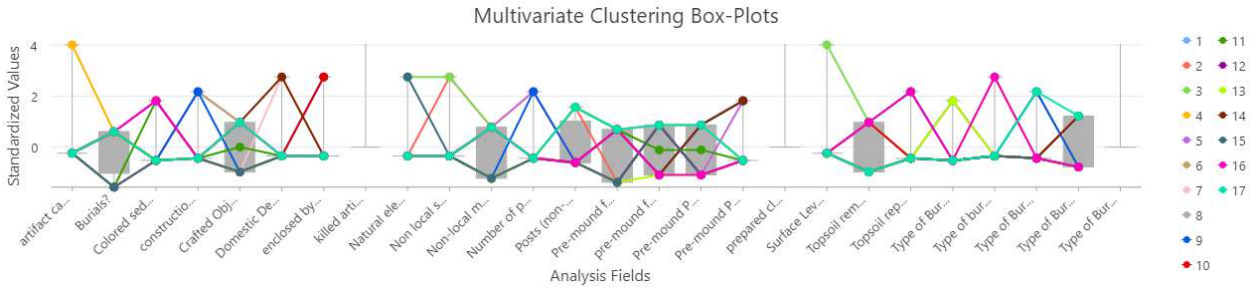

Figure 21: Box-plots from the first Southeast region multivariate clustering

The second round of clustering offered the exact same results as the first, with 17 clusters and Ingomar 1 and Pharr H clustered together. I ran it a third time because of the identical results, knowing that due to the small sample size, the randomized seed locations could have spawned in the same places, causing the same clusters to form. The third clustering offered 16 unique clusters instead, forming 14 individual clusters and two clusters that contained two mounds each. One of these clusters, cluster number 10, is of Pharr Mound H and Ingomar Mound 1. The new combination in cluster 6 is of Mounds 5 and 10 at Pinson. As noted in the above intra-site analysis, the program has trouble clustering mounds in Pinson together due to the small sample size and high intra-site variability of features. Both of these mounds are non-burial platform mounds that only share evidence of topsoil removal and replacement. Mound 5 at Pinson, otherwise known as the Ozier Mound, has a pre-mound fire event and pit while Mound

10 at Pinson was built on a naturally elevated surface and had a capping deposit. In both clusters, both mounds had more features marked as absent than present.

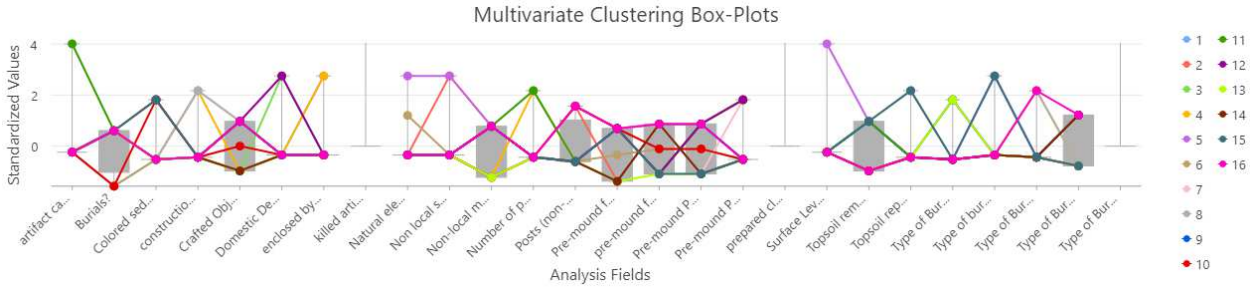

Figure 22: Box-plots from the second Southeast region multivariate clustering

None of the 18 mounds in the Southeast sample are exactly alike in what features they have present or absent, showing a greater variety than the Ohio sample although, as noted, the identical mounds in Ohio had less features in general.

Inter-regional Analysis

Of the 64 total mounds analyzed, there are two groups of mounds which are completely identical to one another, all originating in the Ohio sample. These are Mounds 6, 16, 17, 21, and 22, all from Mound City, and Seip S2 and Seip S3. Five mounds from the same site being identical, at least in by this analysis' standards, would imply a relatively uniform manner of pre-mound activities and preparation. However, with this group as with Seip S2 and S3, the similarities are not because of attributes they have in common, but rather the overall lack of features and data.

Since particular features have already been discussed between regions, they will not be recounted here. The first clustering created by the algorithm created two clusters, the first consisting of thirty-five mounds and the other twenty-nine. The second cluster can be described as the data rich cluster, only being surpassed in quantity by cluster one in colored sediment,

enclosure by other monuments, construction on naturally elevated surfaces, and the occurrences of substructures. With all of these attributes, cluster 1 barely has more occurrences.

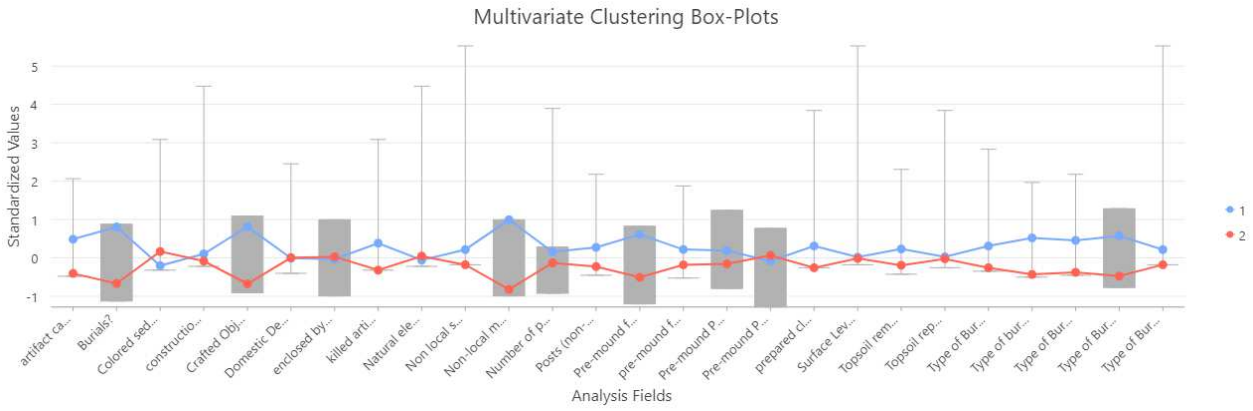

Figure 23: Box-plots from the first and second inter-region multivariate clustering, which were identical.

Of the twenty-nine mounds in cluster 2, only Hopewell 17 is not a burial mound, proving the pattern that burial mounds within this sample are generally associated with more features. All mounds have non-local material and the majority of mounds have crafted objects, pre-mound fire features, and at least one substructure. Of the twelve mounds that have non-funerary caches, eleven of them are included in cluster 2, and all six mound that have killed artifacts are in this cluster.

Of the forty-six Ohio mounds, twenty-seven of them are in cluster 1 and nineteen are in cluster 2. Of the eighteen Southeastern mounds, eight were included in cluster 1 while ten were included in cluster 2. While skewed by different sample sizes, more than half of the Ohio group was placed in the cluster with mostly absent features, while more than half of the Southeastern group was placed in the more feature rich sample. Of course, the fact that the Ohio sample is largely lacking in place-making data may contribute to this problem.

The second time multivariate clustering was run it created the exact same clusters, only with the numbers swapped. With smaller samples redoing multivariate clustering usually creates

similar although slightly different clusters, or creates completely different clusters, identifying either smaller or larger patterns as seen in previous sections. To see if the program would create new results, I ran the clustering a third time to see if different clusters were created, or if the combinations changed. The third time was identical to the first two.

In sum, the pattern for all of the data can be summed up in that there are two groups: the group with many features present or "data rich" versus the "data poor" group. Using legacy data and all the issues that entails makes it difficult to assess how much these differences reflect the reality of what people did prior to the construction of these mounds. However, it is clear even with this small sample size that the complexity of pre-mound activities and construction is not a region-based phenomena.

CHAPTER 6: DISCUSSION

The multivariate clustering performed in ArcGIS supports what many researchers have argued for years: trying to restrict or define a culture by a set of traits is an impossible task. While there are a set of traits that the Middle Woodland can be constructed from—this study would not have worked if this was not the case—each site and even each mound has a different composition of these traits. This study contributes to that growing base of knowledge by proposing a method that begins to quantify variability of archaeological contexts. Regarding the 26 attributes in this study, mounds were only identical when very few features were present at all, such as the mounds in the Mound City that only had one substructure present. If more variables were tested, and the quantity of certain features was taken into consideration such as the number of ancestors interred in burial mounds or the weight and number of copper artifacts considered, the same sample would reveal both a greater depth of variability and relay more information regarding patterns and similarities between sites and further explore the patterns between mounds at the same site.

Variability within sites

While only two sites were chosen for an in-depth examination in intra-site pre-mound contexts, all sites that had more than one mound in the sample show that no two pre-mound surfaces were the same, even with the limitation of looking at only 26. Mound City had less variability than other sites in that, of the 24 mounds discussed here, all but one of them had a recorded post-structure. This suggests that the people responsible for the construction of the mounds were using the area prior in a similar fashion to one another by constructing structures, although the variability in features within those structures shows that each structure was unique in its use and purpose, and it should be noted that this study did not focus on the variability of

architecture, which is another aspect available for further study. Fourteen mounds had human burials interred on or beneath a substructure floor, and another 14 had pre-mound fire features with many, but not all, overlapping. These two features, while tied for the second most common pre-mound feature, are not identical in purpose or use. Mounds 7, 8, 13, and 18 showed evidence of at least two non-contemporaneous substructures prior to the construction of a primary mound, showing prolonged use of that space or the need to decommission the earlier structures.

The type and placement of interment was taken into consideration to see if people at the same site, or even within the same pre-mound context, were consistent in sharing burial practices, but this was revealed also proven to be quite variable. The low mounds at Seip had no premound burials and were likely meant to cover the structures that preceded them, while Seip Mound 1 had a burial placed in stone and log tombs, on earthen platforms, on the floor, and in a pit all before the construction of the mound. Another example of this variability is present at Pharr Mounds, specifically Mounds A, D, and E, which all had burials but were interred in different manners, for example Pharr Mound D had a burial on the prepared floor while the other two did not, and it did not have a pit burial which the other two had. It is rare for pre-mound burial types to be identical among sites within mounds, even with simplifying the forms to just the placement of burials. Mounds B and D at Bynum are similar to one another in that all pre-mound burials are pit burials, and of the fourteen mounds that served in part to cover human interments at Mound City, the burials were limited to floor, earthen platform, and pit or basin burials, although some contained all three while others contained only one kind. The differences in burial placement or associated grave goods within the same mound could be a difference of status of the individual or their family, be it in an achieved and heterarchical authority such as that suggested by Henry and Barrier (2016) or an inherited hierarchical social position. If these

individuals came from a large geographical range and culturally diverse backgrounds, differences in mortuary treatment within sites and within the same pre-mound space could be explained simply as cultural differences.

Meanwhile at Pinson, all six mounds show evidence of topsoil removal prior to the creation of the activity surface. While the original ground surface may have also served as a place of gathering and ceremony, it is possible that evidence for these activities was erased from the archaeological record when it was removed. While difficult to discuss in a six mound sample, it also shows a high level of intra-site variability, although a common factor beyond the removal of topsoil is the lack of substructures. Unlike Mound City, this does not seem to have been an important step toward mound-building for societies at Pinson. As discussed above, burials and non-local materials are often found within the same pre-mound contexts, and only mounds with burials have non-local materials at Pinson, the other three being platform mounds.

Ohio Hopewell and Regional Differences

The Ohio River Valley is often referred to as the Hopewell Core, where the largest amount of intricate crafted objects and exotic materials is found in conjunction with moundbuilding. This region is also where the idea of Hopewell sprung into the imaginations of archaeologists. Considering this "core" area, I expected to find more common ground between sites, but once the differences among mounds of the same site became clear it was obvious that this was unlikely to be the case. As mentioned in the previous chapter, most of the Ohio mounds (36 of 46 in my sample) have substructures while the presence of structures in my Southeastern sample is statistically smaller, being present at only Mound 4 at Marksville and Mounds A, B, and D at Bynum; only four of the 18 mounds, and Mound D a Bynum is in reference to four large posts outside a pit that may have supported a canopy. Other than a general lack of

landscape alteration prior to mound construction, there is no obvious general trends that make the Ohio samples unique from the Southeast with the attributes examined, other than the fact that multiple pre-mound substructures are only found in the Ohio sample and that in general there are more exotic or crafted artifacts in the Ohio sample. There is only one artifact cache in the Southeast sample in Mound B at Bynum of twenty-nine celts and no evidence of purposely killed artifacts, while there are eleven artifact deposits in the Ohio sample and six examples of killed artifacts. While the Ohio sample is much larger than the Southeast sample, it makes a 24% versus about a 6% difference.

The placement and types of mortuary treatment within and among the mounds is incredibly varied, with no obvious preference to how humans were placed in the mounds, although stone tombs are the rarest in the sample. While not an attribute examined, both extended and cremated burials as well individual and communal graves were utilized by Middle Woodland communities in Ohio (Clay 2014; Coon 2009), further showing the variability of mortuary treatment.

A phenomenon that is unique to the Southeast sample is the construction of an earthen platform prior to the construction of the mound, only occurring at Marksville 4, Crooks A, and Bynum A of the mounds included. As mentioned in the prior chapter, it is difficult to know whether the differences in pre-mound landscape alteration between the two analysis regions are real or the result of differences in excavation and recording methods between the two groups. Notably, only Pinson pre-mound spaces have soil sourced from over one kilometer away, but this may only reflect the data collected rather than the reality of the situation, especially since many of the mounds were excavated prior to the 1950s and that information may have not been available or of interest to the researcher.

Of the 64 mounds in the sample, there is a trend within regions that non-local material is nearly exclusively associated with burial mounds, with the exception of the low mound that covered Seip structure 7 (referred to as S7) and Hopewell Mound 17, the former contained three flakes of obsidian and a quartz blade fragment, while the latter contained two large offerings of artifacts, many of which were made of exotic materials. Of the 36 mounds containing burials, only six of them do not contain non-local materials, four which are from Mound City (Mounds 9, 15, 19, and 24) and the other two are Marksville Mound 4 and Mound B from Helena Crossing. Mound City accounts for the majority of burial mounds without exotic goods, but that is expected since the mounds at this site account for over a third of the total sample. If other mounds had been excavated to their pre-mound contexts it would become clearer if the relationship between non-local materials and burials has a strong correlation throughout or if there are more examples where one lacks the other.

There is no clear differentiation between the Southeast and the Ohio samples as far as the presences and absences of the twenty-six attributes examined would imply. There are differences in the ways people were preparing for the creation of the mounds, where there is more evidence of landscape alteration in the Southeast sample, and there are greater quantities of exotic items and craft goods in Ohio, although such items are not absent in the Southeast.

Chronology and Diachronic Change

One of the concerns in examining the variability and diversity in the Middle Woodland record is whether diachronic change is a main factor. Pre-mound contexts within sites such as Mound City, Hopewell, and Pinson are very different from one another, and while these differences may be the result of differences between builders, the issue of standards and practices for ritual and mound building also likely changed through time. Unfortunately, radiocarbon

dating is still underdeveloped for the Middle Woodland period in the Eastern U.S., even for famous and well-studied sites such as Hopewell and Mound City. Other sites throughout Ohio and the Southeast have been studied even less, making culture change through time difficult to assess. Some sites, like Seip, are believed to have a long history of site use throughout the Middle Woodland (Greber 2009b) and have radiocarbon dates that reflect a long use period, even if they are from different features in the site, while other sites only have dates taken from one or a few features, that do not give a clear idea of the site's comprehensive Middle Woodland component.

Even for the sites that are dated, some of them are widespread, such as Crooks which has a 350 BCE date and a 790 CE date, which may represent a use of the site that represents the entire Middle Woodland, but there are very few dates for the site in total that it is difficult to understand its chronology. In addition, very few radiocarbon dates come from pre-mound contexts, making it more difficult to ascertain the importance of diachronic change in the diversity of how people were preparing physically, spiritually, and socially for the construction of these monuments. For the sites where pre-mound or mound floor dates exist, they do not cover all of the mounds I use in the sample, making it an impossible task with the data published, and possibly an impossible task overall considering the lack of dates that would have be collected. While change through time cannot be discussed in certain terms, most of the mounds were built over years and possible generations. Practices and relationships had to be assessed each time people gathered, and multiple pre-mound gatherings are evident in sites that have multiple mounds and likely could not all be constructed during one year, or in mounds where there is clear evidence of reuse of structures, such as mounds with multiple substructures overlayed.

Assemblages and Situations: What is Hopewell?

My compilation of legacy data speaks to what many archaeologists have argued before: that the Middle Woodland of the Eastern United States is an incredibly complex and variable archaeological situation and understanding what counts as regional variance and what counts as a greater unifying cultural tradition is a difficult if not impossible task. Hopewell refers to the overarching trend of the movement of people, ideas, and materials throughout the Midwest and Southeast at this time, and regardless of the variability of the Middle Woodland assemblages, this trend is evident in the archaeological record: it cannot be denied that people were cooperating in an unprecedented way; not in that they were coming together to create monuments as that occurred thousands of years before, but in the geographic scale of the networks people were creating that left a material record. This geographic scale meant people were coming to certain sites from hundreds of miles away, and in doing so came across new ideas, new rituals, and new ways of understanding leadership that created dissonance between people and groups (Henry and Barrier 2016).

I limited my research to mound, or pre-mound to be more exact, contexts because earthen mounds are the most widespread of monuments constructed during the Middle Woodland. It is before a mound is built that we can see the material evidence for the formalization of cooperative relationships, overcoming of dissonance, and a the creation and formalization of place, with the act of mound-building and the activities that took place prior being a very literal act of place-making . This study implies that there is not a single social practice that archaeologists can point to when attempting to define the Middle Woodland era or ceremonialism. Moreover, it shows that the ways people tried to build consensus prior to the construction of mounds was, in each case, a unique experience. When people came from a large geographical range to participate in communal monument building, they encountered others they would interact with infrequently

and had their own customs, expectations, and values relating to leadership and the worth underlying how to evaluate it. To overcome this dissonance, they built consensus by participating in communal rituals and activities befitting the communities involved. In doing so, they left a varied and diverse record of activities that show a common move to cooperation through mound building while also proving that there was no one toolkit to do so. This is the case even among groups that we might consider having a similar cultural background due to their presence at the same site or between sites of close geographical proximity.

Future Research

This type of analysis opens the door for further understanding of larger cultural trends within and between various regions, not just in the Middle Woodland but other time periods across space that shows evidence of a large network of items and ideas. By examining the separate histories of mounds against the backdrop of a larger cultural tradition, we can begin to understand the ways in which people chose to engage in a particular type monumentality as well different people and ideas. This method may be used in quantifying, or at least simplifying, variability among archaeological contexts that can be expanded upon and improved upon in the future. However, I would argue that even if one were to try and quantify cultural variability in archaeological settings, it should not be in the absence of qualitative data, as we should not try to transform the material world into numbers, but rather use quantification in tandem with the qualitative features that humanize the past.

Examining more attributes in addition to focusing on the exact quantity of certain elements, such as the weight or number of items of certain material or differences in pre-mound architecture will give a greater idea of the minute differences between mounds and sites, although as I was more interested in the activities and the particular ways people manipulated the

space prior to the construction of the mound, I opted for a more broad approach. The attributes examined will of course depend on the context of the project, as I chose the variables that I came across during the research phase into the mounds, so examining Mississippian mounds, for example, may require different attributes to fit a similar research question. The main benefit to expanding on a study like this would be to increase the number of mounds and sites represented, which were limited largely in part due to time and information available. As radiocarbon dating for Middle Woodland sites improves, understanding of diachronic change as a factor of Middle Woodland diversity will become clear, but it is unlikely to become a main factor when intra-site variability is so high.

CHAPTER 7: CONCLUSION

The Middle Woodland period in the Eastern and Southeastern United States is defined by archaeologists as a time of low-population density with scattered semi-permanent settlements, plant cultivation and domestication, pottery, and most important to this paper, the widespread construction and use of earthen monuments associated with a large social network evidenced by the movement of material craft items, people, and ideas. By looking at 26 pre-mound features at 64 mounds spread throughout the Hopewell, Mound City, Taylor, Tremper, Newark, Seip, Pharr, Ingomar, Bynum, Helena Crossing, Pinson, Marksville, and Crooks sites, I show as other researchers have before me that Middle Woodland contexts, even sites that historically fall under the Hopewell label, are incredibly varied in the events that took place prior to the construction of the mounds in terms of landscape alteration, feature construction, as well as placement of items and individuals.

I argue that an explanation for this variability may be due to the dissonance created as groups from a large geographical range with different values of worth and ways of doing to engage in ceremonial activity and, later, create mounds (see Henry and Barrier 2016); during this time of uncertainty, people built a consensus by engaging in common activities (see DeMarrais 2016). Figuring out which activities were important to the process of relationship building both between themselves, themselves with the space the mound was to occupy, and themselves and the mound, explaining why high variability was present between mounds of the same site. Unfortunately, with a lack of dates throughout the entire site and pre-mound contexts, it is difficult to know whether the diversity within sites is due to creative differences or temporal changes.

As the multivariate clustering and summary of submound features shows, the combination of pre-mound activities and constructions are unique to each mound, the exceptions being only the cases where little information is given for pre-mound contexts. The 26 attributes chosen for multivariate clustering analysis were the presence or absence of burials and their placement (log or stone tomb, on the floor, platform, or pit burial), non-local material, domestic debris, artifact caches, killed artifacts, crafted objects, fire or crematory, substructure, number of substructures, non-structural posts, pre-mound pits, topsoil removal, topsoil replacement, surface leveling, pre-mound cap or floor, substructure prepared clay floors, colored sediments, construction on a naturally elevated feature, non-local sediment over one kilometer away from the site, enclosure by another monument, and the presence of a construction platform. Mound City and Pinson are excellent examples that show that even within the same site people are preparing the space and negotiating their relationships with each other differently before the construction of each mound regardless of region. While these were the only two sites that were given a more in-depth look, the other sites follow suit, with each having a unique blend of features.

The data collection and subsequent also showed that there are few differences, in terms of the absence of presence of the twenty-six attributes listed above, between the Ohio sample and the Southeast sample. Minute differences, such as the quantity and types of exotic materials as well differences in pre-mound architecture are still important in understanding the ways people in different areas were engaging with the larger Middle Woodland community and is something that should be studied further. A similar type of research question should be applied to a larger sample with more sites, or a focus on a type of pre-mound phenomena to examine pre-mound variability in greater depth.

The Middle Woodland was a time of widespread cooperation, the material evidence of this event left in the form of the sheer magnitude of monuments built and the artifacts left at these sites, showing that people and material were traveling great distances to be a part of something special. Coming across people and customs they did not usually interact with, these groups were forced to overcome a dissonance created by the situation, negotiating what should be done before the construction of each mound, leaving a diverse and varied archaeological record. Prior research on monuments has focused on the grandness of their stature in terms of the weight of their materials as well as the man-hours necessary for their construction, but archaeology is turning toward a more agentic view of the past: monuments, and the archaeological record in general, are the product of decisions made by their creators. While past research on mounds specifically focused on their finished state, researchers are now applying this more humanistic brush to the past, becoming interested in every part of the mound: to how it was used when completed and how these functioned to support and create relationships, the color symbolism of the mound fill, and, as I have done here, to what people were doing prior to the mound's construction. This pre-stage of monumentality is rife with unknowns, largely because most of the data is older or from salvage excavations as our ethics and laws change how we interact with the archaeological record, especially on colonized land. In this thesis I have attempted to follow the trend in Eastern Woodland archaeology that gives the past agency by trying to understand what decisions people were making before the mound was built to understand if there was a greater Middle Woodland toolkit for this vital stage. What I found was that there was no toolkit even within sites and that people were adaptable and variable, doing what they needed to form and stabilize their relationships with others, the space they gathered, and finally the mound they built.

BIBLIOGRAPHY

Abrams, Elliot M. 2009. "Hopewell Archaeology: A View from the Northern Woodlands." *Journal of Archaeological Research*, No. 17: 169–204.

Abrams, Elliot M., and AnnCorrinne Freter. 2005. *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*. Athens, OH: Ohio University Press.

Aldenderfer, Mark. 1996. "Introduction." In *Anthropology, Space, and Geographic Information Systems*, by Mark Aldenderfer and Herbert D.G. Maschner, 3–18. New York, NY and Oxford, England: Oxford University Press.

Alt, Susan. 2011. "Histories of Mound Building and Scales of Explanation in Archaeology." In *Ideologies of Archaeology,* edited by R. Bernbeck and R. McGuire, University of Arizona Press.

Anderson, David G., and Robert C. Mainfort. 2002. *The Woodland Southeast*. University of Alabama Press.

Armitage, Ruth Ann, and Kathryn A. Jakes. 2016. "Sequencing Analytical Methods for Small Sample Dating and Dye Identification of Textile Fibers." *Midcontinental Journal of Archaeology*, no. Vol. 14, No. 1: 26–40.

Artursson, Magnus, Timothy Earle, and James Brown. 2015. "The Construction of Monumental Landscapes in Low-Density Societies: New Evidence from the Early Neolithic of Southern Scandinavia (4000-3300 BC) in Comparative Perspective." *Journal of Anthropological Archaeology*.

Baby, Raymond S., and S.M Langlois. 1979. "Seip Mound State Memorial: Nonmortuary Aspects of Hopewell." In *Hopewell Archaeology: The Chillicothe Conference,* edited by D.S. Brose and N. Greber, Kent State University Press, Kent, Chillicothe, OH: 16-18.

Baxter, M.J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press Ltd, Edinburgh.

Bernardini, Wesley. 2004. "Hopewell Geometric Earthworks: A Case Study in the Referential and Experiential Meaning of Monuments." *Journal of Anthropological Archaeology*.

Bohannon, Charles F. 1972. *Excavations at the Pharr Mounds and the Bear Creek Site*. Washington, D.C. : U.S. Department of the Interior, National Park Service, Office of Archeology and Historic Preservation.

Bolnick, Deborah A., and David Glenn Smith. 2007. "Migration and Social Structure among the Hopewell: Evidence from Ancient DNA." *American Antiquity*, Vol. 72, No. 4: 627–44.

Brown, James A. 2017. *Mound City: The Archaeology of a Renewed Ohio Hopewell Mound Center*, *Special Report 6, 2017 Revised Edition.* National Park Service, Lincoln Nebraska.

Burks, Jarrod, and N'omi B. Greber. 2009. "Exploring the Features Found During the 1971-1977 Seip Earthworks Excavation." *Midcontinental Journal of Archaeology*, Vol. 34, No. 1, Re-interpretation of a Group of Hopewell Low Mounds and Structures, Seip Earthworks, Ross County, Ohio: 143–70.

Byers, A. Martin. 2011. *Sacred Games, Death, and Renewal in the Ancient Eastern Woodlands*. Plymouth, UK: Rowman Altamira.

Byers, A. Martin. 2015. *Reclaiming the Hopewellian Ceremonial Sphere*. University of Oklahoma Press.

Byers, A. Martin. 2018. *The Real Mound Builders of North America: a Critical Realist Prehistory of the Eastern Woodlands, 200 BC-1450 AD.* Lexington Books, Lanham.

Caldwell, Joseph R. 1964. "Interaction Spheres in Prehistory." In *Hopewellian Studies,* edited by Joseph R. Caldwell and Robert L, Illinois State Museum, Springfield: 133-143.

Carr, Christopher. 2005. "Tripartite to Ceremonial Alliance among Scioto Hopewellian Communities." In *Gathering Hopewell: Society, Ritual and Ritual Interaction*, by Christopher Carr and D. Troy Case, 463–79. New York: Kluwer Academic/Plenum.

Charles, Douglas K. 1992. "Woodland Demographic and Social Dynamics in the American Midwest: Analysis of a Burial Mound Survey." *World Archaeology*, no. 24 (2), Analytical Field Report: 175–97.

Charles, Douglas K. 2012. "Colorful Practices in Hopewellian Earthwork Construction." *Res: Anthropology and Aesthetics*, March, 343–52.

Charles, D.K., Van Nest, J., Buikstra, J.E., 2004. From the Earth: Minerals and Meaning in the Hopewellian World, in: Boivin, N., Owoc, M.A. (Eds.), Soils, Stones And Symbols: Archaeological And Anthropological Perspectives On The Mineral World. University College London Press, London, pp. 43-70.

Cinadr, Thomas J., and Robert A. Genheimer. 1983. Middle Woodland Study Unit: Archaeological Resource Plan—Ohio River Basin. Ms. On File, Ohio Historic Preservation Office, Columbus.

Clay, R. Berle. 1998. “The Essential Features of Adena Ritual and their Implications.” *Southeastern Archaeology,* Vol. 17, No. 1: 1-21.

Clay, R. Berle. 2014. “What Does Mortuary Variability in the Ohio Valley Middle Woodland Mean? Agency, Its Projects, and Interpretive Ambiguity.” *Southeastern Archaeology,* Vol. 33, No. 2: 143-152.

Conolly, James and Mark Lake. 2006. *Geographical Information Systems in Archaeology.* Cambridge University Press, Cambridge, UK and New York.

Coon, Matthew S. 2009. “Variation in Ohio Hopewell Political Economies.” American Antiquity, Vol. 74, No. 1: 49–76.

Cotter, John L., and John M. Corbett. 1951. *Archeology of the Bynum Mounds, Mississippi*. Washington D.C.: National Park Service, U.S Department of the Interior.

Cowan, Frank L., and N’omi B. Greber. 2002. “Hopewell Mound 11: Yet Another Look at an Old Collection.” *The Newsletter of the Archaeology in the Ohio River Valley*, Vol. 5, No. 2: 7–11.

Dancey, William S., and Paul J. Pacheco. 1997. *Ohio Hopewell Community Organization*. Kent, OH: Kent State University Press.

DeMarrais, Elizabeth. 2016. “Making Pacts and Collaborative Acts: The Archaeology of Coalition and Consensu.” *World Archaeology*, Vol. 48, No.1: 1–13.

Emerson, Thomas, Randall Hughes, Kenneth Farnsworth, Sarah Wisseman, and Mary Hynes. 2005. “Tremper Mound, Hopewell Catlinite, and PIMA Technology.” *Midcontinental Journal of Archaeology,* Vol. 30, No. 2: 189-216

Escobar, Arturo. 2012. *Development: the Making and Unmaking of the Third World.* Princeton, N.J.: Princeton University Press.

Ethridge, Robbie, Robin Beck, and Eric E. Bowne. 2020. "Introduction: The Historical Turn in Southeastern Archaeology." In *The Historical Turn in Southeastern Archaeology* edited by Robbie Ethridge and Eric E. Bowne, University of Florida Press, Gainesville: 1-16.

Everhart, Timothy D. 2021. "The Case of the Caldwell Mound: A Woodland Period Mound in the Central Scioto River Valley." *Midcontinental Journal of Archaeology,* Vol. 45, No. 2: 130-159

Everhart, Timothy D. 2021. "On the Monumentality of Ditches." *Journal of Anthropological Archaeology*, Vol. 62, No. 101295: 1–17.

Feinman, Gary M., and Jill E. Neitzel. 2020. "Excising Culture History from Contemporary Archaeology." *Journal of Anthropological Archaeology*, Vol. 60.

Ford, Richard I. 1979. "Gathering and Gardening: Trends and Consequences of Hopewell Subsistence Strategies." In *Hopewell Archaeology: The Chillicothe Conference,* edited by David S. Brose and N'omi Greber. Kent, OH: The Kent State University Press.

Ford, James A. 1963. *Hopewell Culture Burial Mounds Near Helena, Arkansas.* Anthropological Papers of the American Museum of Natural History Vol. 50:1-56.

Ford, James A., and Gordon Willey. 1940. *Crooks Site, a Marksville Period Burial Mound in La Salle Parish, Louisiana*. New Orleans, LA: Department of Conservation Louisiana Geological Survey.

Fowke, Gerard. 1902. *Archaeological History of Ohio: The Mound Builders and Later Indians.* The Ohio State Archaeological and Historical Society, Columbus, Ohio.

Fowke, Gerard. 1928. Archaeological Investigation—II: Explorations in the Red River Valley in Louisiana. *44th Annual Report of the Bureau of American Ethnology,* Washington, DC: 399-436.

Furholt, Martin, Martin Hinz, and Doris Mischka. 2012. "'As time goes by'- Meanings, Memories and Monument." In "As time goes by?": Monumentality, Landscapes, and the Temporal Perspective, edited by Martin Furholt, Martin Hinz, and Doris Mischka, Bonn, Halbet: 13-20.

Giles, Bretton T. 2010. "Sacrificing complexity: renewal through Ohio Hopewell rituals." In *Ancient complexities: new perspectives in Precolumbian North America* edited by SusanM. Alt*,* University of Utah Press, Salt Lake City:73-95.

Giles, Bretton, Jennifer Bauder, and Marta P. Alfonso-Durruty. 2010. "Revisiting the Dead at Helena Crossing, Arkansas." *Southeastern Archaeology*, Vol. 29, No. 2: 323-340.

Giles, Bretton T., Brian M. Rowe, and Ryan M. Parish. 2020. "An Event-Centered Perspective on Mound 2 at the Hopewell Earthworks." *Midcontinental Journal of Archaeology*, Vol. 45, No. 3: 243–68.

Graeber, David, and David Wengrow. 2021. *The Dawn of Everything*. Farrar, Straus and Giroux.

Greber, N'omi B. 2009a. "Final Data and Summary Comments." *Midcontinental Journal of Archaeology*, no. Vol. 34, No. 1, Reinterpretation of a Group of Hopewell Low Mounds and Structures, Seip Earthworks, Ross County, Ohio: 171–86.

Greber, N'omi B. 2009b. "Preface." *Midcontinental Journal of Archaeology*, Vol. 34, No. 1, Re-interpretation of a Group of Hopewell Low Mounds and Structures, Seip Earthworks, Ross County, Ohio: 5–8.

Greber, N'omi B. 2009c. "Stratigraphy and Chronology in the 1971-1977 Ohio Historical Society Field Data." *Midcontinental Journal of Archaeology*, Vol. 34, No. 1, Re-interpretation of a Group of Hopewell Low Mounds and Structures, Seip Earthworks, Ross County, Ohio: 19–52.

Gremillion, Kristen J. 2002. "The Development of Dispersal of Agricultural Systems in the Woodland Period Southeast." In *The Woodland Southeast,* edited by David G. Anderson and Robert C. Mainfort, Jr., University of Alabama Press: 483-501.

Griffin, James B. 1951. "Some Adena and Hopewell Radiocarbon Dates." *Memoirs of the Society for American Archaeology*, pp. 26–29.

Griffin, James B. 1967. "Eastern North American archaeology: A summary." *Science* Vol. 156: 175-191.

Hall, Robert L. 1997. *An Archaeology of the Soul*. Urbana and Chicago: University of Illinois Press.

Hays, Christopher T. 2010. "Adena Mortuary Patterns In Central Ohio." *Southeastern Archaeology,* Vol. 29, No. 1: 106-120.

Henry, Edward R. 2017. "Building Bundles, Building Memories: Processes of Remembering in Adena-Hopewell Societies of Eastern North America." In *Journal of Archaeological Method & Theory* 24: 188-228.

Henry, Edward R., and Casey R. Barrier. 2016. “The organization of dissonance in Adena-Hopewell societies of eastern North America.” *World Archaeology,* Vol. 48, No. 1:87-109.

Henry, Edward R., and G. Logan Miller. 2020. “Toward a Situational Approach to Understanding Middle Woodland Societies in the North American Midcontinent.” *Midcontinental Journal of Archaeology,* Vol. 45, No. 3: 187-202.

Heyman, Marjorie, Elliot M. Abrams, and Sara DeAloia. 2005. “Late Archaic Community Aggregation and Feasting in the Hocking Valley.” In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by Elliot M. Abrams and AnnCorinne Freter. Athens, OH: Ohio University Press.

Hively, Ray, and Robert Horn. 2013. “A New and Extended Case for Lunar (and Solar) Astronomy at the Newark Earthworks.” *Midcontinental Journal of Archaeology*, Vol. 38, No. 1: 83–118.

“How Multivariate Clustering Works—ArcGIS Pro | Documentation.” 2022. Esri. 2022. https://pro.arcgis.com/en/pro-app/2.8/tool-reference/spatial-statistics/how-multivariate-clustering-works.htm#ESRI_SECTION1_103DAE5B22924FEFA7F8B9A79D9614F7.

Howey, Meghan C. L., Michael W. Palace, and Crystal H. McMichael. 2016. “Geospatial Modeling Approach to Monument Construction Using Michigan from A.D. 1000–1600 as a Case Study.” *Proceedings of the National Academy of Sciences*, Vol. 113, No. 27: 7443–7448.

Kassabaum, Megan C., David J. Cranford, and Erin Steven Nelson. 2011. "Multiple Modes of Monumentality Studies from the American South." *SAA Archaeological Record* Vol. 11: 33-37.

Kassabaum, Megan C. 2019. "Early Platforms, Early Plazas: Exploring the Precursors to Mississippian Mound-and-Plaza Centers." *Journal of Archaeological Research,* Vol. 27: 187-247.

Kidder, Tristram R., and Sarah C. Sherwood. 2017. "Look to the Earth: The Search for Ritual in the Context of Mound Construction." *Archaeological and Anthropological Sciences*, Vol. 9, No. 6: 1077–1099.

Konigsberg, Lyle W. 1985. "Demography and Mortuary Practice at Seip Mound One." *Midcontinental Journal of Archaeology*, Vol. 10, No. 1: 123–148.

Knight, V. J., Jr. 2001. Feasting and the emergence of platform mound ceremonialism in eastern North America. In Dietler, M., and Hayden, B. (eds.), *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, Smithsonian Institution Press, Washington, DC, pp. 311–333.

Kvamme, Kenneth L. 1990. "The Fundamental Principles and Practice of Predictive Archaeological Modeling. In *Mathematics and Information Science in Archaeology: A Flexible Framework,* edited by A. Voorrips, Studies in Modern Archaeology, Vol. 3: 257-295.

Leusen, Martijn van. 1993. "Cartographic modelling in cell-based GIS." In *Computing the Past: Computer Applications and Quantitative Methods in Archaeology. CAA92,* Edited by Jens Andresen, Torsten Madsen, and Irwin Scollar, Aarhus University, Aarhus: 105-124.

Lindauer, O., Blitz, J.H. 1997. Higher ground: the archaeology of North American platform mounds. *Journal of Archaeological Research* 5, 169–207.

Mainfort, Robert C., Jr. 1996. "Pinson Mounds and the Middle Woodland Period in the Midsouth and Lower Mississippi Valley." In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, 370–91. Columbus, OH: Ohio Archaeological Council.

Mainfort, Robert C., and Charles H. McNutt. 2004. "Calibrated Radiocarbon Chronology for Pinson Mounds and Middle Woodland in the Midsouth." *Southeastern Archaeology* , no. Vol. 23, No. 1: 12–24.

Mainfort, Robert C. 2013a. "Pinson Mounds and Its Setting." In *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*, edited by Robert C. Mainfort, Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen, Fayetteville: University of Arkansas Press: 3-18.

Mainfort, Robert C. 2013b. "Western Ritual Precinct." In *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*, edited by Robert C. Mainfort, Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen, Fayetteville: University of Arkansas Press: 85-142.

Mainfort, Robert C. 2013c. "Central Ritual Precinct." In *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*, edited by Robert C. Mainfort, Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen, Fayetteville: University of Arkansas Press:143-172.

Mainfort, Robert C., Andrew M. Mickelson, and Robert Thunen. 2013. "Eastern Ritual Precinct (The 'Eastern Citade')." In *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*, edited by Robert C. Mainfort, Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen, Fayetteville: University of Arkansas Press: 173-190.

Mainfort, Robert C., and Charles H. McNutt. 2013. "Calibrated Radiocarbon Chronology for Pinson Mounds and Related Sites". In *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*, edited by Robert C. Mainfort, Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen, Fayetteville: University of Arkansas Press:

Mainfort, Robert C., Mary L. Kwas, Charles H. McNutt, Andrew M. Mickelson, and Robert Thunen. 2013. *Pinson Mounds: Middle Woodland Ceremonialism in the Midsouth*. Fayetteville: University of Arkansas Press.

Marsh, O. C. 1866. "Description of an Ancient Sepulchral Mound near Newark, Ohio." *American Journal of Science*, Vol. s2-42, No. 124: 1–11.

Mills, William C. 1909. Explorations of the Seip Mound. *Ohio Archaeological and Historical Quarterly,* Ohio Historical Society, Columbus, Vol. 18: 269-321.

Mills, William C. 1916. *Exploration of the Tremper Mound*. Certain mounds and village sites in Ohio, Vol. 2, part 3, issued by the Ohio state archaeological and historical society. Columbus, Ohio: F.J. Heer Printing Company.

Mills, William C. 1922. Explorations of the Mound City Group. *Ohio Archaeological and Historical Quarterly,* Vol. 31: 423-584

Moore, Clarence Bloomfield. 1909. *Antiquities of the Ouachita Valley*. Vol. 14, No. 1. Philadelphia: Academy of Natural Sciences.

Moorehead, Warren K. 1922. "The Hopewell Mound Group of Ohio." *Publications of the Field Columbian Museum. Anthropological Series*, no. Vol. 6, No. 5: 75–181, 183–185.

Mueller, Natalie G., Gayle J. Fritz, Paul Patton, Stephen Carmody, and Elizabeth T. Horton. 2017. "Growing the Lost Crops of Eastern North America's Original Agricultural System." *Nature Plants*, Vol 3, No. 17092.

Ortmann, Anthony L. and Tristram R. Kidder. 2013. Building Mound A at Poverty Point, Louisiana: monumental public architecture, ritual practice, and implications for hunter-gatherer complexity. *Geoarchaeology* 28 (1): 66-86

Osborne, James F. 2014. "Monuments and Monumentality." In *Approaching Monumentality in Archaeology,* edited by James F. Osborne, SUNY Press, Albany, NY:1-19.

Otto, Martha Potter. 2009. "Historical Introduction to the 1971-1977 Ohio Historical Society Excavations." *Midcontinental Journal of Archaeology*, Vol. 34, No. 1, Reinterpretation of a Group of Hopewell Low Mounds and Structures, Seip Earthworks, Ross County, Ohio: 9–17.

Pecora, Albert M. and Jarrod Burks. 2005. "The Bremen Site: A Terminal Late Archaic Period Upland Occupation in Fairfield County, Ohio." In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by Elliot M. Abrams and AnnCorinne Freter. Athens, OH: Ohio University Press.

Prufer, Olaf H. 1965. *The McGraw Site: A Study in Hopewellian Dynamics*. Cleveland, OH: Cleveland Museum of Natural History.

Rafferty, Janet E. 1987. "The Ingomar Mounds Site: Internal Structure and Chronology." *Midcontinental Journal of Archaeology,* Vol. 12, No. 2: 147-173.

Rafferty, Sean M. 2005. "The Many Messages of Death: Mortuary Practices in the Ohio Valley and Northeast." In *Woodland Period Systematics in the Middle Ohio Valley,* University of Alabama Press, Tuscaloosa: 150-167.

Rolingson, Martha Ann and Robert C. Mainfort, Jr. 2002. Woodland Period Archaeology of the Central Mississippi Valley. In *The Woodland Southeast,* edited by David G. Anderson and Robert C. Mainfort, Jr., pp 1-19. University of Alabama Press.

Ruby, Bret J. 2006. "The Mann phase: Hopewellian community in the Wabash Lowland." In *Recreating Hopewell: New Perspectives on Middle Woodland in Eastern North America,* edited by Charles, D.K and Buikstra, J.E., University Press of Florida, Gainesville: 190-205.

Saunders, Joe W., Rolfe D. Mandel, Roger T. Saucier, E. Thurman Allen, C. T. Hallmark, Jay K. Johnson, Edwin H. Jackson, et al. 1997. "A Mound Complex in Louisiana at 5400-5000 Years Before the Present." Science, Vol. 277, No. 5333: 1796–99.

Saunders, Joe W., Rolfe D. Mandel, C. Garth Sampson, Charles M. Allen, E. Thurman Allen, Daniel A. Bush, James K. Feathers, et al. 2005. "Watson Brake, a Middle Archaic Mound Complex in Northeast Louisiana." *American Antiquity*, Vol. 70, No. 4: 631–68.

Schlanger, Sarah H. 1992. Recognizing Persistent Places in Anasazi. In *Space, Time, and Archaeological Landscapes,* edited by Jacqueline Rossignol and LuAnn Wandsnider: 91-113

Sherwood, Sarah C. and Tristram R. Kidder. 2011. "The DaVincis of Dirt: Geoarchaeological Perspectives on Native American Mound Building in the Mississippi River Basin." *Journal of Anthropological Archaeology,* Vol. 30: 69-87.

Shetrone, Henry C. 1926. Explorations of the Hopewell Group of Prehistoric Earthworks. *Ohio Archaeological and Historical Society Publications,* Vol. 35:1-277.

Shetrone, Henry C., and E. Greenman. 1931. Explorations of the Seip Group of Prehistoric Earthworks. *Ohio Archaeological and Historical Quarterly,* Vol. 40: 343-509.

Simon, Mary L. 2017. "Reevaluating the Evidence for Middle Woodland Maize from the Holding Site." *American Antiquity*, Vol. 82, No. 1: 140–50.

Simon, Mary L., Kristin M. Hedman, and Thomas E. Emerson. 2021. "Interpreting Isotopic and Macrobotanical Evidence for Early Maize in the Eastern Woodlands: A Response to Hart and Colleagues." *American Antiquity*, Vol. 86, No. 2 (April): 428–30.

Smith, Bruce. 1992. "Hopewellian Farmers of Eastern North America." In *Rivers of Change,* edited by Bruce Smith, University of Alabama Press, Tuscaloosa: 201-248.

Smith, Bruce. 2001. "Low-Level Food Production." *Journal of Archaeological Research*, Vol. 9, No. 1:1–43.

Squier, Ephraim G., and E.H. Davis. 1848. *Ancient Monuments of the Mississippi Valley.* Contributions to Knowledge 1, Smithsonian Institution, Washington, D.C.

Stark, David. 2009. *The Sense of Dissonance: Accounts of Worth in Economic Life.* Princeton, NJ: Princeton University Press.

Stevenson, Christopher M., Ihab Abdelrehim, and Steven W. Novak. 2004. "High Precision Measurement of Obsidian Hydration Layers on Artifacts from the Hopewell Site Using Ion Mass Spectrometry." *American Antiquity*, no. Vol. 69, No. 3: 555–67.

Struever, Stuart. 1965. Middle Woodland Culture History in the Great Lakes Riverine Area. *American Antiquity,* Vol. 31, No. 2: 211-223.

Struever, Stuart and Gail L. Houart. 1972. "An Analysis of the Hopewell Interaction Sphere." In *Social Exchange and Interaction*, edited by Edwin N. Wilmsen, Museum of Anthropology, University of Michigan, Ann Arbor: 47-79.

Stump, Nicole I., Jame Lein, Elliot M. Abrams, and AnnCorinne Freter. 2005. "A Preliminary GIS Analysis of Hocking Valley Archaic and Woodland Settlement Trends." In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, by Elliot M. Abrams and AnnCorinne Freter. Athens, OH: Ohio University Press.

Thomas, Cyrus. 1894. Report on the mound explorations of the Bureau of Ethnology. *Twelfth Annual Report of the Bureau of Ethnology,* Smithsonian Institution, Washington.

Thomas, Prentice M., Jr., and Carol S. Weed. 1981. Cultural Resources Survey of Enclosure B and Adjacent Areas, the Marksville Site (16AV1), Avoyelles Parish, Louisiana.

Tilley, Christopher. 1994. *A Phenomenology of Landscape: Places, Paths and Monuments*. Bloomsbury USA Academic.

Toth, Edwin A. 1974. Archaeology and Ceramics at the Marksville Site. *University of Michigan Museum of Anthropology Anthropological Papers* 56. Ann Arbor, Michigan.

Toth, Edwin A. 1988. *Early Marksville Phases in the Lower Mississippi Valley: A Study of Culture Contact Dynamics.* Archaeological Report 21. Mississippi Department of Archive and History, Jackson.

Trigger, B. G. 1990. Monumental architecture: A thermodynamic explanation of symbolic behavior. *World Archaeology* 22: 119-132.

Wakeman, Joseph E. 2005. "The Impact of Maize on Settlement Patterns in the Hocking Valley" In *The Emergence of the Moundbuilders: The Archaeology of Tribal Societies in Southeastern Ohio*, edited by Elliot M. Abrams and AnnCorinne Freter. Athens, OH: Ohio University Press.

Walling, Richard, Robert C Mainfort Jr., and James R. Atkinson. 1991. "Radiocarbon Dates for the Bynum, Pharr, and Miller Sites, Northeast Mississippi." *Southeastern Archaeology,* Vol. 10, No. 1: 54-62.

Webb, William S. 1942. *The Robbins Mounds, Sites Be 3 and Be 14, Boone County, Kentucky*. Reports in Anthropology and Archaeology, University of Kentucky, Lexington, Vol. 5, No. 5.

Webb, William S., and Charles E. Snow. 1945. *The Adena People.* Reports in Anthropology and Archaeology 6, University of Kentucky, Lexington.

Webb, William S., and Raymond S. Baby. 1956. *The Adena People No. 2.* Ohio State University Press, Columbus.

Whitridge, P. 2004. “Landscapes, Houses, Bodies, Things: ‘Place’ and the Archaeology of Inuit Imaginaries.” *Journal of Archaeological Method and Theory,* Vol. 11, No. 2: 213-250.

Wright, Alice P. 2014. “History, Monumentality, and Interaction in the Appalachian Summit Middle Woodland.” *American Antiquity,* Vol. 79, No. 2: 277-294.

Wright, Alice P. 2016. “Local and ‘Global’ Perspectives on the Middle Woodland Southeast.” *Journal of Archaeological Research*, Vol. 25, No. 1: 37–83.

Wright, Alice, and Edward Henry. 2013. “Introduction: Emerging Approaches to the Landscapes of the Early and Middle Woodland Southeast.” *In Early and Middle Woodland Landscapes of the Southeast*, eds Alice Wright and Edward Henry, 1–18. Gainesville: University Press of Florida.

APPENDIX A

Table of in-depth descriptions of individual mounds

Ohio Sites

Hopewell	
Mound Name	2
Burials	yes
# of Burials	5
Placement	platform (2), stone grave (1), floor (1), basin/pit (1)
Substructure	one
Associated artifacts	copper earspools, silver foil, copper head plates, 100 copper beads, copper adze, marine shell container, thousands of marine shell beads, copper axe, shell spoon
Subfloor pit	underneath first burial, 1 m deep
Fire activity	"crematory" basin
Non-burial cache	large flint discs deposit at center
Colored soil	inverted cone full of red and yellow clay
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	4
Burials	no
# of Burials	0
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	southern border, 7 m across and 1.2 m deep
Fire activity	n/a

Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	7
Burials	no
# of Burials	0
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	11
Burials	yes
# of Burials	2
Placement	basin/pit (1), floor (1)
Substructure	n/a
Associated artifacts	obsidian cores, deposits, flakes; mica sheets; pearl beads

Subfloor pit	n/a
Fire activity	crematory basin
Non-burial cache	1.8 m by 2.1 rectangular obsidian deposit, which also contained mica and green chlorite
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	17
Burials	no
# of Burials	0
Placement	n/a
Substructure	n/a
Associated artifacts	see non-burial cache
Subfloor pit	n/a
Fire activity	56 by 66 cm basin was burnt red to a considerable depth, same basin that the second artifact deposit placed
Non-burial cache	2; first is a 1.5 by 2 m, filled with many artifacts including effigy platform pipes, differing kinds of copper artifacts, shark teeth, obsidian biface, and many others including intentionally broken items; second was placed directly into a 56 by 66 cm basin burnt basin and consisted of many artifacts including potsherds, mica designs and fragments, bear claws, and various types of stone materials and artifacts.
Colored soil	yellow clay covers the first cache
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a

Non-structure posts	scattered post molds
Mound Name	20
Burials	yes
# of Burials	3
Placement	floor (2), platform (1)
Substructure	n/a
Associated artifacts	2 copper earspools, copper pendant, mica
Subfloor pit	shallow basin, 43 by 56 cm
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	two post molds on the southern margin
Mound Name	23
Burials	yes
# of Burials	2
Placement	floor (2)
Substructure	n/a
Associated artifacts	copper ear ornaments, marine shell container, flint biface, bone needle
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	covered in sand

Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	scattered post molds not associated with a structure plan
Mound Name	24
Burials	no
# of Burials	0
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	shallow basin, 56 by 71 cm
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	5 cm of black marl
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	25
Burials	yes
# of Burials	at least 7
Placement	floor (2), platform (3), log tomb (1), basin/pit (1)
Substructure	one, large
Associated artifacts	hundreds of pearl beads, 50 "button" stone ornaments, over 50 copper ear ornaments, 6 large bear canines, pearl beads, copper covered "buttons", copper headdress with copper wings, mica cutouts, bird feathers, bear claws, marine shell container, copper noses on burials 6 and 7, garnets
Subfloor pit	n/a

Fire activity	several hearths, one basin was still burning when covered
Non-burial cache	n/a
Colored soil	n/a
Floor	sand and gravel
Domestic debris	n/a
Landscape clearing or alteration	cleared of obstructions and leveled
Non-structure posts	n/a

Mound Name	26
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	small basin, near northeastern edge
Fire activity	51 by 66 cm long and wide and 33 cm deep basin, bright red and covered in burnt material
Non-burial cache	cache of 4 copper axes, 6 marine shell items, shell beads, thousands of bird bone beads in the large burnt basin
Colored soil	n/a
Floor	gravel rich with signs of burning
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	33
Burials	no
# of Burials	0
Placement	n/a

Substructure	one
Associated artifacts	mica fragments, large decorated pottery sherds, flint bifaces, bone needles, bear canines
Subfloor pit	n/a
Fire activity	northeast and center greatly burned
Non-burial cache	n/a
Colored soil	n/a
Floor	compact soil, 6 m across
Domestic debris	bird bones, ashes, pottery fragments
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound City	
Mound Name	Mound 1
Burials	yes
# of Burials	1
Placement	pit basin (1), placed on mica sheets
Substructure	one, 10.4 by 8.4 m wide
Associated artifacts	decorated potsherds and copper ear spools in the burnt basin. Mica sheets laid on top of the basin
Subfloor pit	n/a
Fire activity	burnt clay basin
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 2
Burials	yes
# of Burials	5
Placement	floor (9), pit/basin (2)
Substructure	one
Associated artifacts	A floor burial interred with a pearl necklace, copper alligator teeth effigies, 300 shell and pearl beads, obsidian biface, perforated elk teeth, mica plates. Basin burial interred with mica, beads, and a platform pipe.
Subfloor pit	n/a
Fire activity	3 burnt basins, one covered in sand
Non-burial cache	1 of the burnt basins contained pearl and shell beads and a restorable vessel
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 3
Burials	yes
# of Burials	4
Placement	floor (4)
Substructure	one
Associated artifacts	one of the floor burials had a shell necklace, large copper ornament, and broken projectile points
Subfloor pit	n/a
Fire activity	4 basins. Basin 1, 2.4 m long and 1.5 m wide, was burnt to a depth of 30 cm and it was clear that the basin was utilized and cared for extensively. Basin 2, north of the first, was 3.7 m long and 2.1 m wide and had burnt plant material. Basin 3, at the north end of the substructure contained only burnt plant material; it was 1.8 m long

	and 1.4 m wide. Basin 4 in the northwest end of the mound and in line with the post molds was 7.6 cm in diameter and 12.7 cm deep, burnt and made of puddled clay
Non-burial cache	1st basin contained a great deal of lithics including an obsidian point, a great deal of pottery including at least two restorable vessels, 2 platform pipes, copper objects and beads, pearl and shell beads, and perforated shark teeth
Colored soil	n/a
Floor	floor of the structure was made of fire-hardened clay
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 4
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 15.5 m by 13 m. double-posted side walls
Associated artifacts	n/a
Subfloor pit	present, but not described
Fire activity	burnt basin, contained a 12.7 cm layer of burnt shell
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 5
Burials	no

# of Burials	n/a
Placement	n/a
Substructure	one, rhomboid, 16 m long, 11.3 m wide at the south and 8 m at the north. double-posted side walls
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	1 burnt basin
Non-burial cache	burnt basin contained 13.6 kg of galena
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 6
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 12.8 m by 10.8 m. double- posted side walls
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 7
Burials	yes
# of Burials	10 (upper)
Placement	upper: platform (9), 1 placed in a tree stump
Substructure	two, one superimposed over the other. Upper: 14.6 by 14.6 m, double-posted sidewalls. Lower: 12.2 m long northeast-southwest axis and 9.1 m wide
Associated artifacts	upper: Burial 3 was interred with an obsidian biface, a copper "button", and a necklace of shell and pearl beads; burial 4 was buried with some copper artifacts and 1 obsidian and 1 quartz biface; burial 5, placed in a tree stump, was interred with some animal bones and shell; burials 6,7,8 were placed together and associated with shell bead necklaces. Burial 9's platform was covered by a small mound, which had a large deposit of mica sheets placed near it. Burial 9 was interred with copper falcon cutout along with other copper artifacts, and a "buffalo headdress" (Mills 1922) with copper horns. Burial 10 had a bone bead necklace and perforated bear canines; Burial 12 was associated with a long list of artifacts that were made of copper, obsidian, as well as some shark teeth. Burial 13 was found with mica sheets, shell beads, quartz biface, and a copper axe
Subfloor pit	n/a
Fire activity	upper: crematory basin is 2.7 m long, 1.8 m wide, showed signs of extensive use, burnt to a depth of 30.4 cm deep. Lower: crematory basin that was used for human creation and showed signs of repair
Non-burial cache	n/a
Colored soil	n/a
Floor	The upper structure has a floor of puddled clay covered in a layer of sand, mixed together in the middle in a "cement-like" matrix. Lower had a floor of muddled clay
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	Upper: a circle of posts surrounded burial 9
Mound Name	Mound 8

Burials	no
# of Burials	n/a
Placement	upper: basin/pit (4), floor (3); lower: basin/pit (1)
Substructure	two, the upper may have been potentially damaged by bulldozers
Associated artifacts	upper: Burial 1 was interred with 16 crushed copper objects; Burial 2 was buried with about 100 perforated elk and bear teeth, shell and pearl beads, 50 perforated shell discs and gorgets, and 3 copper eagle claw cutouts; Burial 3 two slate gorgets, 5 copper beads, over 100 perforated elk canines, potsherds, and a wolf and bear bone necklace; burial 6 only had a copper plate; the 3 floor burials did not have grave goods described. Lower: unnumbered interment placed with a platform pipe base
Subfloor pit	40 cm diameter and 15.2 cm deep pit with mica and animal bones
Fire activity	n/a
Non-burial cache	upper: central depository, mold left by a bag filled with hundreds of pipe fragments, shell and pearl beads, galena crystals, and copper tubes and ornaments
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 9
Burials	yes
# of Burials	14
Placement	basin/pit (5), undescribed (9)
Substructure	one, 7.5 m by 6.7 m
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	1 burnt basin

Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 10
Burials	yes
# of Burials	2
Placement	basin/pit (1), floor (1)
Substructure	one, 15.1 m north-south, 13.2 east-west. double- posted side walls
Associated artifacts	the basin burial was interred with burnt shell and pearl beads, copper sagittal headdress, copper adze, and a grit-tempered sherd. Floor burial accompanied by 2 "shell-like" copper objects
Subfloor pit	irregular and ovoid, 1.7 m by 1.2 m and 1.4 m deep
Fire activity	1 basin, with 2 layers of fill. The upper layer consisted of red-brown clay with charcoal and mica flakes, and the lower was of dark brown loam, fifteen stone flakes and a bladelet of unknown material. Underneath the lower fill was a cremation on top of a bed of charcoal
Non-burial cache	n/a
Colored soil	n/a
Floor	compact zone of soil
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 11
Burials	no
# of Burials	n/a

Placement	n/a
Substructure	one, 13.4 m east-west, 11.6 m north-south
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	flint, potsherds, mica, and bones of unspecified animals found in north post_molds
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 12
Burials	yes
# of Burials	3
Placement	floor (2), basin/pit (1)
Substructure	one
Associated artifacts	Burial 2, a basin burial, was interred with wolf canines, small copper pendant, flint biface, and a shell bead necklace
Subfloor pit	Basin 2 is interpreted by Brown (2017) as being a pit because it is 60 cm below the base of the mound, although it shows signs of burning
Fire activity	3 basins. Basin 1 was undescribed, disturbed by Camp Sherman construction. Basin 3 was on the east side and burnt to a depth of 12.7 cm, 1.5 by 1.1 m. Basin 4, 2.1 by 1.2, had crematory remains still present. Basin 2, actually a pit, shows signs of burning
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a

Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 13
Burials	yes
# of Burials	18 (upper); 4 (lower)
Placement	upper: platform (5), basin/pit (1), floor (12); lower: basin/pit (4)
Substructure	two, one superimposed over the other, oriented on the same axis as Mound 12's structure. Upper: 17.2 m northwest-southeast, 13.4 m wide. Lower: 11.7 m by 11.6 m. At least one of the structures had double-posted sidewalls
Associated artifacts	upper: Burial 1 or the "Great Mica Grave", platform, had fragments of obsidian and quartz bifaces, perforated shark and canine teeth, 1 copper awl, 1 bone awl, 100 pipe pieces (4 restorable), and beads of various materials in the fill; this was then covered in mica sheets where 4 cremations and a copper sagittal headdress was placed. The 4 other upper platform burials were interred with various copper artifacts and one of them, Burial 3, was interred with 2 obsidian bifaces
Subfloor pit	upper: 3 pits
Fire activity	upper: small burnt basin
Non-burial cache	upper: Burial 50 is a purposeful deposition of objects, charcoal, and dark earth, 30.5 cm high and 152.4 by 61 cm. It contained perforated shark and elk teeth, copper bear teeth, copper crosses, cut shell objects, pipe fragments, an obsidian biface and biface fragments. There is a separate cache of over 5,000 barrel-shaped shell beads, most of them killed
Colored soil	n/a
Floor	prepared floor of fire-hardened clay
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 14

Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 12.2 m north-south, 6.1 m east-west. Double-posted side walls
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	uncleaned floor covered in mica, potsherds, chipped stone, and charred hickory nutshells
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 15
Burials	yes
# of Burials	1
Placement	basin/pit (1)
Substructure	one, rhomboid, 12.2 m long and 8.4 m wide at the north end and 12.3 m long at the south
Associated artifacts	burial interred with a cut canine mandible and two drilled bear canines
Subfloor pit	a hole left by a post intruded into the burial, the post itself was removed before interment
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a

Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 16
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 11.4 m by 9.1 m, double-posted sidewalls
Associated artifacts	bird bone fragment in a post mold
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 17
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, ovular floor plan
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a

Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 18
Burials	yes
# of Burials	8 (upper), 3 (lower)
Placement	upper: floor (8); lower: floor (3)
Substructure	two, one superimposed over the other. Based on the placement of the crematory basins, the lower structure was oriented 30° east
Associated artifacts	one of the 8 floor burials in the upper structure was found with about 50 shell beads; bone needle next to the upper crematory basin. One of the lower 3 burials was interred with 3 platform pipes, 5 effigy platform pipes and a pearl and shell necklace which was all covered by a small primary mound; another lower burial was accompanied by perforated bear teeth, copper "buttons", and 2 mica plates
Subfloor pit	n/a
Fire activity	upper crematory basin covered in a burnt layer of leaves, 3 by 2.3 m. Lower basin is undescribed, 2.7 by 1.8 m
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 19
Burials	yes
# of Burials	1
Placement	basin/pit (1)

Substructure	one
Associated artifacts	n/a
Subfloor pit	burial pit
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 20
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 15.4 m north-south, 10.4 m east-west
Associated artifacts	n/a
Subfloor pit	north of crematory basin, about a meter below the floor of the structure and contained domestic debris
Fire activity	crematory basin, basin contained ash
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	mussel shell, animal bone, and undescribed "debris" (Mills 1922, 466) found in the subsurface pit
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 21

Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 12 m north-south, 8.4 m east-west. Double- posted side walls
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 22
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	one, 12.1 m east-west, 6.1 m north-south
Associated artifacts	only two potsherds found in a post mold
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a

Non-structure posts	n/a

Mound Name	Mound 23
Burials	n/a
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Mound 24
Burials	yes
# of Burials	1
Placement	floor (1)
Substructure	n/a
Associated artifacts	burial was interred with a shell bead necklace and potentially two granite discoidal that may be fire-cracked rock
Subfloor pit	n/a
Fire activity	3 basins, 2 of which showed long term use and burning, the last one had no description
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a

Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound 25
Burials	yes
# of Burials	6
Placement	basin/pit (4), platform (2),
Substructure	one, no precise measurements given
Associated artifacts	Burial 1, one of the platform burials, was associated with mica; burial 3, the other platform burial, was associated with shell beads, large copper ornament, 3 mica plates, 6 copper tubes. Burial 6, a pit burial, was buried with a shell bead necklace, 2 copper earspools, large copper ornament, fragments from a fossil ivory tusk. Cluster of post molds has charred matting, mica, pieces of shell, and a mastodon tusk
Subfloor pit	n/a
Fire activity	crematory basin burnt centimeters deep, containing ash. A thick layer of burnt charred material near burial 6,
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Newark	
Mound Name	Eagle Mound
Burials	n/a
# of Burials	n/a
Placement	n/a

Substructure	one, 30 m by 7 m
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	large fired basin, with signs of repeated use
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Seip	
Mound Name	Seip Mound 1
Burials	yes
# of Burials	unclear but numerous
Placement	majority on platforms, about 5 cm tall, covered in log tombs. The "great multiple burial" had 6 individuals placed on a platform 1.2 m tall covered by a log tomb. Burial 1 was placed on the floor, burial 10 was placed in a stone tomb, and burial 77 was interred in a pit
Substructure	n/a
Associated artifacts	great multiple burial: Effigy pipes were placed on the roof of the tomb while the platform was outlined with pearl beads. All six individuals were interred with grave goods which included various copper objects such as breastplates and buttons, shell and pearl beads, and mica designs. See non-burial cache
Subfloor pit	2 pits, both under burial 93. Both contained potential domestic debris
Fire activity	5 crematory basins
Non-burial cache	three circular depressions, about a 1 m in diameter to 15 to 25.4 cm deep, filled with charcoal, fragments of pottery and marine shells, mica and flint-flake knives; some of the artifacts in these depressions were killed by breaking or burning. There was a large deposit of obsidian, 2.7 by 1.5 meters, by burial 6, a platform burial.

	Toward the western end there was a large oval depression which contained a great offering of items in various stages of heat reduction including: fragments of a racoon baculum that were carved and copper banded, ear spools and other copper objects, bear claws, potsherds of both utilitarian and ceremonial varieties, the teeth of several kinds of animals, among them shark and alligator teeth, carefully piled flint knives, and a number of unrecognizable objects. Non heat damaged items included bird and insect effigies made of soapstone and shale respectively, some copper objects, and an obsidian blade
Colored soil	n/a
Floor	thick dark clay
Domestic debris	pit 1 under burial 93 contained flint flakes, potsherds, and animal bones; pit 2 contained some potsherds
Landscape clearing or alteration	topsoil removed to a depth of 15 to 30.5 cm, then replaced with a dark clay at a depth of 15 to 61 cm
Non-structure posts	200 post molds that were adjacent or piercing burial platforms, ranging from 2.5 and 38 cm in diameter; potentially places where trophies or tributes were placed (Shetrone and Greenman 1931)
Mound Name	Seip S1
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	small circular pit full of charcoal, mica flecks, fire cracked rock, and bone fragments
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or	n/a

alteration	
Non-structure posts	n/a
Mound Name	Seip S2
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	2 pits. 1 in the southeast corner between the wall and a large interior post, was a deep, straight-sided pit that contained burned earth and charcoal that was burned elsewhere. The other located near the western wall, was 43 cm in diameter and contained two post molds
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Seip S3
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	small pit, recorded as post hole 49, just beyond the southwest corner of the building
Fire activity	n/a

Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Seip S4
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	5 stone pits filled pits along the eastern wall, capped with rock and dark soil. Exact compositions are not the same but all contain alternating layer of dark sediment with larger rocks, such as pebbles of limestone, fire-cracked rock, or sandstone. Ovular pit, 127 by 175 cm and 122 cm deep, filled with charcoal, fire-cracked rock, and cobbles. Pit in northwest corner, 73 by 58 cm, contained domestic debris
Fire activity	n/a
Non-burial cache	n/a
Colored soil	5 stone filled pits contained alternating dark and light colors
Floor	n/a
Domestic debris	pit in northwest corner full of potsherds, bone, and charcoal
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Seip S5
Burials	no
# of Burials	0

Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	1975-2, at the southeastern corner, was a deep circular pit full of charcoal. 1975-3 was a pit with two post molds of differing size and charcoal. 1975-4 and 1974-5 were pits with no recorded content, and 1975-6 only contained a few animal bone fragments. Shallow depression south of the fire burnt pit filled with the debris from that feature
Fire activity	shallow depression with a fire-reddened wall near the northern wall
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Mound Name	Seip S6
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	n/a
Subfloor pit	a line of 8 pits, similar to those found in S4 with alternating layers of dark and light, soils and rocks, including 2 which were outside of the structure. There were three more pits: one filled with charcoal and burnt earth, the other with nothing, and the last with domestic materials
Fire activity	n/a
Non-burial cache	n/a
Colored soil	pits with alternating dark and light colors.

Floor	n/a
Domestic debris	pit contained potsherds, animal bones, and flint bladelet
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Seip S7
Burials	no
# of Burials	0
Placement	n/a
Substructure	one
Associated artifacts	pit 1977-6 contained a quartz blade and flakes of obsidian
Subfloor pit	line of 5 pits, similar to S4 and S6, that went diagonally across the floor, one of which contained some domestic debris and another some artifacts. 1977-7 contained two sets of overlapping post molds, showing clear signs of structure maintenance. A large pit, 2.1 by 1.7 m across and 1.8 deep, on the outside of the structure with three post molds along its edges.
Fire activity	small pit in the northeastern corner showed signs of *in situ* burning.
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Taylor	
Mound Name	The Taylor Mound
Burials	yes
# of Burials	8
Placement	pit (8)

Substructure	n/a
Associated artifacts	9 projectile points, 6 hand-axes, hematite hatchet, flint chisel, 13 cm in diameter pottery vessel, 5 deer bone needles, worked antler, mussel "spoons", black bear tooth "whistle"
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	broken deer bones toward the bottom of the mound and grave
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Tremper	
Mound Name	Mound 1, Tremper Mound
Burials	yes
# of Burials	unclear because of communal burials
Placement	All burials were under the floor or in communal crematories, all counted as basin/pit
Substructure	4, segmented structures. About 600 post molds. The largest substructure was ovular, 61 m by 30 m, off of which were 3 additions
Associated artifacts	non-mortuary deposit likely associated with the communal burials was about 2 m in diameter, contained about 136 pipes, beads, gorgets, mica and galenite crystals, stone ear ornaments, animal and human mandible ornaments, "boat-shaped objects of copper" (Mills 1916: 285), large stone disk in the center. All objects burned or killed
Subfloor pit	n/a
Fire activity	southernmost addition had 3 large crematories, middle had a large fireplace or hearth, northernmost had a large fireplace or hearth
Non-burial cache	middle addition had caches of pipes and other artifacts. Another

	non-mortuary described in associated artifacts
Colored soil	n/a
Floor	floor had been leveled and covered in fine sand in some places
Domestic debris	a "room" on the northern side contained broken animal bones and potsherds, was interpreted as a kitchen
Landscape clearing or alteration	n/a
Non-structure posts	n/a

Southeast Sites

Pinson	
Mound Name (type)	Mound 5, Ozier mound (platform)
Burials	No
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	a large pit was dug into the subsoil next to the disturbed soil
Fire activity	n/a
Non-burial cache	n/a
Colored soil	the first soils used in the construction of the mound contrasted in color, ranging from pale brown to bluish gray, the latter of which was likely gathered either from the Forked Deer River floodplain or the Hudson Branch, both 300 meters away in different directions. The purposeful color choice for the creation of Ozier may have been a reenactment of the earth diver story and thus a world-renewal act (Mainfort 2013b).
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	topsoil was removed up to 20 cm and replaced

Non-structure posts	n/a
Mound Name	Mound 6, Twin Mounds (conical)
Burials	yes
# of Burials	6 facilities, only 4 excavated
Placement	basin/pit (4), log tomb (4)
Substructure	n/a
Associated artifacts	mica was found in 4 different basins. Fiber headdress covered in copper stains, marine shell beads found in one tomb; copper ear ornaments, green granite pendant, engraved rattles crafted from human parietal bones (with birdlike imagery similar to those at the Hopewell site), strings of shell beads, and mica sheets in another tomb; one tomb only had a freshwater pearl for each individual interred; the last tomb had no preserved grave goods
Subfloor pit	5 straight-sided pits excavated into the subsoil
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	Pre-mound surface was covered by a 10 cm thick layer of brown clayey sand, then sealed by puddled clay 2 to 8 cm, closest source 1,000 km away
Domestic debris	n/a
Landscape clearing or alteration	topsoil removed exposing subsoil
Non-structure posts	9 scattered post molds
Mound Name	Mound 10 (platform)
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	n/a

Fire activity	n/a
Non-burial cache	n/a
Colored soil	6 cm of yellow sand was placed on top of the exposed topsoil of the knoll, and then covered with a gray sandy clay layer, 12 cm thick
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	built on a small natural knoll which had its humus layer removed, and then had yellow sand placed on top
Non-structure posts	n/a

Mound Name	Mound 12 (conical)
Burials	yes
# of Burials	at least 2
Placement	basin/pit (1), floor (at least 1, maybe 2)
Substructure	n/a
Associated artifacts	lithic debris, fire-cracked rock, over 760 potsherds, and non-local ceramics, 3 pieces of mica, 8 freshwater pearls, red ochre fragments, and a point fashioned from non-local chert were found on the activity surface. Pit burial accompanied by a ceramic jar
Subfloor pit	n/a
Fire activity	5 shallow circular burned areas, one of which contained a mica disc fragment and another was capped by gray clay. 2 other burned surfaces lay on the surface of the large gray clay cap
Non-burial cache	n/a
Colored soil	n/a
Floor	the 6 cm thick, ovoid 330 m diameter, puddled clay layer or pre-mound cap was made from a source potentially 1,500 km away.
Domestic debris	n/a
Landscape clearing or alteration	topsoil and humus were removed, creating an activity surface;. thin layer of sand was used to level out the natural knoll, which was then covered by puddled clay.
Non-structure posts	n/a

Mound Name	Mound 29 (platform)
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	n/a
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	base of the mound is a 1.6 m thick layer of dark brown clay that lies directly over the subsoil
Domestic debris	n/a
Landscape clearing or alteration	prior to construction, the area was stripped of topsoil and replaced with light gray clay
Non-structure posts	n/a

Mound Name	Mound 31 (conical)
Burials	yes
# of Burials	1
Placement	basin/pit (1)
Substructure	n/a
Associated artifacts	burned surface associated with potsherds and chert flakes, as well as Flint Ridge chert bladelet and small quartz flakes, potentially associated with ritual
Subfloor pit	north of the burial pit were two pits fill of ash and charcoal
Fire activity	small fire-hardened area north of the burial pit. Northern and northeastern part of the mound floor was fire-hardened
Non-burial cache	n/a
Colored soil	n/a

Floor	northern and northeastern part of the mound floor was fired prior to construction.
Domestic debris	burned surface had utilitarian potsherds and chert flakes
Landscape clearing or alteration	Stripped of topsoil, which then had a burial facility excavated 50 cm into the exposed surface
Non-structure posts	posts north of the central burial feature with no discernable order
Helena Crossing	
Mound Name	Mound B
Burials	yes
# of Burials	1
Placement	log tomb (1)
Substructure	no
Associated artifacts	tomb A, log, had conch shell beads, 8 blades of Indiana flint about 5 cm long, and a cup of marine shell between 2 individuals
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound C
Burials	yes
# of Burials	4, tombs
Placement	basin/pit (4), log tomb (4)
Substructure	no
Associated artifacts	the individual in Tomb A, log, had a spoon-like item made of seashell, a string of 45 freshwater pearls, 2 7 cm thick shell bead

	armlets, beads around the ankles, belt of canine teeth and shell, copper covered panpipes, and a copper earspool in each hand. Tomb D, log, had burnt and fragmentary contents, including a charred seashell cup. Tomb E, log, contained a cylinder of rolled copper 27.5 cm long with a paw-like cut-out design-possibly a staff ferrule-a conch shell necklace, marine shells, perforated pearls, a sheet of mica, and conch sell beads
Subfloor pit	pit excavated into the original ground surface
Fire activity	tomb D was filled with a mass of burned earth about a half meter thick, and the contents were charred, and the logs that covered the burial were covered with earth and then burned
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	topsoil was removed from the east and west edges of the of the primary mound
Non-structure posts	n/a
Bynum	
Mound Name	Mound A
Burials	yes
# of Burials	2
Placement	log (1), unspecified
Substructure	one, about 25 posts, halfway under and halfway outside the mound
Associated artifacts	central burial was buried with a pair of copper earspools, log tomb individuals were interred along with a small cluster of potsherds
Subfloor pit	irregular shaped pit extending 0.3 m below the mound floor, which contained a post hole
Fire activity	charcoal fire pit 0.6 m in diameter
Non-burial cache	n/a
Colored soil	n/a
Floor	mound floor was made of sandy clay

Domestic debris	n/a
Landscape clearing or alteration	built on a made earthen platform
Non-structure posts	n/a
Mound Name	Mound B
Burials	yes
# of Burials	4
Placement	basin/pit (4)
Substructure	one, 16 large post molds surrounding the primary pit
Associated artifacts	29 celts and 9 spear points with the 3 cremations in the primary pit; 8 spear points with the subpit cremation. A non-local Marksville style sherd was found in the primary pit
Subfloor pit	large oval pit that the primary mound was built over, 11.6 by 9.1 m interior and 14 by 11.6 m on the exterior rim
Fire activity	smaller pit within the larger pit has bright red walls, implying burning
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound D
Burials	yes
# of Burials	1
Placement	basin/pit (1)
Substructure	one, 4 large posts outside of the sub pit, assuming a canopy
Associated artifacts	polished stone celt on the floor of the primary pit. Copper spool and bead of rolled copper found in the subpit with the cremation

Subfloor pit	built over a pit that was 3 by 2.1 m. a subpit was dug into this larger one and contained a human cremation and some artifacts
Fire activity	the sub pit contained ashes and charcoal
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	2 separate clusters of potsherds
Landscape clearing or alteration	n/a
Non-structure posts	n/a
Pharr	
Mound Name	Mound A
Burials	yes
# of Burials	3
Placement	basin/pit (3)
Substructure	n/a
Associated artifacts	only associated artifact in the large pit grave was a piece of wood covered in copper salts, indicating the presence of copper that has not preserved
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	18 cm thick layer of clay that the grave was dug through
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	3 postholes found on the margin of the large pit grave, but not in a pattern that supports the presence of a structure
Mound Name	Mound D

Burials	yes
# of Burials	1
Placement	floor (1)
Substructure	n/a
Associated artifacts	copper spool associated with burial
Subfloor pit	n/a
Fire activity	1.4 m by 0.9 m rectangular burnt area on the prepared base of the mound
Non-burial cache	n/a
Colored soil	the replacement soil was a purposeful mix of red and yellow clay
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	A horizon or humus was removed from a 13.7 m by 10.7 m oval area and then replaced with a mix of yellow clay, red clay, and topsoil 15 cm thick
Non-structure posts	n/a

Mound Name	Mound E
Burials	yes
# of Burials	4
Placement	platform (1), basin/pit (3)
Substructure	n/a
Associated artifacts	a Marksville Incised pottery vessel next a fired pit
Subfloor pit	large rectangular pit next to the platform
Fire activity	a shallow fired depression interpreted as a crematory pit on the platform, and a fire-burnt basin past the platform
Non-burial cache	n/a
Colored soil	n/a
Floor	30.5 cm thick oval floor platform
Domestic debris	n/a

Landscape clearing or alteration	n/a
Non-structure posts	n/a
Mound Name	Mound H
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	platform pipe found on the north-edge of the fired-basin
Subfloor pit	n/a
Fire activity	fired basin, 1.6 by 1.1 m long and across, 21 cm deep, in the old ground surface below the mound, used for a long time. Another patch of burnt earth, 0.5 m in diameter, on the original ground surface northwest of the fired basin
Non-burial cache	n/a
Colored soil	fired basin filled with yellow clay
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	scattered posts with no discernable pattern
Ingomar	
Mound Name	Mound 1
Burials	no
# of Burials	n/a
Placement	n/a
Substructure	n/a
Associated artifacts	10 potsherds found near the small fire
Subfloor pit	pit east of the mound that was associated with 3 to 4 posts

Fire activity	small fire built on the original ground surface near the center of the mound
Non-burial cache	n/a
Colored soil	fire capped with a thin layer of red clay
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	n/a
Non-structure posts	posthole containing unburnt wood and 3 to 4 posts surrounding the sub-floor pit
Crooks	
Mound Name	Mound A
Burials	yes
# of Burials	169
Placement	platform (168), floor (1)
Substructure	none
Associated artifacts	n/a
Subfloor pit	construction platform had several pits on its surface, two of which contained burnt vegetation, but showed no signs on *in situ* burning
Fire activity	several fireplaces on top of the large platform, not used long-term
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	built over an earthen construction platform 60 cm tall, 21.3 m north-south and 13.7 m east-west
Non-structure posts	3 postholes what had been burned in place west of center on the large burial platform
Marksville	
Mound Name	Mound 4

Burials	yes
# of Burials	n/a
Placement	log tomb
Substructure	one, implied by postholes
Associated artifacts	small copper fragments
Subfloor pit	n/a
Fire activity	n/a
Non-burial cache	n/a
Colored soil	n/a
Floor	n/a
Domestic debris	n/a
Landscape clearing or alteration	construction of an earthen platform 1.5 m tall, which then had a large wood tomb excavated into it
Non-structure posts	n/a

APPENDIX B

Site and attribute table as well as tables created from the multivariate clustering in ArcGIS.

State	Site	Mound Number	ID #	Burials?	Burial: log tomb	Burial: stone tomb	Burial: on floor	Burial: on platform	Burial: Pit/basin
TN	Pinson	5	1	0	0	0	0	0	0
TN	Pinson	6	2	1	1	0	0	0	1
TN	Pinson	10	3	0	0	0	0	0	0
TN	Pinson	12	4	1	0	0	1	0	0
TN	Pinson	29	5	0	0	0	0	0	0
TN	Pinson	31	6	1	0	0	0	0	1
OH	Mound City	1	7	1	0	0	0	0	1
OH	Mound City	2	8	1	0	0	1	0	1
OH	Mound City	3	9	1	0	0	1	0	0
OH	Mound City	4	10	0	0	0	0	0	0
OH	Mound City	5	11	0	0	0	0	0	0
OH	Mound City	6	12	0	0	0	0	0	0
OH	Mound City	7	13	1	0	0	0	1	0
OH	Mound City	8	14	1	0	0	0	0	1
OH	Mound City	9	15	1	0	0	0	0	1
OH	Mound City	10	16	1	0	0	1	0	1
OH	Mound City	11	17	0	0	0	0	0	0
OH	Mound City	12	18	1	0	0	1	0	1
OH	Mound City	13	19	1	0	0	1	1	1
OH	Mound City	14	20	0	0	0	0	0	0
OH	Mound City	15	21	1	0	0	0	0	1
OH	Mound City	16	22	0	0	0	0	0	0
OH	Mound City	17	23	0	0	0	0	0	0
OH	Mound City	18	24	1	0	0	1	0	0
OH	Mound City	19	25	1	0	0	0	0	1
OH	Mound City	20	26	0	0	0	0	0	0
OH	Mound City	21	27	0	0	0	0	0	0
OH	Mound City	22	28	0	0	0	0	0	0
OH	Mound City	24	29	1	0	0	1	0	0
OH	Mound City	25	30	1	0	0	0	1	1
MS	Ingomar	1	31	0	0	0	0	0	0
LA	Marksville	4	32	1	0	0	0	1	0
LA	Crooks	A	33	1	0	0	0	1	0
MS	Bynum	A	34	1	1	0	0	0	0
MS	Bynum	B	35	1	0	0	0	0	1
MS	Bynum	D	36	1	0	0	0	0	1
OH	Newark	Eagle	37	0	0	0	0	0	0
OH	Taylor	1	38	1	0	0	0	0	1
OH	Tremper	1	39	1	0	0	0	0	1
OH	Seip	S1	40	0	0	0	0	0	0
OH	Seip	S2	41	0	0	0	0	0	0
OH	Seip	S3	42	0	0	0	0	0	0
OH	Seip	S4	43	0	0	0	0	0	0
OH	Seip	S5	44	0	0	0	0	0	0
OH	Seip	S6	45	0	0	0	0	0	0
OH	Seip	S7	46	0	0	0	0	0	0
AK	Helena Crossing	C	47	1	1	0	0	0	1
AK	Helena Crossing	B	48	1	1	0	0	0	0
OH	Hopewell	2	49	1	0	1	0	1	1
OH	Hopewell	4	50	0	0	0	0	0	0
OH	Hopewell	7	51	0	0	0	0	0	0
OH	Hopewell	11	52	1	0	0	0	0	1
OH	Hopewell	17	53	0	0	0	0	0	0
OH	Hopewell	20	54	1	0	0	1	1	0
OH	Hopewell	23	55	1	1	0	1	0	0
OH	Hopewell	24	56	0	0	0	0	0	0
OH	Hopewell	26	57	1	0	0	0	1	1
OH	Hopewell	33	58	0	0	0	0	0	0
OH	Hopewell	25	59	1	1	0	1	1	1
MS	Pharr	H	60	0	0	0	0	0	0
MS	Pharr	A	61	1	0	0	0	0	1
MS	Pharr	D	62	1	0	0	1	0	0
MS	Pharr	E	63	1	0	0	0	1	1
OH	Seip	1	64	1	1	1	1	1	1

Table 2: Part one of four of the mound attribute table which was used in the multivariate clustering, 0s being absences and 1s being presences.

State	Site	Mound Number	ID #	Non-local material	Domestic Debris	non-mortuary artifact caches	killed artifacts	Crafted Objects	Pre-mound fire events	Substructure
TN	Pinson	5	1	0	0	0	0	0	1	0
TN	Pinson	6	2	1	0	0	0	1	0	0
TN	Pinson	10	3	0	0	0	0	0	0	0
TN	Pinson	12	4	1	0	0	0	0	1	0
TN	Pinson	29	5	0	0	0	0	0	0	0
TN	Pinson	31	6	1	1	0	0	0	1	0
OH	Mound City	1	7	1	0	0	0	1	1	1
OH	Mound City	2	8	1	0	1	0	1	1	1
OH	Mound City	3	9	1	0	1	0	1	1	1
OH	Mound City	4	10	0	0	0	0	0	1	1
OH	Mound City	5	11	0	0	1	0	0	1	1
OH	Mound City	6	12	0	0	0	0	0	0	1
OH	Mound City	7	13	1	0	0	0	1	1	1
OH	Mound City	8	14	1	0	1	1	1	1	1
OH	Mound City	9	15	0	0	0	0	0	1	1
OH	Mound City	10	16	1	0	0	0	1	1	1
OH	Mound City	11	17	0	0	0	0	1	0	1
OH	Mound City	12	18	1	1	0	0	1	1	1
OH	Mound City	13	19	1	0	1	1	1	1	1
OH	Mound City	14	20	0	1	0	0	0	0	1
OH	Mound City	15	21	0	0	0	0	0	0	1
OH	Mound City	16	22	0	0	0	0	0	0	1
OH	Mound City	17	23	0	0	0	0	0	0	1
OH	Mound City	18	24	1	0	0	0	1	1	1
OH	Mound City	19	25	0	0	0	0	0	0	1
OH	Mound City	20	26	0	1	0	0	0	1	1
OH	Mound City	21	27	0	0	0	0	0	0	1
OH	Mound City	22	28	0	0	0	0	0	0	1
OH	Mound City	24	29	0	0	0	0	0	0	0
OH	Mound City	25	30	1	0	0	0	1	1	1
MS	Ingomar	1	31	0	0	0	0	0	1	0
LA	Marksville	4	32	0	0	0	0	0	1	1
LA	Crooks	A	33	1	0	0	0	1	0	0
MS	Bynum	A	34	1	0	0	0	1	1	1
MS	Bynum	B	35	1	0	1	0	1	1	1
MS	Bynum	D	36	1	1	0	0	1	1	1
OH	Newark	Eagle	37	0	0	0	0	0	1	1
OH	Taylor	1	38	1	1	0	0	0	0	0
OH	Tremper	1	39	1	1	1	1	1	1	1
OH	Seip	S1	40	0	0	0	0	0	0	1
OH	Seip	S2	41	0	0	0	0	0	0	1
OH	Seip	S3	42	0	0	0	0	0	0	1
OH	Seip	S4	43	0	1	0	0	0	0	1
OH	Seip	S5	44	0	0	0	0	0	1	1
OH	Seip	S6	45	0	0	0	0	1	0	1
OH	Seip	S7	46	1	0	0	0	0	0	1
AK	Helena Crossing	C	47	1	0	0	0	1	1	0
AK	Helena Crossing	B	48	0	0	0	0	0	0	0
OH	Hopewell	2	49	1	0	1	0	1	1	1
OH	Hopewell	4	50	0	0	0	0	0	0	0
OH	Hopewell	7	51	0	0	0	0	0	0	0
OH	Hopewell	11	52	1	0	1	0	1	1	0
OH	Hopewell	17	53	1	0	1	1	1	1	0
OH	Hopewell	20	54	1	0	0	0	0	0	0
OH	Hopewell	23	55	1	0	0	0	0	1	0
OH	Hopewell	24	56	0	0	0	0	0	1	0
OH	Hopewell	26	57	1	0	1	1	1	1	1
OH	Hopewell	33	58	0	1	0	0	1	1	1
OH	Hopewell	25	59	1	0	0	0	1	1	1
MS	Pharr	H	60	0	0	0	0	1	1	0
MS	Pharr	A	61	1	0	0	0	0	0	0
MS	Pharr	D	62	1	0	0	0	1	1	0
MS	Pharr	E	63	1	0	0	0	1	1	0
OH	Seip	1	64	1	0	1	1	1	1	0

Table 3: Part two of four of the mound attribute table which was used in the multivariate clustering, 0s being absences and 1s being presences.

State	Site	Mound Number	ID #	Number of substructures	Posts (non-structural)	Pre-mound Pit	Topsoil removal	Topsoil replacement	Surface Leveling	pre-mound floor or cap
TN	Pinson	5	1	0	0	1	1	1	0	0
TN	Pinson	6	2	0	1	1	1	0	0	1
TN	Pinson	10	3	0	0	0	1	1	0	1
TN	Pinson	12	4	0	0	1	1	0	1	1
TN	Pinson	29	5	0	0	0	1	0	0	1
TN	Pinson	31	6	0	1	1	1	0	0	1
OH	Mound City	1	7	1	0	0	0	0	0	0
OH	Mound City	2	8	1	0	0	0	0	0	0
OH	Mound City	3	9	1	0	0	0	0	0	0
OH	Mound City	4	10	1	0	1	0	0	0	0
OH	Mound City	5	11	1	0	0	0	0	0	0
OH	Mound City	6	12	1	0	0	0	0	0	0
OH	Mound City	7	13	2	1	0	0	0	0	0
OH	Mound City	8	14	2	0	0	0	0	0	0
OH	Mound City	9	15	1	0	0	0	0	0	0
OH	Mound City	10	16	1	0	1	0	0	0	0
OH	Mound City	11	17	1	0	0	0	0	0	0
OH	Mound City	12	18	1	0	1	0	0	0	0
OH	Mound City	13	19	2	0	1	0	0	0	1
OH	Mound City	14	20	1	0	0	0	0	0	0
OH	Mound City	15	21	1	1	0	0	0	0	0
OH	Mound City	16	22	1	0	0	0	0	0	0
OH	Mound City	17	23	1	0	0	0	0	0	0
OH	Mound City	18	24	2	0	0	0	0	0	0
OH	Mound City	19	25	1	0	0	0	0	0	0
OH	Mound City	20	26	1	0	1	0	0	0	0
OH	Mound City	21	27	1	0	0	0	0	0	0
OH	Mound City	22	28	1	0	0	0	0	0	0
OH	Mound City	24	29	0	0	0	0	0	0	0
OH	Mound City	25	30	1	0	0	0	0	0	0
MS	Ingomar	1	31	0	1	1	0	0	0	1
LA	Marksville	4	32	1	0	1	0	0	0	0
LA	Crooks	A	33	0	0	0	0	0	0	1
MS	Bynum	A	34	1	0	0	0	0	0	1
MS	Bynum	B	35	1	0	1	1	0	0	0
MS	Bynum	D	36	0	0	1	0	0	0	0
OH	Newark	Eagle	37	1	0	0	0	0	0	0
OH	Taylor	1	38	0	0	0	0	0	0	0
OH	Tremper	1	39	4	0	0	0	0	0	0
OH	Seip	S1	40	1	0	0	0	0	0	0
OH	Seip	S2	41	1	0	1	0	0	0	0
OH	Seip	S3	42	1	0	1	0	0	0	0
OH	Seip	S4	43	1	0	1	0	0	0	0
OH	Seip	S5	44	1	0	1	0	0	0	0
OH	Seip	S6	45	1	0	1	0	0	0	0
OH	Seip	S7	46	1	0	0	0	0	0	0
AK	Helena Crossing	C	47	0	0	1	1	0	0	0
AK	Helena Crossing	B	48	0	0	0	0	0	0	0
OH	Hopewell	2	49	1	0	1	0	0	0	0
OH	Hopewell	4	50	0	0	1	0	0	0	0
OH	Hopewell	7	51	0	0	0	0	0	0	0
OH	Hopewell	11	52	0	0	0	0	0	0	0
OH	Hopewell	17	53	0	1	0	0	0	0	0
OH	Hopewell	20	54	0	1	1	0	0	0	0
OH	Hopewell	23	55	0	1	1	0	0	0	1
OH	Hopewell	24	56	0	0	0	0	0	0	1
OH	Hopewell	26	57	1	0	0	0	0	0	0
OH	Hopewell	33	58	1	0	0	0	0	1	0
OH	Hopewell	25	59	4	0	0	0	0	0	0
MS	Pharr	H	60	0	1	0	0	0	0	0
MS	Pharr	A	61	0	0	0	0	0	0	1
MS	Pharr	D	62	0	0	0	1	1	0	0
MS	Pharr	E	63	0	1	1	0	0	0	1
OH	Seip	1	64	0	1	1	1	1	0	1

Table 4: Part three of four of the mound attribute table which was used in the multivariate clustering, 0s being absences and 1s being presences.

State	Site	Mound Number	ID #	prepared clay floors (structure)	Colored sediments	Natural elevated feature	Non-local sediment	Enclosed by other monument or feature	Construction platform
TN	Pinson	5	1	0	0	0	0	0	0
TN	Pinson	6	2	0	0	0	1	0	0
TN	Pinson	10	3	0	0	1	0	0	0
TN	Pinson	12	4	0	0	1	1	0	0
TN	Pinson	29	5	0	0	0	0	1	0
TN	Pinson	31	6	0	0	0	0	0	0
OH	Mound City	1	7	0	0	0	0	1	0
OH	Mound City	2	8	0	0	0	0	1	0
OH	Mound City	3	9	1	0	0	0	1	0
OH	Mound City	4	10	0	0	0	0	1	0
OH	Mound City	5	11	0	0	0	0	1	0
OH	Mound City	6	12	0	0	0	0	1	0
OH	Mound City	7	13	1	0	0	0	1	0
OH	Mound City	8	14	0	0	0	0	1	0
OH	Mound City	9	15	0	0	0	0	1	0
OH	Mound City	10	16	0	0	0	0	1	0
OH	Mound City	11	17	0	0	0	0	1	0
OH	Mound City	12	18	0	0	0	0	1	0
OH	Mound City	13	19	1	0	0	0	1	0
OH	Mound City	14	20	0	0	0	0	1	0
OH	Mound City	15	21	0	0	0	0	1	0
OH	Mound City	16	22	0	0	0	0	1	0
OH	Mound City	17	23	0	0	0	0	1	0
OH	Mound City	18	24	0	0	0	0	1	0
OH	Mound City	19	25	0	0	0	0	1	0
OH	Mound City	20	26	0	0	0	0	1	0
OH	Mound City	21	27	0	0	0	0	1	0
OH	Mound City	22	28	0	0	0	0	1	0
OH	Mound City	24	29	0	0	0	0	1	0
OH	Mound City	25	30	0	0	0	0	1	0
MS	Ingomar	1	31	0	1	0	0	0	0
LA	Marksville	4	32	0	0	0	0	1	1
LA	Crooks	A	33	0	0	0	0	0	1
MS	Bynum	A	34	0	0	0	0	0	1
MS	Bynum	B	35	0	0	0	0	0	0
MS	Bynum	D	36	0	0	0	0	0	0
OH	Newark	Eagle	37	0	0	0	0	0	0
OH	Taylor	1	38	0	0	1	0	0	0
OH	Tremper	1	39	1	0	0	0	1	0
OH	Seip	S1	40	0	0	0	0	0	0
OH	Seip	S2	41	0	0	0	0	0	0
OH	Seip	S3	42	0	0	0	0	0	0
OH	Seip	S4	43	0	1	0	0	0	0
OH	Seip	S5	44	0	0	0	0	0	0
OH	Seip	S6	45	0	1	0	0	0	0
OH	Seip	S7	46	0	0	0	0	0	0
AK	Helena Crossing	C	47	0	0	0	0	0	0
AK	Helena Crossing	B	48	0	0	0	0	0	0
OH	Hopewell	2	49	0	0	0	0	0	0
OH	Hopewell	4	50	0	0	0	0	0	0
OH	Hopewell	7	51	0	0	0	0	1	0
OH	Hopewell	11	52	0	0	0	0	0	0
OH	Hopewell	17	53	0	0	0	0	0	0
OH	Hopewell	20	54	0	0	0	0	0	0
OH	Hopewell	23	55	0	0	0	0	0	0
OH	Hopewell	24	56	0	0	0	0	0	0
OH	Hopewell	26	57	0	0	0	0	1	0
OH	Hopewell	33	58	0	0	0	0	1	0
OH	Hopewell	25	59	0	0	0	0	1	0
MS	Pharr	H	60	0	1	0	0	0	0
MS	Pharr	A	61	0	1	0	0	0	0
MS	Pharr	D	62	0	1	0	0	0	0
MS	Pharr	E	63	0	0	0	0	0	0
OH	Seip	1	64	0	0	0	0	1	0

Table 5: Part four of four of the mound attribute table which was used in the multivariate clustering, 0s being absences and 1s being presences.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches_Purposeful_depo	killed_artifacts	Crafted_Objects	Pre_mound_fire_crematory_basins
Mound City	1	1	1	1	0	0	1	1	0	0	0	1	1
Mound City	2	2	2	1	1	0	1	1	0	1	0	1	1
Mound City	3	3	3	1	1	0	0	1	0	1	0	1	1
Mound City	4	4	4	0	0	0	0	0	0	0	0	0	1
Mound City	5	5	5	0	0	0	0	0	0	1	0	0	1
Mound City	6	6	6	0	0	0	0	0	0	0	0	0	0
Mound City	7	7	7	1	0	1	0	1	0	0	0	1	1
Mound City	8	8	8	1	0	0	1	1	0	1	1	1	1
Mound City	9	9	9	1	0	0	1	0	0	0	0	0	1
Mound City	10	10	10	1	1	0	1	1	0	0	0	1	1
Mound City	11	11	11	0	0	0	0	0	0	0	0	1	0
Mound City	12	12	12	1	1	0	1	1	0	0	0	1	1
Mound City	13	13	13	1	1	1	1	1	0	1	1	1	1
Mound City	14	14	14	0	0	0	0	0	1	0	0	0	0
Mound City	15	15	15	1	0	0	1	0	0	0	0	0	0
Mound City	16	16	16	0	0	0	0	0	0	0	0	0	0
Mound City	17	17	17	0	0	0	0	0	0	0	0	0	0
Mound City	18	18	18	1	1	0	0	1	0	0	0	1	1
Mound City	19	19	19	1	0	0	1	0	0	0	0	0	0
Mound City	20	20	20	0	0	0	0	0	1	0	0	0	1
Mound City	21	21	21	0	0	0	0	0	0	0	0	0	0
Mound City	22	22	22	0	0	0	0	0	0	0	0	0	0
Mound City	24	23	23	1	1	0	0	0	0	0	0	0	0
Mound City	25	24	24	1	0	1	1	1	0	0	0	1	1

Table 6: Clusters created for the Mound City sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Pre_mound_Post_structure	Number_of_pre_mound_substructur	Posts__non_structural_	Pre_mound_Pit	pre_mound_floor_or_cap	prepared_clay_floors__structure	Type_of_Burial__log_tomb	Type_of_Burial__stone_tomb	Surface_Leveling	CLUSTER_ID	IS_SEED
Mound City	1	1	1	1	1	0	0	0	0	0	0	0	8	1
Mound City	2	2	2	1	1	0	0	0	0	0	0	0	10	1
Mound City	3	3	3	1	1	0	0	0	1	0	0	0	17	1
Mound City	4	4	4	1	1	0	1	0	0	0	0	0	14	1
Mound City	5	5	5	1	1	0	0	0	0	0	0	0	7	1
Mound City	6	6	6	1	1	0	0	0	0	0	0	0	2	1
Mound City	7	7	7	1	2	1	0	0	1	0	0	0	18	1
Mound City	8	8	8	1	2	0	0	0	0	0	0	0	12	1
Mound City	9	9	9	1	1	0	0	0	0	0	0	0	6	1
Mound City	10	10	10	1	1	0	1	0	0	0	0	0	16	1
Mound City	11	11	11	1	1	0	0	0	0	0	0	0	5	1
Mound City	12	12	12	1	1	0	1	0	0	0	0	0	16	0
Mound City	13	13	13	1	2	0	1	1	1	0	0	0	19	1
Mound City	14	14	14	1	1	0	0	0	0	0	0	0	4	1
Mound City	15	15	15	1	1	1	0	0	0	0	0	0	13	1
Mound City	16	16	16	1	1	0	0	0	0	0	0	0	2	0
Mound City	17	17	17	1	1	0	0	0	0	0	0	0	2	0
Mound City	18	18	18	1	2	0	0	0	0	0	0	0	11	1
Mound City	19	19	19	1	1	0	0	0	0	0	0	0	3	1
Mound City	20	20	20	1	1	0	1	0	0	0	0	0	15	1
Mound City	21	21	21	1	1	0	0	0	0	0	0	0	2	0
Mound City	22	22	22	1	1	0	0	0	0	0	0	0	2	0
Mound City	24	23	23	0	0	0	0	0	0	0	0	0	1	1
Mound City	25	24	24	1	1	0	0	0	0	0	0	0	9	1

Table 7:Clusters created for the Mound City sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_burial__on_floor	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	Crafted_Objects	Pre_mound_fire_crematory_basins	Posts__n	Pre_mou	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	Natural_elevated_feature	pre_mound_floor_or_cap
Pinson	5	1	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0
Pinson	6	2	2	1	1	0	1	1	0	1	0	1	1	0	0	1	0	1
Pinson	10	3	3	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
Pinson	12	4	4	1	0	1	0	1	0	0	1	0	1	0	1	1	1	1
Pinson	29	5	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Pinson	31	6	6	1	0	0	1	1	1	0	1	1	1	0	0	1	0	1

Table 8:First clusters created for the Pinson sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Natural_elevated_feature	Non_local_sediment	enclosed_by_other_monument	Type_of_Burial__stone_tomb	Type_of_Burial__on_platform	artifact_caches	killed_artifacts	Pre_mound_Post_structure	Number_of_pre_mound_substructur	Topsoil_removal	prepared_clay_floors__structure	Colored_sediments	construction_platform	CLUSTER_ID	IS_SEED
Pinson	5	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
Pinson	6	2	2	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1
Pinson	10	3	3	1	0	0	0	0	0	0	0	0	1	0	0	0	3	1
Pinson	12	4	4	1	1	0	0	0	0	0	0	0	1	0	0	0	2	1
Pinson	29	5	5	0	0	1	0	0	0	0	0	0	1	0	0	0	3	0
Pinson	31	6	6	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0

Table 9:First clusters created for the Pinson sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_burial__on_floor	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	Crafted_Objects	Pre_mound_fire_crematory_basins	Posts__non_structural_	Pre_mound_Pit	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	Natural_elevated_feature
Pinson	5	1	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0
Pinson	6	2	2	1	1	0	1	1	0	1	0	1	1	0	0	1	0
Pinson	10	3	3	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Pinson	12	4	4	1	0	1	0	1	0	0	1	0	1	0	1	1	1
Pinson	29	5	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pinson	31	6	6	1	0	0	1	1	1	0	1	1	1	0	0	1	0

Table 10: Second clusters created for the Pinson sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Non_local_sediment	enclosed_by_other_monument	Type_of_Burial__stone_tomb	Type_of_Burial__on_platform	artifact_caches	killed_artifacts	Pre_mound_Post_structure	Number_of_pre_mound_substructur	Topsoil_removal	prepared_clay_floors__structure	Colored_sediments	construction_platform	CLUSTER_ID	IS_SEED
Pinson	5	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Pinson	6	2	2	1	0	0	0	0	0	0	0	1	0	0	0	2	1
Pinson	10	3	3	0	0	0	0	0	0	0	0	1	0	0	0	3	1
Pinson	12	4	4	1	0	0	0	0	0	0	0	1	0	0	0	4	1
Pinson	29	5	5	0	1	0	0	0	0	0	0	1	0	0	0	3	0
Pinson	31	6	6	0	0	0	0	0	0	0	0	1	0	0	0	5	1

Table 11: Second clusters created for the Pinson sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_Burial__stone_tomb	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches	killed_artifacts	Crafted_Objects	Pre_mound_fire	Pre_mound_Post_structure	Number_of_pre_mound_substructur
Mound City	1	1	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1
Mound City	2	2	2	1	0	0	1	0	1	1	0	1	0	1	1	1	1
Mound City	3	3	3	1	0	0	1	0	0	1	0	1	0	1	1	1	1
Mound City	4	4	4	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Mound City	5	5	5	0	0	0	0	0	0	0	0	1	0	0	1	1	1
Mound City	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	7	7	7	1	0	0	0	1	0	1	0	0	0	1	1	1	2
Mound City	8	8	8	1	0	0	0	0	1	1	0	1	1	1	1	1	2
Mound City	9	9	9	1	0	0	0	0	1	0	0	0	0	0	1	1	1
Mound City	10	10	10	1	0	0	1	0	1	1	0	0	0	1	1	1	1
Mound City	11	11	11	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Mound City	12	12	12	1	0	0	1	0	1	1	1	0	0	1	1	1	1
Mound City	13	13	13	1	0	0	1	1	1	1	0	1	1	1	1	1	2
Mound City	14	14	14	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Mound City	15	15	15	1	0	0	0	0	1	0	0	0	0	0	0	1	1
Mound City	16	16	16	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	17	17	17	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	18	18	18	1	0	0	1	0	0	1	0	0	0	1	1	1	2
Mound City	19	19	19	1	0	0	0	0	1	0	0	0	0	0	0	1	1
Mound City	20	20	20	0	0	0	0	0	0	0	1	0	0	0	1	1	1
Mound City	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	22	22	22	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	24	23	23	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Mound City	25	24	24	1	0	0	0	1	1	1	0	0	0	1	1	1	1
Newark	Eagle	25	25	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Taylor	1	26	26	1	0	0	0	0	1	1	1	0	0	0	0	0	0
Tremper	1	27	27	1	0	0	0	0	1	1	1	1	1	1	1	1	4
Seip	S1	28	28	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S2	29	29	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S3	30	30	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S4	31	31	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Seip	S5	32	32	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Seip	S6	33	33	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Seip	S7	34	34	0	0	0	0	0	0	1	0	0	0	0	0	1	1
Hopewell	2	35	35	1	0	1	0	1	1	1	0	1	0	1	1	1	1
Hopewell	4	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	7	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	11	38	38	1	0	0	0	0	1	1	0	1	0	1	1	0	0
Hopewell	17	39	39	0	0	0	0	0	0	1	0	1	1	1	1	0	0
Hopewell	20	40	40	1	0	0	1	1	0	1	0	0	0	0	0	0	0
Hopewell	23	41	41	1	1	0	1	0	0	1	0	0	0	0	1	0	0
Hopewell	24	42	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hopewell	26	43	43	1	0	0	0	1	1	1	0	1	1	1	1	1	1
Hopewell	33	44	44	0	0	0	0	0	0	0	1	0	0	1	1	1	1
Hopewell	25	45	45	1	1	0	1	1	1	1	0	0	0	1	1	1	4
Seip	1	46	46	1	1	1	1	1	1	1	0	1	1	1	1	0	0

Table 12:First clusters created for the Ohio sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Posts__non_structural_	Pre_mound_Pit	Topsoil_removal	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	prepared_clay_floors__structure	Colored_sediments	Natural_elevated_feature	enclosed_by_other_monument	Non_local_sediment	construction_platform	CLUSTER_ID	IS_SEED
Mound City	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Mound City	2	2	2	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Mound City	3	3	3	0	0	0	0	0	0	1	0	0	1	0	0	1	0
Mound City	4	4	4	0	1	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	5	5	5	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	6	6	6	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	7	7	7	1	0	0	0	0	0	1	0	0	1	0	0	1	0
Mound City	8	8	8	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Mound City	9	9	9	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	10	10	10	0	1	0	0	0	0	0	0	0	1	0	0	1	1
Mound City	11	11	11	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	12	12	12	0	1	0	0	0	0	0	0	0	1	0	0	1	0
Mound City	13	13	13	0	1	0	0	0	1	1	0	0	1	0	0	1	0
Mound City	14	14	14	0	0	0	0	0	0	0	0	0	1	0	0	2	1
Mound City	15	15	15	1	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	16	16	16	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	17	17	17	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	18	18	18	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Mound City	19	19	19	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	20	20	20	0	1	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	21	21	21	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	22	22	22	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	24	23	23	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Mound City	25	24	24	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Newark	Eagle	25	25	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Taylor	1	26	26	0	0	0	0	0	0	0	0	1	0	0	0	2	0
Tremper	1	27	27	0	0	0	0	0	0	1	0	0	1	0	0	1	0
Seip	S1	28	28	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S2	29	29	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S3	30	30	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S4	31	31	0	1	0	0	0	0	0	1	0	0	0	0	2	0
Seip	S5	32	32	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S6	33	33	0	1	0	0	0	0	0	1	0	0	0	0	2	0
Seip	S7	34	34	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Hopewell	2	35	35	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	4	36	36	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Hopewell	7	37	37	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Hopewell	11	38	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	17	39	39	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	20	40	40	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	23	41	41	1	1	0	0	0	1	0	0	0	0	0	0	1	0
Hopewell	24	42	42	0	0	0	0	0	1	0	0	0	0	0	0	2	0
Hopewell	26	43	43	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Hopewell	33	44	44	0	0	0	0	1	0	0	0	0	1	0	0	2	0
Hopewell	25	45	45	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Seip	1	46	46	1	1	1	1	0	1	0	0	0	1	0	0	1	0

Table 13:First clusters created for the Ohio sample, part two of two

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_Burial__stone_tomb	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches	killed_artifacts	Crafted_Objects	Pre_mound_fire	Pre_mound_Post_structure
Mound City	1	1	1	1	0	0	0	0	1	1	0	0	0	1	1	1
Mound City	2	2	2	1	0	0	1	0	1	1	0	1	0	1	1	1
Mound City	3	3	3	1	0	0	1	0	0	1	0	1	0	1	1	1
Mound City	4	4	4	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	5	5	5	0	0	0	0	0	0	0	0	1	0	0	1	1
Mound City	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	1
Mound City	7	7	7	1	0	0	0	1	0	1	0	0	0	1	1	1
Mound City	8	8	8	1	0	0	0	0	1	1	0	1	1	1	1	1
Mound City	9	9	9	1	0	0	0	0	1	0	0	0	0	0	1	1
Mound City	10	10	10	1	0	0	1	0	1	1	0	0	0	1	1	1
Mound City	11	11	11	0	0	0	0	0	0	0	0	0	0	1	0	1
Mound City	12	12	12	1	0	0	1	0	1	1	1	0	0	1	1	1
Mound City	13	13	13	1	0	0	1	1	1	1	0	1	1	1	1	1
Mound City	14	14	14	0	0	0	0	0	0	0	1	0	0	0	0	1
Mound City	15	15	15	1	0	0	0	0	1	0	0	0	0	0	0	1
Mound City	16	16	16	0	0	0	0	0	0	0	0	0	0	0	0	1
Mound City	17	17	17	0	0	0	0	0	0	0	0	0	0	0	0	1
Mound City	18	18	18	1	0	0	1	0	0	1	0	0	0	1	1	1
Mound City	19	19	19	1	0	0	0	0	1	0	0	0	0	0	0	1
Mound City	20	20	20	0	0	0	0	0	0	0	1	0	0	0	1	1
Mound City	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	1
Mound City	22	22	22	0	0	0	0	0	0	0	0	0	0	0	0	1
Mound City	24	23	23	1	0	0	1	0	0	0	0	0	0	0	0	0
Mound City	25	24	24	1	0	0	0	1	1	1	0	0	0	1	1	1
Newark	Eagle	25	25	0	0	0	0	0	0	0	0	0	0	0	1	1
Taylor	1	26	26	1	0	0	0	0	1	1	1	0	0	0	0	0
Tremper	1	27	27	1	0	0	0	0	1	1	1	1	1	1	1	1
Seip	S1	28	28	0	0	0	0	0	0	0	0	0	0	0	0	1
Seip	S2	29	29	0	0	0	0	0	0	0	0	0	0	0	0	1
Seip	S3	30	30	0	0	0	0	0	0	0	0	0	0	0	0	1
Seip	S4	31	31	0	0	0	0	0	0	0	1	0	0	0	0	1
Seip	S5	32	32	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S6	33	33	0	0	0	0	0	0	0	0	0	0	1	0	1
Seip	S7	34	34	0	0	0	0	0	0	1	0	0	0	0	0	1
Hopewell	2	35	35	1	0	1	0	1	1	1	0	1	0	1	1	1
Hopewell	4	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	7	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	11	38	38	1	0	0	0	0	1	1	0	1	0	1	1	0
Hopewell	17	39	39	0	0	0	0	0	0	1	0	1	1	1	1	0
Hopewell	20	40	40	1	0	0	1	1	0	1	0	0	0	0	0	0
Hopewell	23	41	41	1	1	0	1	0	0	1	0	0	0	0	1	0
Hopewell	24	42	42	0	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	26	43	43	1	0	0	0	1	1	1	0	1	1	1	1	1
Hopewell	33	44	44	0	0	0	0	0	0	0	1	0	0	1	1	1
Hopewell	25	45	45	1	1	0	1	1	1	1	0	0	0	1	1	1
Seip	1	46	46	1	1	1	1	1	1	1	0	1	1	1	1	0

Table 14: Second clusters created for the Ohio sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Number_of_pre_mound_substructur	Posts__non_structural_	Pre_mound_Pit	Topsoil_removal	opsoil_replacemer	Surface_Leveling	pre_mound_floor_or_cap	red_clay_floors__stru	Colored_sediments
Mound City	1	1	1	1	0	0	0	0	0	0	0	0
Mound City	2	2	2	1	0	0	0	0	0	0	0	0
Mound City	3	3	3	1	0	0	0	0	0	0	1	0
Mound City	4	4	4	1	0	1	0	0	0	0	0	0
Mound City	5	5	5	1	0	0	0	0	0	0	0	0
Mound City	6	6	6	1	0	0	0	0	0	0	0	0
Mound City	7	7	7	2	1	0	0	0	0	0	1	0
Mound City	8	8	8	2	0	0	0	0	0	0	0	0
Mound City	9	9	9	1	0	0	0	0	0	0	0	0
Mound City	10	10	10	1	0	1	0	0	0	0	0	0
Mound City	11	11	11	1	0	0	0	0	0	0	0	0
Mound City	12	12	12	1	0	1	0	0	0	0	0	0
Mound City	13	13	13	2	0	1	0	0	0	1	1	0
Mound City	14	14	14	1	0	0	0	0	0	0	0	0
Mound City	15	15	15	1	1	0	0	0	0	0	0	0
Mound City	16	16	16	1	0	0	0	0	0	0	0	0
Mound City	17	17	17	1	0	0	0	0	0	0	0	0
Mound City	18	18	18	2	0	0	0	0	0	0	0	0
Mound City	19	19	19	1	0	0	0	0	0	0	0	0
Mound City	20	20	20	1	0	1	0	0	0	0	0	0
Mound City	21	21	21	1	0	0	0	0	0	0	0	0
Mound City	22	22	22	1	0	0	0	0	0	0	0	0
Mound City	24	23	23	0	0	0	0	0	0	0	0	0
Mound City	25	24	24	1	0	0	0	0	0	0	0	0
Newark	Eagle	25	25	1	0	0	0	0	0	0	0	0
Taylor	1	26	26	0	0	0	0	0	0	0	0	0
Tremper	1	27	27	4	0	0	0	0	0	0	1	0
Seip	S1	28	28	1	0	0	0	0	0	0	0	0
Seip	S2	29	29	1	0	1	0	0	0	0	0	0
Seip	S3	30	30	1	0	1	0	0	0	0	0	0
Seip	S4	31	31	1	0	1	0	0	0	0	0	1
Seip	S5	32	32	1	0	1	0	0	0	0	0	0
Seip	S6	33	33	1	0	1	0	0	0	0	0	1
Seip	S7	34	34	1	0	0	0	0	0	0	0	0
Hopewell	2	35	35	1	0	1	0	0	0	0	0	0
Hopewell	4	36	36	0	0	1	0	0	0	0	0	0
Hopewell	7	37	37	0	0	0	0	0	0	0	0	0
Hopewell	11	38	38	0	0	0	0	0	0	0	0	0
Hopewell	17	39	39	0	1	0	0	0	0	0	0	0
Hopewell	20	40	40	0	1	1	0	0	0	0	0	0
Hopewell	23	41	41	0	1	1	0	0	0	1	0	0
Hopewell	24	42	42	0	0	0	0	0	0	1	0	0
Hopewell	26	43	43	1	0	0	0	0	0	0	0	0
Hopewell	33	44	44	1	0	0	0	0	1	0	0	0
Hopewell	25	45	45	4	0	0	0	0	0	0	0	0
Seip	1	46	46	0	1	1	1	1	0	1	0	0

Table 15: Second clusters created for the Ohio sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches_	Crafted_Objects	Pre_mound_fire_	Pre_mound_Post_structure	Number_of_pre_mound_substructur	Posts__non_structural_	Pre_mound_Pit
Pinson	5	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Pinson	6	2	2	1	1	0	0	1	1	0	0	1	0	0	0	1	1
Pinson	10	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	12	4	4	1	0	1	0	0	1	0	0	0	1	0	0	0	1
Pinson	29	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	31	6	6	1	0	0	0	1	1	1	0	0	1	0	0	1	1
Marksville	4	7	7	1	0	0	1	0	0	0	0	0	1	1	1	0	1
Crooks	A	8	8	1	0	0	1	0	1	0	0	1	0	0	0	0	0
Bynum	A	9	9	1	1	0	0	0	1	0	0	1	1	1	1	0	0
Bynum	B	10	10	1	0	0	0	1	1	0	1	1	1	1	1	0	1
Bynum	D	11	11	1	0	0	0	1	1	1	0	1	1	1	0	0	1
Helena Crossing	C	12	12	1	1	0	0	1	1	0	0	1	1	0	0	0	1
Helena Crossing	B	13	13	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Pharr	H	14	14	0	0	0	0	0	0	0	0	1	1	0	0	1	0
Pharr	A	15	15	1	0	0	0	1	1	0	0	0	0	0	0	0	0
Pharr	D	16	16	1	0	1	0	0	1	0	0	1	1	0	0	0	0
Pharr	E	17	17	1	0	0	1	1	1	0	0	1	1	0	0	1	1
Ingomar	1	18	18	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Table 16: First clusters created for the Southeast sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Topsoil_removal	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	Colored_sediments	Natural_elevated_feature	Non_local_sediment	enclosed_by_other_monument	construction_platform	Type_of_Burial__stone_tomb	killed_artifacts	_clay_floors_	CLUSTER_ID	IS_SEED
Pinson	5	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Pinson	6	2	2	1	0	0	1	0	0	1	0	0	0	0	0	4	1
Pinson	10	3	3	1	1	0	1	0	1	0	0	0	0	0	0	5	1
Pinson	12	4	4	1	0	1	1	0	1	1	0	0	0	0	0	3	1
Pinson	29	5	5	1	0	0	1	0	0	0	1	0	0	0	0	7	1
Pinson	31	6	6	1	0	0	1	0	0	0	0	0	0	0	0	10	1
Marksville	4	7	7	0	0	0	0	0	0	0	1	1	0	0	0	2	1
Crooks	A	8	8	0	0	0	1	0	0	0	0	1	0	0	0	13	1
Bynum	A	9	9	0	0	0	1	0	0	0	0	1	0	0	0	8	1
Bynum	B	10	10	1	0	0	0	0	0	0	0	0	0	0	0	6	1
Bynum	D	11	11	0	0	0	0	0	0	0	0	0	0	0	0	9	1
Helena Crossing	C	12	12	1	0	0	0	0	0	0	0	0	0	0	0	16	1
Helena Crossing	B	13	13	0	0	0	0	0	0	0	0	0	0	0	0	12	1
Pharr	H	14	14	0	0	0	0	1	0	0	0	0	0	0	0	11	1
Pharr	A	15	15	0	0	0	1	1	0	0	0	0	0	0	0	14	1
Pharr	D	16	16	1	1	0	0	1	0	0	0	0	0	0	0	15	1
Pharr	E	17	17	0	0	0	1	0	0	0	0	0	0	0	0	17	1
Ingomar	1	18	18	0	0	0	1	1	0	0	0	0	0	0	0	11	0

Table 17: First clusters created for the Southeast sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches	Crafted_Objects	Pre_mound_fire_	Pre_mound_Post_structure	Number_of_pre_mound_substructur	Posts__non_structural_	Pre_mound_Pit
Pinson	5	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Pinson	6	2	2	1	1	0	0	1	1	0	0	1	0	0	0	1	1
Pinson	10	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	12	4	4	1	0	1	0	0	1	0	0	0	1	0	0	0	1
Pinson	29	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	31	6	6	1	0	0	0	1	1	1	0	0	1	0	0	1	1
Marksville	4	7	7	1	0	0	1	0	0	0	0	0	1	1	1	0	1
Crooks	A	8	8	1	0	0	1	0	1	0	0	1	0	0	0	0	0
Bynum	A	9	9	1	1	0	0	0	1	0	0	1	1	1	1	0	0
Bynum	B	10	10	1	0	0	0	1	1	0	1	1	1	1	1	0	1
Bynum	D	11	11	1	0	0	0	1	1	1	0	1	1	1	0	0	1
Helena Crossing	C	12	12	1	1	0	0	1	1	0	0	1	1	0	0	0	1
Helena Crossing	B	13	13	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Pharr	H	14	14	0	0	0	0	0	0	0	0	1	1	0	0	1	0
Pharr	A	15	15	1	0	0	0	1	1	0	0	0	0	0	0	0	0
Pharr	D	16	16	1	0	1	0	0	1	0	0	1	1	0	0	0	0
Pharr	E	17	17	1	0	0	1	1	1	0	0	1	1	0	0	1	1
Ingomar	1	18	18	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Table 18: Second clusters created for the Southeast sample, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Topsoil_removal	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	Colored_sediments	Natural_elevated_feature	Non_local_sediment_	enclosed_by_other_monument	construction_platform	Type_of_Burial__stone_tomb	killed_artifacts	prepared_clay_floors__structure	CLUSTER_ID	IS_SEED
Pinson	5	1	1	1	1	0	0	0	0	0	0	0	0	0	0	6	0
Pinson	6	2	2	1	0	0	1	0	0	1	0	0	0	0	0	2	1
Pinson	10	3	3	1	1	0	1	0	1	0	0	0	0	0	0	6	1
Pinson	12	4	4	1	0	1	1	0	1	1	0	0	0	0	0	5	1
Pinson	29	5	5	1	0	0	1	0	0	0	1	0	0	0	0	1	1
Pinson	31	6	6	1	0	0	1	0	0	0	0	0	0	0	0	3	1
Marksville	4	7	7	0	0	0	0	0	0	0	1	1	0	0	0	4	1
Crooks	A	8	8	0	0	0	1	0	0	0	0	1	0	0	0	8	1
Bynum	A	9	9	0	0	0	1	0	0	0	0	1	0	0	0	7	1
Bynum	B	10	10	1	0	0	0	0	0	0	0	0	0	0	0	11	1
Bynum	D	11	11	0	0	0	0	0	0	0	0	0	0	0	0	12	1
Helena Crossing	C	12	12	1	0	0	0	0	0	0	0	0	0	0	0	9	1
Helena Crossing	B	13	13	0	0	0	0	0	0	0	0	0	0	0	0	13	1
Pharr	H	14	14	0	0	0	0	1	0	0	0	0	0	0	0	10	1
Pharr	A	15	15	0	0	0	1	1	0	0	0	0	0	0	0	14	1
Pharr	D	16	16	1	1	0	0	1	0	0	0	0	0	0	0	15	1
Pharr	E	17	17	0	0	0	1	0	0	0	0	0	0	0	0	16	1
Ingomar	1	18	18	0	0	0	1	1	0	0	0	0	0	0	0	10	0

Table 19: Second clusters created for the Southeast sample, part two of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Burials_	Type_of_Burial__log_tomb	Burial__st	Type_of_burial__on_floor	Type_of_Burial__on_platform	Type_of_Burial__Pit_basin	Non_local_material	Domestic_Debris	artifact_caches_	killed_artifacts	Crafted_Objects	Pre_mound_fire_	Pre_mound_Post_structure	Number_of_pre_mound_substructur
Pinson	5	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pinson	6	2	2	1	1	0	0	0	1	1	0	0	0	1	0	0	0
Pinson	10	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	12	4	4	1	0	0	1	0	0	1	0	0	0	0	1	0	0
Pinson	29	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinson	31	6	6	1	0	0	0	0	1	1	1	0	0	0	1	0	0
Mound City	1	7	7	1	0	0	0	0	1	1	0	0	0	1	1	1	1
Mound City	2	8	8	1	0	0	1	0	1	1	0	1	0	1	1	1	1
Mound City	3	9	9	1	0	0	1	0	0	1	0	1	0	1	1	1	1
Mound City	4	10	10	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Mound City	5	11	11	0	0	0	0	0	0	0	0	1	0	0	1	1	1
Mound City	6	12	12	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	7	13	13	1	0	0	0	1	0	1	0	0	0	1	1	1	2
Mound City	8	14	14	1	0	0	0	0	1	1	0	1	1	1	1	1	2
Mound City	9	15	15	1	0	0	0	0	1	1	0	0	0	0	1	1	1
Mound City	10	16	16	1	0	0	1	0	1	1	0	0	0	1	1	1	1
Mound City	11	17	17	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Mound City	12	18	18	1	0	0	1	0	1	1	1	0	0	1	1	1	1
Mound City	13	19	19	1	0	0	1	1	1	1	0	1	1	1	1	1	2
Mound City	14	20	20	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Mound City	15	21	21	1	0	0	0	0	1	0	0	0	0	0	0	1	1
Mound City	16	22	22	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	17	23	23	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	18	24	24	1	0	0	1	0	0	1	0	0	0	1	1	1	2
Mound City	19	25	25	1	0	0	0	0	1	0	0	0	0	0	0	1	1
Mound City	20	26	26	0	0	0	0	0	0	0	1	0	0	0	1	1	1
Mound City	21	27	27	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	22	28	28	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Mound City	24	29	29	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Mound City	25	30	30	1	0	0	0	1	1	1	0	0	0	1	1	1	1
Ingomar	1	31	31	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Marksville	4	32	32	1	0	0	0	1	0	0	0	0	0	0	1	1	1
Crooks	A	33	33	1	0	0	0	1	0	1	0	0	0	1	0	0	0
Bynum	A	34	34	1	1	0	0	0	0	1	0	0	0	1	1	1	1
Bynum	B	35	35	1	0	0	0	0	1	1	0	1	0	1	1	1	1
Bynum	D	36	36	1	0	0	0	0	1	1	1	0	0	1	1	1	0
Newark	Eagle	37	37	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Taylor	1	38	38	1	0	0	0	0	1	1	1	0	0	0	0	0	0
Tremper	1	39	39	1	0	0	0	0	1	1	1	1	1	1	1	1	4
Seip	S1	40	40	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S2	41	41	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S3	42	42	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seip	S4	43	43	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Seip	S5	44	44	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Seip	S6	45	45	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Seip	S7	46	46	0	0	0	0	0	0	1	0	0	0	0	0	1	1
Helena Crossing	C	47	47	1	1	0	0	0	1	1	0	0	0	1	1	0	0
Helena Crossing	B	48	48	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	2	49	49	1	0	1	0	1	1	1	0	1	0	1	1	1	1
Hopewell	4	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	7	51	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopewell	11	52	52	1	0	0	0	0	1	1	0	1	0	1	1	0	0
Hopewell	17	53	53	0	0	0	0	0	0	1	0	1	1	1	1	0	0
Hopewell	20	54	54	1	0	0	1	1	0	1	0	0	0	0	0	0	0
Hopewell	23	55	55	1	1	0	1	0	0	1	0	0	0	0	1	0	0
Hopewell	24	56	56	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hopewell	26	57	57	1	0	0	0	1	1	1	0	1	1	1	1	1	1
Hopewell	33	58	58	0	0	0	0	0	0	0	1	0	0	1	1	1	1
Hopewell	25	59	59	1	1	0	1	1	1	1	0	0	0	1	1	1	4
Pharr	H	60	60	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Pharr	A	61	61	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Pharr	D	62	62	1	0	0	1	0	0	1	0	0	0	1	1	0	0
Pharr	E	63	63	1	0	0	0	1	1	1	0	0	0	1	1	0	0
Seip	1	64	64	1	1	1	1	1	1	1	0	1	1	1	1	0	0

Table 20: Clusters created for the all the mounds, part one of two.

Site	Mound Number	OBJECTID	SOURCE_ID	Posts__non_structural_	Pre_mound_Pit	Topsoil_removal	Topsoil_replacement	Surface_Leveling	pre_mound_floor_or_cap	prepared_clay_floors__structure	Colored_sediments	Natural_elevated_feature	Non_local_sediment_	enclosed_by_other_monument	construction_platform	CLUSTER_ID	IS_SEED
Pinson	5	1	1	0	1	1	1	0	0	0	0	0	0	0	0	2	0
Pinson	6	2	2	1	1	1	0	0	1	0	0	0	1	0	0	1	0
Pinson	10	3	3	0	0	1	1	0	1	0	0	1	0	0	0	2	0
Pinson	12	4	4	0	1	1	0	1	1	0	0	1	1	0	0	1	0
Pinson	29	5	5	0	0	1	0	0	1	0	0	0	0	1	0	2	0
Pinson	31	6	6	1	1	1	0	0	1	0	0	0	0	0	0	1	1
Mound City	1	7	7	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	2	8	8	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	3	9	9	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Mound City	4	10	10	0	1	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	5	11	11	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	6	12	12	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	7	13	13	1	0	0	0	0	0	1	0	0	0	1	0	1	0
Mound City	8	14	14	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	9	15	15	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	10	16	16	0	1	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	11	17	17	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	12	18	18	0	1	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	13	19	19	0	1	0	0	0	1	1	0	0	0	1	0	1	0
Mound City	14	20	20	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	15	21	21	1	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	16	22	22	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	17	23	23	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	18	24	24	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Mound City	19	25	25	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	20	26	26	0	1	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	21	27	27	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	22	28	28	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	24	29	29	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Mound City	25	30	30	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Ingomar	1	31	31	1	1	0	0	0	1	0	1	0	0	0	0	2	0
Marksville	4	32	32	0	1	0	0	0	0	0	0	0	0	1	1	2	0
Crooks	A	33	33	0	0	0	0	0	1	0	0	0	0	0	1	1	0
Bynum	A	34	34	0	0	0	0	0	1	0	0	0	0	0	1	1	0
Bynum	B	35	35	0	1	1	0	0	0	0	0	0	0	0	0	1	0
Bynum	D	36	36	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Newark	Eagle	37	37	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Taylor	1	38	38	0	0	0	0	0	0	0	0	1	0	0	0	2	0
Tremper	1	39	39	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Seip	S1	40	40	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S2	41	41	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S3	42	42	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S4	43	43	0	1	0	0	0	0	0	1	0	0	0	0	2	0
Seip	S5	44	44	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Seip	S6	45	45	0	1	0	0	0	0	0	1	0	0	0	0	2	0
Seip	S7	46	46	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Helena Crossing	C	47	47	0	1	1	0	0	0	0	0	0	0	0	0	1	0
Helena Crossing	B	48	48	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Hopewell	2	49	49	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	4	50	50	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Hopewell	7	51	51	0	0	0	0	0	0	0	0	0	0	1	0	2	0
Hopewell	11	52	52	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	17	53	53	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	20	54	54	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Hopewell	23	55	55	1	1	0	0	0	1	0	0	0	0	0	0	1	0
Hopewell	24	56	56	0	0	0	0	0	1	0	0	0	0	0	0	2	0
Hopewell	26	57	57	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Hopewell	33	58	58	0	0	0	0	1	0	0	0	0	0	1	0	2	0
Hopewell	25	59	59	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Pharr	H	60	60	1	0	0	0	0	0	0	1	0	0	0	0	2	0
Pharr	A	61	61	0	0	0	0	0	1	0	1	0	0	0	0	2	1
Pharr	D	62	62	0	0	1	1	0	0	0	1	0	0	0	0	1	0
Pharr	E	63	63	1	1	0	0	0	1	0	0	0	0	0	0	1	0
Seip	1	64	64	1	1	1	1	0	1	0	0	0	0	1	0	1	0

Table 21: Clusters created for the all the mounds, part two of two.