THE KOCHER SITE (12D491): A SPATIAL AND CERAMIC ANALYSIS

A THESIS

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

MASTER OF ARTS

BY

ERIN ALICIA STEINWACHS

DR. KEVIN C. NOLAN- ADVISOR

BALL STATE UNIVERSITY

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INTRODUCTION

Social organization, community structure, and the spatial layout of archaeological sites are often represented by activity areas or clusters of different classes of artifacts. This differentiation of space and overall community patterning can provide insight into the landscape planning and use of an area. These spaces, based on different classes of artifacts can identify household areas, specialization areas, and areas void of physical artifacts. My research focuses on the identification of these specific activity areas, or purposeful spaces designated within a large Late Prehistoric village, 12D491 (the Kocher Site) located in Dearborn County, Indiana, based on a sample systematically collected through surface survey (Figure 1). Specifically, I examine the spatial distribution of each artifact class in addition to conducting an in-depth ceramic attribute analysis to better understand the fine-scale patterns of space usage and fluctuations in density within the site. According to original collection information from George Zeumer, 12D491 is a large Late Prehistoric village; this determination was based on the presence of many shell-tempered ceramics, shell hoes, bone pins, triangular points, and antler points (Parish and McCord 1995). In 2013, this site was pedestrian surveyed by the Applied Anthropology Laboratories at Ball State University as part of a Fiscal Year 2013 Historic Preservation Fund grant, and almost 12,000 artifacts were collected. The ultimate goal of this research is to gain a more comprehensive understanding of the site structure and use of space, such as degrees or presence of use differentiation, and overall community patterning within a Late Prehistoric village, using a sample collected exclusively from surface survey. In addition, I demonstrate that the successful analysis of a surface assemblage can provide support for alternative data collection methods and types of analysis.
BACKGROUND AND LITERATURE REVIEW

Introduction

In this chapter, I discuss the history of the term Fort Ancient in archaeology touching on the origin, development, and current uses of the term. I also examine village or settlement structure in the Late Prehistoric period, as well as archaeological investigation and spatial analysis through surface survey. Lastly, I will review the history of the Late Prehistoric period in southern Indiana, and the specific environmental context of 12D491.

Fort Ancient History and Culture Concept

Fort Ancient is a taxon used to describe the Late Prehistoric in the Midwest United States. It was originally used by William C. Mills in 1906, but there was no explicit definition of the term. Fort Ancient was first comprehensively examined by James Griffin (1943) in *The Fort Ancient Aspect* in an attempt to create a comprehensive definition of the Fort Ancient culture. Griffin constructed foci, or groups of objects similar in nature based on their phenotypic characteristics (Griffin 1966). Griffin constructed these foci around ceramics, and his categorization has continued throughout the different characterizations of Fort Ancient. Griffin used the Midwestern Taxonomic Method, also known as the McKern method, to categorize the sites (Griffin 1966:327-341). However, the method was not used properly and the term Fort Ancient is loosely described by geographic location and phenotypic variation in ceramics (Graybill 1981:9-10; Lyman and O’Brien 2003:59). Griffin’s four Fort Ancient foci—Baum, Anderson, Feurt, and Madisonville—were considered to be mostly contemporaneous and are not associated with any temporal designations (Griffin 1966). Griffin states the Baum focus is mostly in Ross County, Ohio. However, Serpent Mound and Baldwin—both sites associated with the Baum focus—are located outside the present day Ross County limits (Figure 1; Griffin
The majority of the Baum focus ceramics are called Baum Cordmarked by Griffin and are grit-tempered (Griffin 1966:44). The Anderson focus is in the northern portion of southwestern Ohio and the ceramics are mostly grit-tempered and cord-marked (Griffin 1966:97-100, 116). Some ceramic decoration elements like guilloches and line-filled triangles suggest a link with Mississippian sites (Griffin 1966:118). The Fuert focus is mostly in south central Ohio on the east side of the Scioto River (Griffin 1966:70). The ceramics are incised, called Fuert Incised by Griffin, and are plain and shell-tempered (Griffin 1966:76-80). The Madisonville Focus incorporates the largest number of sites and geographically includes part of southeastern Indiana and the northern portion of Kentucky; it also has the largest number of traits which indicate relationships with Oneota, Mississippian, and Fisher communities (Griffin 1966:188-194). The ceramics in this focus are all shell-tempered (Griffin 1966:133).

After Griffin’s volume, the next comprehensive work associated with Fort Ancient was written by Prufer and Shane in 1970. *Blain Village and the Fort Ancient Tradition* focused on the Late Prehistoric in the Middle Ohio Valley. Using Griffin’s work as a starting point, the foci were modified by a temporal designation and geographic boundary. Prufer and Shane’s new foci were called phases, had temporal designation, and the Fort Ancient Aspect was renamed to the Fort Ancient Tradition. Additional phases have been defined and referred to as part of the Fort Ancient Tradition (Carskadden and Morton 1977; Cowan 1986; Dunnell 1972; Essenpreis 1978; Gartley 1977; Graybill 1981; Pollack and Henderson 1992). Kennedy (2000; Table 1) presents a comprehensive table including many of these commonly referenced Fort Ancient Phases, their proposed time spans, and the references associated with each. Because of the availability of radiocarbon dates, Prufer and Shane were able to use new information in their analysis, but the final product was still largely based on ceramic traits and Griffin’s original foci. In addition to
adding a temporal component to their phases, Prufer and Shane split Fort Ancient into three
distinct periods, Early (AD 950-1250), Middle (AD 1250-1450), and Late (AD 1450-1750)
which are widely used today. Griffin’s Baum focus was designated as Early Fort Ancient, the
Anderson and Fuert phase are designated as Middle Fort Ancient, and the Madisonville phase is
designated Late Fort Ancient.

Both Griffin (1966) and Prufer and Shane (1970) focused on the Ohio Fort Ancient.
Prüfer dedicated himself specifically to the Middle Ohio River Valley, elaborating on Griffin’s
original work. Griffin briefly discussed other areas that exhibit the Fort Ancient aspect,
including sites in West Virginia and Kentucky. He also included a few sites in Indiana (Site 14
Ohio County, Site 18 Ohio County, Site 29 and Site 18 Dearborn County) (Griffin 1966:12, see
Map 1). This data collected by Griffin (1966) and Prufer and Shane (1970) did not seem to fit
with the perception of Fort Ancient in Kentucky, probably because each time period
corresponded to a regional (Ohio) designation (Nolan 2010:31). Other than these limited sites
outside of Ohio, Fort Ancient was not clearly described in other areas until A. Gwynn Henderson
(1992a, 1992b, 1998) detailed the archaeological record using an approach called a polythetic set
to group items (mostly ceramics) based on observable traits from five sites in Kentucky and
defined four new Fort Ancient phases, which are the Croghan phase (A.D. 1000-1200), Manion
phase (A.D. 1200-1400), Gist phase (A.D. 1400-1550), and Montour phase (A.D. 1550-1750)
(Henderson 1992a). Ohio and Kentucky Fort Ancient have been examined in detail, but Indiana
and West Virginia Fort Ancient are only mentioned, often lumped in with southwestern Ohio or
southeastern Ohio and Kentucky, respectively, and are infrequently the sole focus of Fort
Ancient culture description.
In addition to being called Fort Ancient, groups of people in the Late Prehistoric are also called Madisonville. The Madisonville horizon, originally defined by Griffin (1966), was used to describe a spatial location (southeastern Indiana, southwestern Ohio, and Northern Kentucky), a set of specific ceramic characteristics, and then a temporal period (around A.D. 1400) (Essenpreis 1988:9; Griffin 1966:119-164; Kennedy 2000:15). Griffin (1966) devotes a specific section to Southeastern Indiana and the Madisonville Focus sites and highlights ceramic assemblages from Site No. 18 (12D18) and Site No. 19 (12D19) that are mostly shell-tempered, and plain (Griffin 1966:184-185). Today, the term Madisonville has become synonymous with Late Fort Ancient. The spatial and social organization of Late Prehistoric interaction and Madisonville specifically have been reexamined by Drooker (2000) who explores the integration and relationship between the Madisonville focus and the Anderson focus (Drooker 2000:228-260). Pollack and Henderson (2000) characterize the Late Fort Ancient, or Madisonville horizon as a period of increased interaction between other communities in the Late Prehistoric including Fort Ancient, Oneonta, and Mississippian, and larger villages or communities (Pollack and Henderson 2000:205).

Today, most research is still based on Griffin’s original work and terminology as well as Prufer and Shane’s adaptations of the term Fort Ancient. Ceramic attributes, and even the attributes used by Griffin, are still widely used to describe sites. Prufer and Shane’s three part designation of Early, Middle, and Late Fort Ancient are commonly paired with these ceramic traits to describe collections or new sites. However, a few people critique this original research and description of the Fort Ancient taxon, suggesting that a re-assessment is in order and that the original groups of objects described as Fort Ancient foci should not be the basis for research (Essenpreis 1978; Graybill 1984; Nolan and Cook 2011; Schambach 1971). After focusing on
the temporal and geographic extent of Fort Ancient, archaeological research shifted to a smaller level focusing on regions (Brady-Rawlins 2007; Carskadden 2000; Cook 2008; Cowan et al 1990; Drooker 1997; Kennedy 2000), specific sites (Cowan 1986; Dunnell, Hanson, and Hardesty 1971; Essenpreis 1982; Heilman et al. 1988), and topic based questions (Brose 1982; Church 1988; Graybill 2981). Each of these works retained some form of the Fort Ancient phases originally defined by Griffin (1966) and later refined by Prufer and Shane (1970), but many made an attempt to modify, further explain, or refute some aspect of them.

The large scope of research and mixing of units makes the term Fort Ancient complicated to understand at best. Because of the lack of an intensional definition (Dunnell 1971) for the term Fort Ancient, it has come to represent different geographic areas, time periods, ceramic forms, and groups of sites. These units aren’t mutually exclusive or directly related, making it difficult to characterize the extent, or lack of, variability within the Late Prehistoric. The mixing of these analytical frameworks and lack of explicit explanation as to which units are being used in each case makes understanding which mental framework and realm of understanding the researcher is using to discuss the Late Prehistoric extremely confusing, especially in southeast Indiana. However, these different frameworks and definitions are still used widely in research today because they are convenient, easily recognizable by name, and have been used almost exclusively in the past. In an attempt to avoid some of this confusion, I will use Fort Ancient only to refer to archaeological forms or previously conducted research and will instead use Late Prehistoric, referring to a time period (A.D. 1000-1600), and if necessary, citing the most applicable frame of reference for understanding which Fort Ancient is being discussed.
Regional Context South East Indiana

Fort Ancient is most often mentioned in relation to southern Ohio, Kentucky, southern Indiana, and the West Virginia/Kentucky/Ohio border. 12D491 is adjacent to the Whitewater River and was resurveyed by the Applied Anthropology Laboratory at Ball State University because it was identified as a Fort Ancient village site and originally found by a local artifact collector (Parrish and McCord 1995:38). The soils in Survey Area 2, SA2, “are relatively young characterized as a fine loamy Eutrudept (Ch) and a coarse loamy Udifluvent (Stonelick sandy loam, St.). Both of the soil phases are frequently flooded (Soil Survey Staff 2012)” (Swihart and Nolan 2014:52). The current landowners also have a small collection consisting of shell-tempered pottery, one sherd with a guilloche design, and Late Prehistoric triangular cluster points (Swihart and Nolan 2014:52). There are a few significant archaeological sites which have been researched in detail within Dearborn County, these include the Oberting-Gle Cann site (12D25), Jennison Guard (12D29), The Haag Site (12D19), and State Line Site (12D18/33Ha56) (Swihart and Nolan 2014:30-31). Most of these sites (Jennison Guard, The Haag Site, and State Line) were investigated by Glenn A. Black in the 1930s as part of a general county-wide survey in both Dearborn and Ohio county and determined to be Fort Ancient sites (Black 1934). Oberting-Gle Cann is a Middle Woodland hill fort and is mentioned in the 1878 Geological Report for Indiana (MacPherson 1879; Swihart and Nolan 2014:26), though the site is multi-component with a strong Early Woodland presence and an additional Late Prehistoric component (Nolan 2014). Jennison Guard is a multi-component prehistoric site on the National Register and consists of a Middle Woodland habitation (12D246), which is also called the Whitacre site, and an Early Late Prehistoric circular village (Blosser 1996; Cook and Burks 2011; Cook and Martin 2013). The Haag Site is also a multi-component prehistoric site and has large Late Woodland
and Late Prehistoric components (Cochran et al. 1995; Reidhead 1981; Reidhead and Limp 1974; Tomak 1997). The State Line site is on the border of Dearborn County, Indiana and Hamilton County, Ohio and is a Late Prehistoric village site that has been disturbed by many construction projects and developments on the Ohio side (Vickery et al. 2000). These sites in southeastern Indiana have been referred to as Madisonville (Griffin 1966), or Late Fort Ancient sites but have also been called Middle to Late Fort Ancient and even Early Fort Ancient depending which unit (radiocarbon dates, ceramic characteristics, etc.) is being used for temporal assignation.
Figure 1: Location of Dearborn County, IN
Village Structure

Within Late Prehistoric research, village structure is a topic of great interest. Pollack and Henderson (1992) presented a model for Fort Ancient village structure and development based primarily on Kentucky Fort Ancient sites from trends in survey and excavation data. Following this, Henderson et al. (1992) presented the trends based on additional excavation data from the Late Prehistoric in Ohio to support Pollack and Henderson’s (1992) model. Within this model, Pollack and Henderson (1992) view the Early Fort Ancient period as consisting of small hamlets until the beginning of the Middle Fort Ancient Period when they transform into circular villages including an open plaza characterized by increased complexity and size (Drooker and Cowan 2001; Henderson et al. 1992; Pollack and Henderson 1992). However, these data are most applicable in Kentucky and don’t always fit with data in southern Ohio, especially within the Early Fort Ancient period (Cook 2008:35; Church 1987). In addition, there hasn’t been enough research in Indiana to determine if this pattern is applicable, but some sites, specifically the Guard site, which dates to the Early Late Prehistoric and exhibits a circular pattern with plaza, do not fit with the model (Cook 2008; Cook and Burks 2011; Cook and Comstock 2014:768-769; Cook and Martin 2013)

Models for Late Prehistoric villages are widely discussed in regard to Fort Ancient and Mississippian sites, but are often only mentioned and not demonstrated through a systematic spatial analysis of artifact distributions. Without actual distribution data, it is hard to describe site structure and layout from memory, limited excavation data, or through anecdote. Many Late Prehistoric sites in the Ohio River Valley have a ring-shaped village structure which is concentric or segmented, an open plaza, and other organizational and structural elements, including habitation rings, refuse, and palisades in their distributions (Cook 2008; Carskadden
and Morton 2000; Dunnell 1972, 1982; Graybill 1981; Henderson 1998, 2008; Moore and Raymer 2013; Roos and Nolan 2012:24). There are explicit presentations of Late Prehistoric sites with distributional structure based on excavation data (Brady-Rawlins 2007; Brose 1982; Carskadden and Morton 1977, 2000; Cook 2008; Dunnell 1983; Graybill 1981; Hawkins 1998; Henderson 1998; Prufer and Shane 1970) and non-invasive investigation techniques (Nolan 2010, 2011; Roos and Nolan 2012; Swihart and Nolan 2014). This patterning is often connected with the social structure of a village (Cook 2008; Henderson 1998; Means 2007; Nolan 2010, 2011). The majority of these sites with known structure are circular or ovular in shape with concentric circles of activity (Brady-Rawlins 2007; Carskadden and Morton 1977, 2000; Cook 2008; Essenpreis 1982; Graybill 1981; Hawkins 1998; Henderson 1998; Nolan 2010). However, some of these suggest that there is deviation from Pollack and Henderson’s (1992) model and that there is more variation in distribution than the discipline has documented (Cook 2008; Means 2007). Outside of the Midwest, Bernard Means (2005, 2006, 2007) presents the most comprehensive spatial analysis, which considers the implications of social structure, community structure, and inter-household relations at many circular villages in Pennsylvania associated with the Monongahela taxon. Although there are many sites that display a circular pattern, there have only been a few extensive studies that systematically examine variability in these sites (Cook 2008; Henderson 1998; Means 2007; Nolan 2010). Nolan (2010, 2011), Roos and Nolan 2012, and Swihart and Nolan (2014) incorporated surface data into their distributional analysis but many other studies have been based exclusively on data collected from intensive excavation. Because of the nature of excavation, clusters of artifacts are present in areas where units were placed. This inherent clustering in the distribution makes a systematic spatial analysis at the
settlement scale extremely difficult and often only provides insight into a small portion of the entire site.

My work will expand on previous research by utilizing spatial analysis and identifying activity areas from data collected exclusively through surface survey to delineate community structure within a Late Prehistoric village in Indiana. Clusters of different types of artifacts will be used to interpret areas used exclusively for particular tasks or specific household areas. They can also designate unused space within the larger distribution. These patterns and the spatial structure of the archaeological record can reveal social organization or individual groups within the community.

Within sites and under conditions of agricultural disturbance and collector activity, useful spatial patterning is easily discernible when systematic surface collection techniques are employed… the surficial distribution of artifacts constitutes an appropriate source of archaeological data independent of subsurface remains [Dunnell and Dancey 1983:269-70].

The spatial analysis conducted in this study was based on a systematic sample from a controlled surface survey collection to discern intra-site density clusters across the surface (Dunnell 1983; Hawkins 1998). With the ceramic artifacts, the stylistic and functional attributes were examined and mapped separately to discern different types of spatial patterning (Dunnell 1983). The combination of systematic sampling, rigorous spatial analysis, and variables collected from an in-depth ceramic analysis aid in the discovery of activity areas, which lead to a more comprehensive understanding of the presence and degree of community differentiation or structure, significantly expanding upon current research in the region.

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Spatial Analysis

Spatial analyses, and specifically distribution data, are especially useful in determining patterning in the archaeological record, especially when there is no known site structure. As Dunnell remarks, “Quantitative methods are of most assistance when data approach uniform or random distributions and thus lack ‘obvious’ pattern” (Dunnell 1983:132). Because the archaeological record is, for the most part, a distribution of artifacts that varies in location and density, systematic surface collection techniques are best suited for identifying these variations in areas with collector and agricultural disturbance (Dunnell and Dancey 1983:269-270). This type of archaeological investigation is useful when examining plowed fields, determining small-scale variations in a larger distribution pattern, and identifying site structure and size (Dunnell and Dancey 1983; Graybill 1981; Hawkins 1998; Roos and Nolan 2012; Roper 1976). Utilizing archaeological data collected through surface survey in spatial analysis is extremely important because there is no excavation bias from uneven collection, or inherent clustering in areas where units were located, present in the distribution (Graybill 1981:100; Dunnell, Hanson, and Hardesty 1971). In addition to being helpful in determining variation and eliminating excavation bias, surface survey is more cost-effective than a large scale excavation and requires less staff, time, resources, and curation space (Dunnell and Dancey 1983:170; Nolan 2011:125; Roos and Nolan 2012:23).

Not many researchers in southern Ohio, southeastern Indiana, and northern Kentucky have exclusively used surface survey to collect and analyze archaeological data, but many people have used it in conjunction with other noninvasive survey techniques or with limited excavation (Brady-Rawlins 2007; Cook and Burks 2011; Hawkins 1998; Henderson 1998; Nolan 2010; Roos and Nolan 2014; Thompson 2007). In Ohio, at the Reinhardt site, Nolan (2010) conducted
archaeological research through many minimally-invasive survey techniques, including surface
survey with transects spaced at 10m and 20m intervals, magnetic susceptibility, magnetometry,
soil phosphate, and shovel testing (Nolan 2010:52-56). In addition, he also mapped the density
of artifacts collected during surface survey (Nolan 2010:81-82; 381-396). Cook and Burks
(2011) also used a variety of minimally invasive techniques including shovel testing, magnetic
susceptibility, magnetic gradiometry, and coring to determine the site structure at the Wildcat
survey instead of invasive plowzone stripping in order to determine feature patterns, identify
historic disturbances, and locate previous archaeological excavations (Brady-Rawlins 2007:70-71). An overall ring shaped village with plaza was revealed based on the geophysical survey
data (Brady Rawlins 2007: Figure 40). Horseshoe Johnson was chisel plowed and then
systematically surface surveyed and mapped in 20 ft (6.1 m) squares, revealing a circular pattern
of feature debris including pot sherds, nutshell, chipped-stone artifacts, fire-cracked rock and
amount of surface survey to examine and reexamine Late Prehistoric sites in Kentucky over
approximately 1360 acres; 35 total Fort Ancient sites were discovered and their assemblages

Ceramic Analysis

Ceramic composition lends to good preservation; because of this, sherds are frequently
used in analysis of archeological material in order to examine the past (Sinopoli 1991:2). An
extensive analysis of ceramic traits in the Midwest was initially conducted by Griffin (1996) and
the tradition has continued with ceramics being the focus for many temporal, typological, and
technical studies. There have been regional inter-site comparisons (Krieg 2009; Henderson 1992; Turnbow and Henderson 1992), identifications of specific characteristic trends (Cotkin et al 1999; Cook and Fargher 2008; Pollack, Henderson, and Raymer 2008), evolutionary approaches to ceramic analysis (Braun 1983; O’Brien et al. 1994), intra-site analysis (Carskadden and Morton 2000; Mortine and Randls 1988; Turnbow 1988), and technical studies discussing manufacture or approaches to analysis (Shepard 1954; Sunderhaus and Cook 2011; Tite 1999).

Griffin’s (1966) ceramic foci are often the basis for Late Prehistoric ceramic studies with different assemblages being characterized based on his original groups. Because these groups were sets of traits based on empirical units and defined extensionally (Dunnell 1971), their definition changes with each addition of ceramic classes. These ever-changing definitions make it difficult to interpret further analyses because of the lack of explicit criteria: “Archaeological typologies should be replicable; other people should be able to produce the same typology using the same criteria…” (Sinopoli 1991:46). Instead of utilizing extensionally defined groups, I structured the ceramic analysis by systematically recording explicitly defined attributes that have measurable patterns, or variables, following Krieg (2009), Munson (1994), Turnbow (1988), and Dunnell (1983), attribute analysis in order to examine the distribution and changes in density of these variables across the landscape using data collected exclusively through surface survey. Attribute analysis was used instead of the traditional typological method in order to collect and analyze the spatial distribution of measurable data and because “important aspects of the assemblage may be under emphasized and obscured by the use of types alone” (Turnbow 1988:99). Collecting and analyzing this type of data can assist in the identification of activity
areas and intra-site variation across the landscape that may be indicative of functional differences in the use of space or social variation (Sinopoli 1991).
METHODS

Introduction

This chapter focuses on the methods employed to gain a more comprehensive understanding about site structure and use of space, such as degrees or presence of use differentiation, within a Late Prehistoric village in Dearborn County, Indiana using a sample collected exclusively from surface survey. The first two sections discuss the pedestrian survey procedures, laboratory processing, and initial data collection methods. The third section focuses on the more detailed ceramic analysis attributes used and their collection methods. The final section explains which spatial analysis procedures were used to better assess and convey information collected from the distribution of artifacts and their attributes across the site.

Field Collection Methods and Artifact Processing

12D491 in Survey Area 2 (SA2) was part of a 2013-2014 Historic Preservation Fund Grant (Grant 13FF03), which focused on the investigation of archaeological materials in Dearborn County, Indiana (Swihart and Nolan 2014). SA2 was examined with pedestrian survey on two separate days with 70-90 percent visibility of the ground surface. Field crew members walked in straight lines (transects), which were placed no more than 10 m apart. All artifacts, both historic and prehistoric, including fire cracked rock, were collected (Nolan and Swihart 2014:34-52). One human parietal bone was found during the field survey and was not collected; an additional cranial fragment was found during the laboratory processing of artifacts. Because of the large number of artifacts (approximately 12,000) encountered in the vicinity of 12D491, a GPS point was taken approximately every two meters to represent an aggregate of artifacts found instead of an individual GPS point for each artifact.
Laboratory Methods/Processing

After the pedestrian survey, during the 2013-2014 academic year, all artifacts collected were washed and re-bagged. Their weight and frequency as well as more detailed hierarchically organized attributes were recorded. A mass analysis of artifacts from SA2 was conducted, due to the large number of artifacts recovered. The attributes were organized in a hierarchical system starting with artifact material, followed by type, subtype, and modification; in each category there were different classification options depending on the attribute (Table 1). Ceramic decoration type, surface treatment, diagnostic types of projectile points, lithic modification, burning, and other distinguishing attributes were recorded in a comments section, but were not systematically recorded. In addition, the chronological period of diagnostic artifacts was recorded (Swihart and Nolan 2014:38-39). The faunal remains were analyzed by M. L. Neiberg and S. Homes Hogue and identified to species and class when possible (Hogue 2014: 136). The artifacts collected as part of the 2013-2014 HPF are being curated in the Applied Anthropology Laboratory at Ball State University until all research has been completed. After that, they will be returned to the landowner.

Two types of analysis—spatial and a detailed ceramic attribute analysis—will be used to identify the presence of important variation in artifact distribution throughout 12D491. Both the attributes collected through mass analysis and the more detailed ceramic attributes collected will be used in the distributional analysis of the site. These variations both in general frequency patterns and more specific groupings of ceramic attributes can detect activity areas and community structure within the site.
Table 1: Artifact mass analysis classification adapted from Swihart and Nolan 2014

| Artifact Material | 1. Chert  
|                  | 2. Non-chert lithics  
|                  | 3. Fauna  
|                  | 4. Ceramics  
| Type             | 1. Chert- objective or detached  
|                  | 2. Non-chert lithics- fire cracked rock (FCR), groundstone, and other  
|                  | 3. Fauna- mammal, non-mammal, fish, and shell  
|                  | 4. Ceramics (temper type)- shell, grit, shell and grit, and other  
| Subtype          | 1. Chert- objective pieces- core or bifacial artifacts; Detached pieces- flake or non-flake shatter  
|                  | 2. Non-chert lithic- modified or not modified  
|                  | 3. Fauna- modified or not modified  
|                  | 4. Ceramics- decorated or non- decorated  
| Modification     | 1. Chert- diagnostic or non-diagnostic  
|                  | 2. Non-chert lithic- modified or not modified  
|                  | 3. Fauna- modified or not modified  
|                  | 4. Ceramics- decorated or non- decorated  

Ceramic Analysis

In addition to the broad artifact class analysis, a detailed ceramic analysis was conducted. Ceramic artifacts are commonly found in Late Prehistoric assemblages and can provide insight into both functional and stylistic attribute distribution that will translate into variations in patterning throughout the site (Dunnell 1983:124-136, 149-159). This analysis focused both on functional and stylistic attributes within the assemblage. Each of these attributes can provide insights into activity areas and organization of archaeological materials (Dunnell 1983:124; Munson 1994).

Functional attributes have specific performance value depending on the version of the trait that is expressed (Dunnell 1978:200). These attributes are often indicative of activity areas or different contexts within a larger area (Blitz 1993; Dunnell 1983:123). The size and shape, identified by functional variables, can be indicative of the tasks in which these vessels are being used (e.g. cooking or storage), as well as the context of their use (Blitz 1993). Domestic contexts,
for example, can represent a wide range of activities and have the greatest range of sherd profiles and size (Blitz 1993:84-85). Conversely, specialized contexts with a limited set of activities would have a less diverse range of sherd profiles and sizes (Blitz 1993:84-85). Other functional variables such as temper type, surface treatment, and attachment type highlight activity areas throughout the site based on the type of vessel attributes present. The functional characteristics of these variables are important because the morphology of a pot is dictated by its intended conditions of use or functional characteristics; these characteristics also affect the performance of the object (Braun 1983:108-109). Henrickson and McDonald (1983) used ethnographic data to identify areas on ceramics that reflect functional attributes, indicating both form and context of use. For example, “few appendages are reported on temporary dry storage vessels indicating these vessels need not be maneuvered often…” (Henrickson and McDonald 1983:632-633).

Stylistic variables such as decoration can highlight community social structure, smaller groupings of individuals, and the location of types of decoration, within the larger distribution of archaeological materials (Braun 1983:108, 113; Dunnell 1978:199, 1983:123). These stylistic decorations can reveal information about social networks, economic networks, and individual potters; or facilitate some form of communication between groups of people (Braun 1983:108; Hally 1986:276).

All ceramic sherds were broken down into three classes: body sherds (i.e. fragments of the vessel wall without an attached rim), rim sherds (i.e. fragments that have a portion of the lip, where the interior surface and the exterior surface meet, attached), and detached appendages (i.e. fragments of vessel attachments that were not connected to rim or body sherds) (Munson 1994). All ceramics were reexamined after the initial laboratory analysis in 2013-2014 and attributes collected varied for each type of sherd (Table 2). I have included a definition of all attributes
collected (Table 3). Profile drawings of each correctly oriented rim sherd were completed using a standard rim board, detached appendages were hand drawn, and both were then digitized in Adobe Illustrator. Plan drawings of all decorated rim sherds, decorated body sherds, and appendages were hand drawn. Photographs were taken of all sherds, with each decorated sherd individually photographed and the remaining sherds taken in composite shots.

Table 2: Ceramic analysis attributes collected

<table>
<thead>
<tr>
<th>Type of Sherd</th>
<th>Attributes Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body Sherds</strong></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>Temper Type</td>
<td></td>
</tr>
<tr>
<td>Decoration (presence or absence)</td>
<td></td>
</tr>
<tr>
<td>Decoration Type</td>
<td></td>
</tr>
<tr>
<td>Surface Treatment Type</td>
<td></td>
</tr>
<tr>
<td><strong>Rim Sherds</strong></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>Temper Type</td>
<td></td>
</tr>
<tr>
<td>Decoration (presence or absence)</td>
<td></td>
</tr>
<tr>
<td>Decoration Type</td>
<td></td>
</tr>
<tr>
<td>Surface Treatment Type</td>
<td></td>
</tr>
<tr>
<td>Correct Orientation</td>
<td></td>
</tr>
<tr>
<td>Orifice Diameter</td>
<td></td>
</tr>
<tr>
<td>Percent of Orifice Diameter</td>
<td></td>
</tr>
<tr>
<td>Profile (restricted or unrestricted)</td>
<td></td>
</tr>
<tr>
<td>Rim Angle</td>
<td></td>
</tr>
<tr>
<td>Rim Fold (presence or absence)</td>
<td></td>
</tr>
<tr>
<td>Lip Form</td>
<td></td>
</tr>
<tr>
<td>Lip Modification</td>
<td></td>
</tr>
<tr>
<td>Rim Modification</td>
<td></td>
</tr>
<tr>
<td>Lip Thickness</td>
<td></td>
</tr>
<tr>
<td>Neck Thickness</td>
<td></td>
</tr>
<tr>
<td>Body Thickness</td>
<td></td>
</tr>
<tr>
<td>Appendage (presence or absence)</td>
<td></td>
</tr>
<tr>
<td>Appendage Type</td>
<td></td>
</tr>
<tr>
<td><strong>Detached Appendages</strong></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>Temper Type</td>
<td></td>
</tr>
<tr>
<td>Decoration (presence or absence)</td>
<td></td>
</tr>
<tr>
<td>Decoration Type</td>
<td></td>
</tr>
<tr>
<td>Surface Treatment Type</td>
<td></td>
</tr>
<tr>
<td>Attribute</td>
<td>Definition</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Count</td>
<td>Total number of artifacts collected</td>
</tr>
<tr>
<td>Weight</td>
<td>The force gravity exerts on an object (grams)</td>
</tr>
<tr>
<td>Temper Type</td>
<td>Type of non-plastic or foreign material added to clay</td>
</tr>
<tr>
<td>Decoration (presence or absence)</td>
<td>Modifications to the exterior of the vessel beyond the procedures used in forming the clay into a complete vessel that do not change the functional or mechanical properties of the vessel and instead adds communicative value</td>
</tr>
<tr>
<td>Decoration Type</td>
<td>Method of decoration application</td>
</tr>
<tr>
<td>Surface Treatment Type</td>
<td>Modifications to the exterior of the vessel during the construction process used to change the functional properties, composition, or mechanical properties and to form clay into a complete vessel</td>
</tr>
<tr>
<td>Correct Orientation</td>
<td>Vessel mouth facing upward with the opening situated on a horizontal plane present if whole vessel was present</td>
</tr>
<tr>
<td>Orifice Diameter</td>
<td>Measurement of total vessel diameter based on orientated rim sherd on rim chart</td>
</tr>
<tr>
<td>Percent of Orifice Diameter</td>
<td>Amount of the vessel orifice present based on orientated rim sherd and rim chart</td>
</tr>
<tr>
<td>Profile (restricted or unrestricted)</td>
<td>A vertical section of the vessel that depicts thickness and overall shape of the vessel</td>
</tr>
<tr>
<td>Rim Angle</td>
<td>Measurement of the orientation of the vessel at the rim</td>
</tr>
<tr>
<td>Rim Fold</td>
<td>Presence or absence of a piece of folded over clay at rim, or top of the vessel, onto the surface of the vessel</td>
</tr>
<tr>
<td>Lip Form</td>
<td>Lip shape, based on Munson 1994</td>
</tr>
<tr>
<td>Lip Modification</td>
<td>Modifications to the lip, the upper 5-10mm of the rim profile</td>
</tr>
<tr>
<td>Rim Modification</td>
<td>Modifications on the exterior or interior wall of the rim</td>
</tr>
<tr>
<td>Lip Thickness</td>
<td>Measurement of thickness at top of rim perpendicular to vessel line at max thickness</td>
</tr>
<tr>
<td>Neck Thickness</td>
<td>Measurement of thickness 2cm from top of rim perpendicular to vessel line at max thickness</td>
</tr>
<tr>
<td>Body Thickness</td>
<td>Measurement of thickness 4cm from top of rim perpendicular to vessel line at max thickness</td>
</tr>
<tr>
<td>Appendage (presence or absence)- on rim sherd</td>
<td>An attachment of clay to the interior or exterior of rim sherd</td>
</tr>
<tr>
<td>Appendage Type- on rim sherd</td>
<td>Type of attachment present on rim sherd, e.g.: strap handle, lug</td>
</tr>
<tr>
<td>Appendage Type- on detached appendage</td>
<td>Type of attachment present without any connecting vessel wall</td>
</tr>
</tbody>
</table>
Temper type, decoration, surface treatment type, lip form and modification, and attachment type were observed and recorded with a visual inspection. Lip form groups were used from Munson 1994 to characterize the upper 5-10 mm of the rim sherd (Figure 2). Rim orientation was identified with a profile drawing board at a 90° angle. Orifice diameter and percent of vessel were measured and discerned using a correctly oriented sherd on a rim chart; only sherds with a degree of orifice greater than 5 percent of 360 degrees were measured for consistency and accuracy of measurement. The orifice diameter was measured using the interior surface of the lip, where the interior and exterior surfaces of the vessel meet, and was measured to the closest 1 cm mark on a rim diameter chart. Orifice diameter is often used as a component to measure vessel size, and is the only measurement available on rim sherds for vessel size because of its mathematical and geometric relation with height of a vessel (Blitz 1993:85; Hally 1986:272; Munson 1994:15; Sinopoli 1991:55). Restricted or unrestricted profiles were identified based on the profile of the rim sherd. Restricted profiles cross a vertical plane at a 90° angle twice, which is often seen as a narrowing of the vessel form between the base and rim; unrestricted profiles only cross a vertical plane at a 90° angle once and do not exhibit any narrowing between the base and rim (Figure 3). These were identified if there was enough of the profile present to definitively determine one or the other; all others were labeled unknown. After the profile was identified as restricted or unrestricted, a rim angle was taken using a digital protractor: “…(rim angle) requires careful description; hypothetically, a flat ceramic slab would have a rim angle of 0 degrees, and a vertical rim (observed) would have a rim angle of 90 degrees…” (Munson 1994:15). Two types of appendages were identified: strap handles, pieces of clay with an oval or rectangular cross section, and loop handles, coils or rolls of clay with a circular cross section added. Basic dimensional attributes such as weight, thickness, and count
characterize the ceramic assemblage overall and provide a general distribution and density for the area. Rim sherd profiles, orifice diameter, thickness measurements, and lip form or modification provide information regarding the overall form of the vessels represented.

Figure 2: Lip groups used for analysis (Munson 1994:16)

Figure 3: Visual depiction of restricted (left) and unrestricted (right)
Spatial Analysis

All spatial analysis was conducted in ArcGIS 10.2. An attribute table with all recorded information for each artifact was imported into ArcGIS 10.2, and tied to the landscape with GPS information recorded at each aggregate data point in the field. This allows for the spatial distribution of many different types of attributes to be analyzed and displayed visually on a map document. Two basic spatial analyst tools, kernel density and interpolation (both variable radius and fixed radius), were used to interpret the artifact distribution across the site.

Density is used to show an overall trend in frequency across a geographic space- SA2 and within 12D491. Kernel density calculates a magnitude per cell and uses a kernel function to fit these to a smooth surface (Mitchell 1999:60-75). Here the magnitude is the frequency of particular artifacts depending on the class being represented. The magnitude of the density is calculated by adding the values of all of the points in the kernel surface and displaying these values along a smooth surface created by the points where they overlap at the raster cell center.

Interpolation is used to estimate unknown values at points on the surface based on the known values of surrounding points (Lloyd 2010:129). Here, frequency of artifact classes at collection points is used for the known values. The kriging interpolation method, which is a geostatistical method, is used to create a raster surface of cells from point data (Lloyd 2010:146-149), and was used in two sets of interpolation. The geostatistical method of kriging is used specifically, rather than interpolation methods that do not use geostatistics, because the density and distribution of the collected data points is irregular and it provides better predictions and information on error rates. Kriging weights the value based on the spatial structure and degree of autocorrelation present and accounts for error in the sample, which is ideal when working with
archaeological data collected during a systematic surface survey (Conolly and Lake 206:97-100). The first interpolation used a variable search radius using the closest 12 points. The second used a fixed search radius of 20 m with a minimum of six points. Both interpolation methods were used to create distribution maps of the entire assemblage to confirm that the patterns present were present in the artifact distributions rather than a product of the interpolation method itself (Figure 4). After confirming artifact distribution patterns were largely the same regardless of the interpolation method used, a variable search radius with the closest 12 points was used for the rest of the analyses. Each interpolation map could provide information about smaller locations within the larger artifact distribution for specific artifact classes. This information helps to interpret the large number of artifacts found and to discern patterns of variability in the overall distribution, especially because there were such a large number of artifacts recovered.
Figure 4: Fixed radius interpolation (left) and variable radius interpolation (right)
Density and geostatistical analysis maps were created for each artifact class. Some attributes were not abundant enough for density and interpolation and were instead displayed by frequency with graduated symbols. A good example of this is the Middle Woodland collection of diagnostics at 12D491, where less than ten diagnostic artifacts are represented. Both density and interpolation maps were used during interpretation because of their ability to convey different information, a density map better conveys overall trends in the area based on collected data points while interpolation maps can highlight areas of high and low variation within a large dense area of artifacts. The combination of the large scale and small scale spatial analysis, which objectively discern clustering and patterning, can identify variations in the density of artifacts throughout the site.
RESULTS

Introduction

In this chapter, I discuss the results my analyses conducted on 12D491. First, I present the results of initial mass artifact analysis focusing on the composition of the assemblage as a whole. After that, I present the results of the spatial analysis based on attributes collected both during the mass artifact analysis and the ceramic attribute analysis.

Mass Artifact Analysis

A total of 12,053 artifacts were collected and analyzed from Survey Area 2 in Dearborn County, Indiana. Artifacts classes collected include lithics (54 percent), ceramics (30 percent), fauna (15 percent), other lithics- FCR, groundstone, and stone flakes (<1 percent), and historic (6 percent) (Table 4). There were a total of 6,501 lithics identified and the mass analysis classes included flakes, cores, angular shatter, and bifaces (Table 5). In addition, burnt lithics were identified, and made up 10 percent of the total lithics identified, but they were not considered a separate class of lithics, only an identifiable attribute in the already existing classes (Table 5). Within the lithics, flakes were the most common artifact class recovered (85 percent), a total of 82 bifaces were found (40 of these were diagnostic of the Late Prehistoric period), and both cores (7 percent) and shatter (6 percent) made up less than 10 percent of the total lithic assemblage (Table 5). There were a total of 1,813 faunal remains recovered, and 2 pieces of human cranial fragments (one found in the laboratory portion of the analysis and one left in the field); the artifact classes used in the mass artifact analysis for faunal remains include mammal, non-mammal, and turtle shell (Table 6). Mammals constituted more than half (58 percent) of the faunal remains, non-mammal were represented (14 percent), and there was an
uncharacteristically large amount of turtle shell present (n=134, 7 percent) (Table 6). In addition, some faunal remains were too fragmented or damaged to be identified; these unknown pieces constituted 21 percent of the total faunal remains collected (Table 6). Other lithics (n=92) included fire-cracked rock (FCR), groundstone, and stone flakes and made up less than 1 percent of the total assemblage (Table 4). FCR (58 percent) and groundstone (46 percent) were the most common other lithic found; there were only seven stone flakes recovered from SA2 (Table 7). The preliminary ceramic assemblage revealed that a total of 3,633 ceramics were recovered from SA2 (Table 4). The majority of these sherds were body sherds (88 percent), but 173 rims (5 percent), and 33 detached appendages (<1 percent) were also recovered; of these sherds, 240 of them were decorated (Table 8).

Table 4: SA2 assemblage frequency data by artifact class

<table>
<thead>
<tr>
<th>Artifact Class</th>
<th>Frequency</th>
<th>% of Total Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithics</td>
<td>6,501</td>
<td>53.93</td>
</tr>
<tr>
<td>Ceramics</td>
<td>3,633</td>
<td>30.14</td>
</tr>
<tr>
<td>Fauna</td>
<td>1,813</td>
<td>15.04</td>
</tr>
<tr>
<td>Other Lithic</td>
<td>92</td>
<td>.7632</td>
</tr>
<tr>
<td>Historic</td>
<td>14</td>
<td>.1161</td>
</tr>
<tr>
<td>Total</td>
<td>12,053</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 5: Frequency breakdown of lithics

<table>
<thead>
<tr>
<th>Lithic Type</th>
<th>Frequency</th>
<th>% of Lithic Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flakes</td>
<td>5,560</td>
<td>85.52</td>
</tr>
<tr>
<td>Burnt Lithic</td>
<td>658</td>
<td>10.12</td>
</tr>
<tr>
<td>Cores</td>
<td>484</td>
<td>7.44</td>
</tr>
<tr>
<td>Shatter</td>
<td>375</td>
<td>5.76</td>
</tr>
<tr>
<td>Bifaces</td>
<td>82</td>
<td>1.26</td>
</tr>
</tbody>
</table>

Table 6: Frequency of faunal remains

<table>
<thead>
<tr>
<th>Fauna Type</th>
<th>Frequency</th>
<th>% of Faunal Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammal</td>
<td>1047</td>
<td>57.74</td>
</tr>
<tr>
<td>Non-mammal</td>
<td>248</td>
<td>13.67</td>
</tr>
<tr>
<td>Turtle Shell</td>
<td>134</td>
<td>7.39</td>
</tr>
<tr>
<td>Unknown</td>
<td>384</td>
<td>21.18</td>
</tr>
</tbody>
</table>

Table 7: Other lithic frequency including FCR, groundstone, and stone flakes

<table>
<thead>
<tr>
<th>Other Lithic Type</th>
<th>Frequency</th>
<th>% of Other Lithics</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCR</td>
<td>53</td>
<td>57.60</td>
</tr>
<tr>
<td>Groundstone</td>
<td>42</td>
<td>45.65</td>
</tr>
<tr>
<td>Stone Flake</td>
<td>7</td>
<td>7.60</td>
</tr>
</tbody>
</table>
Table 8: Ceramic sherd frequency by type

<table>
<thead>
<tr>
<th>Type of Sherd</th>
<th>Frequency</th>
<th>% of Ceramic Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>3,182</td>
<td>87.58</td>
</tr>
<tr>
<td>Decorated Body</td>
<td>229</td>
<td>6.30</td>
</tr>
<tr>
<td>Rim</td>
<td>178</td>
<td>4.89</td>
</tr>
<tr>
<td>Decorated Rim</td>
<td>11</td>
<td>.3027</td>
</tr>
<tr>
<td>Appendage</td>
<td>33</td>
<td>.9083</td>
</tr>
</tbody>
</table>

Results of Ceramic Analysis

Although the ceramic assemblage was extremely fragmented, I was able to examine and record most attributes for the detailed examination of their spatial distribution that would have been recorded using an assemblage acquired though excavation. All of the sherds were reexamined after the initial mass artifact analysis conducted through the Applied Anthropology Laboratory at Ball State University. Beyond the basic characterization of different types of sherds within the assemblage, I was also able to examine temper, decoration, surface treatment, lip form, the presence or absence of rim folds, orifice diameter, percent of vessel present, rim angle, and draw profiles for some of the rims collected. Although these attributes alone provide information, the additional variables collected were also mapped and their distribution in relation to the larger site patterning and within the ceramics was also examined.

Shell temper, grit temper, and a combination of shell and grit temper were observed macroscopically and recorded as part of the analysis. The majority (n=3,560; 98 percent) of the sherds collected were shell-tempered (Table 9). The next most common type of temper recorded was grit temper (n=39), which accounted for 1 percent of the overall temper (Table 9). The final
1 percent of the sherds was made up of a combination of grit and shell temper (n=19, < 1 percent) and historic ceramics including redware, whiteware, and yellowware (n=8) (Table 9). There were no sherds with temper that could not be observed and recorded.

<table>
<thead>
<tr>
<th>Temper Type</th>
<th>Frequency</th>
<th>% of Ceramic Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell Temper</td>
<td>3,560</td>
<td>98.17</td>
</tr>
<tr>
<td>Grit Temper</td>
<td>39</td>
<td>1.07</td>
</tr>
<tr>
<td>Combination Grit and Shell</td>
<td>19</td>
<td>.5239</td>
</tr>
<tr>
<td>Historic Ceramics</td>
<td>8</td>
<td>.2206</td>
</tr>
</tbody>
</table>

The categories of surface treatment include plain, cord-marked, burnished, and unknown. A plain surface treatment is a completely smooth exterior vessel surface without mechanical modification in the finishing process. A cord-marked surface is a modification to the exterior vessel surface from cord wrapped paddles or sticks. Burnishing is a smooth, and slightly compacted exterior vessel surface that appears to be highly shined. In this analysis, unknown refers to sherds that were too weathered or did not have enough exterior vessel surface to determine surface treatment. In addition to the ceramic assemblage being primarily shell-tempered, the majority of the ceramics also had a plain surface treatment (n=3,086; 85 percent) (Table 10). After a plain surface treatment, cord-marked ceramics were the most common (n=497; 14 percent); besides plain and cord-marked, there was also one burnished sherd (Table 10).
In this analysis, although most of the sherds were plain, there was some decoration present within the assemblage. Of the 3,182 body sherds collected, 229 of them (6 percent) were decorated and of the 178 rim sherds collected, 11 of them (<1 percent) were decorated (Table 8). Of the total number decorated body and rim sherds (n=240), the majority of them were incised (n=235; 98 percent), but there were also five unique sherds, three of them were punctated, one that was punctated and incised, and one stamped sherd (Figure 5; Figure 6).
Figure 5: Examples of decorated rim sherds and their corresponding profiles. The scale is correct for profiles, and the sherds have a 2:1 ratio with the scale present.
Figure 6: Examples of decorated body sherds including incising, the stamped sherd (bottom left) and two punctated sherds (middle top and bottom)

Table 11: Variation in ceramic decoration

<table>
<thead>
<tr>
<th>Decoration</th>
<th>Frequency</th>
<th>% of Decorated Sherds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incised</td>
<td>235</td>
<td>97.91</td>
</tr>
<tr>
<td>Punctated</td>
<td>3</td>
<td>1.25</td>
</tr>
<tr>
<td>Stamped</td>
<td>1</td>
<td>.4166</td>
</tr>
<tr>
<td>Punctated and Incised</td>
<td>1</td>
<td>.4166</td>
</tr>
</tbody>
</table>
It was more difficult to collect attributes associated with rim sherds because of the fragmentary nature of the assemblage. Gathering information about rim sherd orientation, profile type, rim angle, orifice diameter, and percent of orifice diameter was challenging because of the small sherd size. Specifically, if less than 5 percent of the degree of the orifice was present, I did not measure the orifice diameter or percent of vessel present. In addition, no excavation was completed so rim diameter was used instead of vessel size (Sinopoli 1991:55). Although enough of the lip and rim may have been present to draw a correctly oriented profile, if there was not enough attached body sherd present on the rim, determining if the profile was restricted or unrestricted was not possible. Of the 178 rims collected, I was able to get percent of vessel, orifice diameter measurements, and profiles for 39 rims (22 percent). The amount of profile data I was able to collect is slightly lower than the information collected at the Wegerzyn Garden Center site (33MY127) and the Wildcat site (33MY499) and is substantially lower than the information collected from a Madisonville subsample and Steele Dam (33MY1), all three of which are located near Dayton, OH (Jill E. Krieg, personal communication 2015). Profiles were first hand drawn to scale and then digitized in Adobe Illustrator. There are a wide variety of profiles present despite the challenges of the collection (Figure 7). The orifice diameter sizes range between 7 cm and 17.5 cm with the most frequent sizes being 9 cm, 9.5 cm, and 17.5 cm (Figure 8). Five to eight percent of each vessel was represented by the rim sherds, which is a relatively small portion, and highlights the fragmentary nature of the assemblage.

Each profile was drawn to scale, digitized, and represented in the correct orientation. Profiles with complete edges are represented with solid lines black lines, jagged black lines represent a broken sherd edge, white lines represent a rim fold, and dotted lines are used to characterize variation in profile thickness on a sherd. Of these profiles, only four sherds had a
large enough profile to determine if they were restricted or unrestricted and measure a rim angle.

The three restricted profiles 13.65.1785b, 13.65.2813, and 13.65.2859 had rim angles of 64.8 degrees, 102.5 degrees, and 59.2 degrees, respectively (Figure 7). The unrestricted profile, 13.65.993, had a rim angle of 59.2 degrees (Figure 7).
Figure 7: Rim profiles. A) 13.65.1785b, B) 13.65.2813, C) 13.65.2859, D) 13.65.993
Rounded tapered and rounded simple lips each make up 41 percent of the rim assemblage, square simple lips make up 10 percent, rounded extruded and narrow pointed lip shapes each make up 3 percent, and the sole square extruded lip makes up 1 percent (Table 12). Rim folds were present in more of the assemblage (n=130; 73 percent) than sherds that did not have a rim fold (n=38; 21 percent) (Table 13) However, there were 10 rims that I was unable to determine if there was a rim fold present or not because of deterioration and fragmentation.
Table 12: Different types of lip forms represented in the rim sherds

<table>
<thead>
<tr>
<th>Lip Form</th>
<th>Frequency</th>
<th>% of Rims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounded Tapered</td>
<td>29</td>
<td>41.42</td>
</tr>
<tr>
<td>Rounded Simple</td>
<td>29</td>
<td>41.42</td>
</tr>
<tr>
<td>Square Simple</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Rounded Extruded</td>
<td>2</td>
<td>2.85</td>
</tr>
<tr>
<td>Narrow Pointed</td>
<td>2</td>
<td>2.85</td>
</tr>
<tr>
<td>Square Extruded</td>
<td>1</td>
<td>1.42</td>
</tr>
</tbody>
</table>

Table 13: Presence and absence of rim folds in the assemblage

<table>
<thead>
<tr>
<th>Rim Type</th>
<th>Frequency</th>
<th>% of Rims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim Fold</td>
<td>130</td>
<td>73.03</td>
</tr>
<tr>
<td>No Rim Fold</td>
<td>38</td>
<td>21.34</td>
</tr>
<tr>
<td>Unknown</td>
<td>10</td>
<td>5.61</td>
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</table>

The fragmentary nature of the collection most inhibited my ability to record body thickness, and slightly affected my ability to record neck thickness. Body thickness was measured 4 cm down from the lip of the vessel, rim thickness was measured 2 cm down from the lip of the vessel, and lip thickness was measured in the upper 5 mm of the sherd. There were only three sherds that had material present 4 cm down from the rim and about half of the sherds had any material present 2 cm down from the rim. Although the sherds were too small to consistently record lip and body thickness, I was able to consistently measure lip thickness on
102 of the sherds; the mean lip thickness in the assemblage was 5.68 mm, with a maximum of 11.21 mm and a minimum of 3.16 mm (Figure 9).

In addition to the rims, twenty three detached appendages were identified. Most of these appendages were small fragments of an appendage, but two strap handles and one loop handle were identifiable. There was only one appendage fragment present that was still attached to a rim sherd, the rest of the appendages were completely detached from the body or rim of the vessel.

Results of Spatial Analysis

Overall Distribution

The entire survey area two (SA2) is represented by a red boundary line throughout the analysis; physical artifact locations are represented as red dots (Figure 10). In the most dense village area, aggregate points were taken every two meters in order to represent the artifacts.
collected because of the sheer number of artifacts found (Figure 11). Density distributions were used in the total survey area to represent broad patterns (Figure 12). They show an extremely dense section in the west half of the survey area (Figure 12). The interpolation further examines the high-density area in the west, shows distributional variation, and represents fine-grained spatial patterns of higher and lower density areas in more dense section of SA2 (Figure 12).
Figure 10: Survey area two (SA2) and all aggregate artifact location points within the survey area
Figure 11: SA2 with dense village area represented
Figure 12: SA2 artifact density
The interpolation of all artifacts collected in the village area revealed a distinct pattern of high and low density areas within the larger dense cluster in SA2. There is a crescent or semi-circular shaped pattern of a high-density area on the west half of the village area. This ring shaped pattern itself also has variations in density within it. There are three larger clusters of high-density areas, and numerous smaller clusters (Figure 13). In addition, inside of this ring shaped distribution, there is an area with low-density, almost completely void of artifacts (Figure 13). At this point in the analysis, I agree with the original designation of a Late Prehistoric village, and more specifically propose a high-density occupation zone encircling a plaza like feature with very low artifact density.
Figure 13: Interpolation of the dense village area in SA2
It is important to use both the density distribution and the interpolation in order to characterize SA2 as a whole. In addition, the interpolation further explains the distributional variability in the densest, village area, of SA2. Both these density and interpolation distributions complement each other and show a significantly denser west area of SA2. The difference in density between the west and east halves of the village area does not appear to be prehistoric. The landowners informed us that the hayfield, which is on the east section of the SA2 boundary, is no longer used for cultivation due to numerous requests in the past from other local collectors to walk the fields. The landowners decided to stop tilling this area after repeatedly turning up large amounts of prehistoric artifacts over the years and instead use the field for hay today. This is especially interesting because of the large amount of artifacts recovered in the west side of the village area. It also explains why the east side of the village area in SA2 seemed to be relatively less dense. This difference can be attributed to years of collecting in that section.

In addition to exploring the general artifact distribution for SA2, the distribution for each artifact class, and also the distribution of the ceramic attributes collected during the analysis were explored to further discern variations in patterning and the use of space within 12D491.

Ceramic Distribution

Of all the material types, the ceramic distribution most closely matches the overall artifact distribution and circular pattern. However, the lithics, not the ceramics, were the most abundant artifact class recovered (Figure 14). There are two, more dense, northern clusters and one more dense cluster in the southwest portion of the pattern (Figure 14).
Figure 14: All ceramic interpolation
**Sherd Type**

Because body sherds made up the majority of the ceramic assemblage, their distribution exactly matched the overall ceramic distribution. However, this distribution of rims and appendages did not exactly correspond with the overall ceramic patterning. There are two large distinct high-density areas of rims, the larger cluster occupies the proposed plaza area and the other is northwest of this area further away from the proposed plaza (Figure 15). Separating and examining the frequency distributions of rim folds and no rim folds as separate groups highlights the variation in these two high-density rim areas. The northwest high-density area of rims corresponds to rim folds; the high-density area in the proposed plaza corresponds to no rim folds (Figure 16). In addition, these two distributions viewed together display an northeast southwest divide of rim folds and no rim folds, respectively and do not display a circular pattern. At 12D491, the detached appendages occur in the low-density areas of the larger ceramic distribution, but are still part of the ring shaped pattern (Figure 17).
Figure 15: Rim interpolation
Figure 16: Interpolation of the presence and absence and frequency rims in each group
Figure 17: All ceramics interpolation and frequency distribution of detached appendages
**Temper**

Because so few sherds had any temper other than shell, the shell temper distribution was very close to the overall ceramic interpolation but there are a few more high-density areas in the shell temper distribution. Sherds that exhibited a mix of shell temper and grit temper do not match up with the high-density clusters in the overall ceramic distribution but they do fit into the overall ring-shaped pattern. They fall in the areas of the ceramic distribution where there is very low overall density (Figure 19). The grit-tempered pottery does not show the same distribution of the shell temper ceramics or the combination grit and shell temper ceramics. Instead, they are clustered southwestern of the village area, outside of the edge of the ring shaped distribution pattern and other artifact class distributions (Figure 20).
Figure 18: Shell temper ceramics
Figure 19: All ceramic interpolation with a frequency distribution of the combination grit and shell temper ceramics
Figure 20: Grit temper ceramic interpolation
Surface Treatment

The plain ceramics match the overall ceramic interpolation and density distribution because they make up the majority of the assemblage. However, the cord-marked ceramics do not match the overall ceramic distribution and are on the western side of the ring shaped pattern closest to the plaza (Figure 22). They cluster in one specific area and are not found in high frequency within the rest of the circular distribution pattern.
Figure 21: Plain ceramics
Figure 22: Cord-marked ceramic interpolation
Decoration

The decorated ceramics occupy three distinctly circular high-density areas at the outer edge of the western part of the plaza and extend into the plaza with medium-sized density clusters (Figure 23). In Figure 21, I also included the locations of decoration types present in low frequency stamped (n=1) and punctated sherds (n=3) (Figure 23). The decorated ceramics in particular are in a distinct area of the circular distribution, closest to the western edge of the plaza, and are one of the only artifact classes to have high-density clusters in the plaza.
Figure 23: Decorated ceramics interpolation, and location of stamped, and punctated sherds
**Rim Diameter**

The distribution of sherds that were big enough (greater than 5 percent of the vessel) to obtain a rim diameter measurement is most dense on the western edge of the proposed plaza in the same area as the decorated ceramics (Figure 24). They are not in the areas that the high-density ceramic clusters are located. Because all of the bigger rim sherds came from the same area, it is possible that these sherds were not as fragmentary because they came from whole pots, or that this was an area that did not already have sherds that were discarded because of breakage.
Figure 24: The location of sherds that were big enough to obtain a rim diameter from (greater than 5 percent of the sherd)
Faunal and Human Remains

The overall fauna interpolation pattern shows two distinct high-density areas different from the ceramic and lithic distributions (Figure 25). There are two non-overlapping high-density clusters, one adjacent to the western edge of the proposed plaza and one in the northeastern portion of the village area. Both the northeast cluster and west cluster of faunal remains have some mammal fauna in them, but the majority of the non-mammal fauna is in the western cluster and extends slightly into the plaza (Figure 26; Figure 27). The north eastern cluster has a higher amount of mammal fauna. A surprising number of turtle shell (n=134) was recovered and a frequency distribution of the pieces was examined (Figure 28). In general, the turtle shell is dispersed in a ring-shape, with a high frequency area near the faunal cluster with non-mammal remains, which extends further to the north to another small high frequency area (Figure 28). The only two human bone fragments were found on the outside of the high-density area in the northern periphery section of the ring shaped distribution (Figure 29).
Figure 25: Fauna interpolation
Figure 26: Mammal fauna interpolation
Figure 27: Non-mammal fauna interpolation
Figure 28: All fauna interpolation with the turtle shell frequency distribution
Figure 29: All artifact interpolation and the location of the two human parietal fragments recovered
Lithics

The overall lithics interpolation has approximately six higher density areas about 12-14 m in diameter that form a roughly arc-shaped pattern. This arc-shaped pattern is stretched further north than the other artifact distributions and has a high-density cluster on the western edge of the village area (Figure 30). It does not match the overall ceramic or faunal distribution patterns in high-density areas, nor does it match the overall shape. Within the lithics, the bifaces best exhibit a circular pattern, even in eastern village areas where other artifact classes had lower overall density due to extensive collection in the hay field in the northeastern and southeastern areas (Figure 31). Flakes exhibit one larger high-density cluster on the western edge of the village area but their overall distribution pattern is not circular shaped (Figure 32). There are many small scattered high-density clusters across the distribution; these clusters don’t follow any sort of discernable patterning and are present from the westernmost portion of the village to the southern-most point of the high-density habitation area on the edge of the grit temper ceramic cluster. Some of the overall high-density lithic areas correspond to areas with high densities of burnt lithics, but there are two high-density burnt lithic areas, one north of the plaza and one on the western edge of the plaza in the same area as some of the decorated ceramics that do not match with the overall lithic distribution (Figure 33). Neither cores nor shatter have high-density areas that correspond with the overall lithics pattern (Figure 34; Figure 35). The high-density area of cores is northeast of the plaza, on the periphery of the overall high-density artifact distribution and on the eastern edge of the village area (Figure 34). The shatter is closer to the proposed plaza area, on the northwest corner, and radiates north towards the human remains (Figure 35).
Figure 30: All lithics interpolation
Figure 31: All lithics interpolation and biface frequency distribution
Figure 32: Flake interpolation
Figure 33: Burnt lithic interpolation
Figure 34: Core interpolation
Figure 35: Shatter interpolation
Diagnostics

Because there are a large number (n = 3,600) of diagnostic artifacts, including Late Prehistoric bifaces and shell-tempered ceramics, I mapped out the distribution of both the historic and Middle Woodland diagnostics to make sure they were not contributing to the circular distribution pattern. The historic diagnostics (n = 8) are located north of the circular village distribution and in the low-density center area, they are not affecting the Late Prehistoric interpolation, and do not produce any type of patterning on their own (Figure 36; Table 14). The Middle Woodland diagnostics (n = 14) are spread out across the circular village distribution, and although three are located near the major density clusters, two of them are north of the ring-shaped distribution patterns and are not affecting the interpolation, and do not produce any type of patterning on their own (Figure 37; Table 14).

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Frequency</th>
<th>% of Total Assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Prehistoric</td>
<td>3,600</td>
<td>29.86</td>
</tr>
<tr>
<td>Historic</td>
<td>14</td>
<td>.1160</td>
</tr>
<tr>
<td>Middle Woodland</td>
<td>8</td>
<td>.0663</td>
</tr>
</tbody>
</table>
Figure 36: All artifact interpolation with frequency distribution of historic artifacts
Figure 37: All artifact interpolation with Middle Woodland diagnostic frequency distribution
DISCUSSION

In this chapter, I discuss the benefits to using surface collected data and the effects of agricultural disturbance on a surface assemblage. In addition, I explain the results of a more detailed ceramic attribute analysis and discuss the utility and challenges associated with using an assemblage collected entirely through surface survey for a ceramic analysis. Finally, I examine the spatial distribution patterns of each artifact class in more detail, and explore the overall variation in the use of space within the village area and the implications of the spatial patterning at the 12D491.

Discussion of Surface Survey and Plowing

The Kocher Site (12D491) was investigated entirely through a systematic surface survey. This has many advantages, including non-invasive data collection, lower time and personnel commitment, systematic sample availability available for distributional analysis, and lower costs for implementation. Still, the effects of plowing and lateral displacement merit discussion. Other investigations in the Midwest, and some on Late Prehistoric villages, have provided crucial information on settlement patterning and site organization (Hawkins 1993; Lewarch and O’Brien 1981; Nolan 2010, 2011; Roper 1976; Swihart and Nolan 2014). In addition, many studies have found that the lateral displacement of artifacts is not as great as most archaeologists believe it to be and that surface deposits are infrequently used because of prejudice against plowed deposits (Cowan and Odell 1987, 1990; Dunnell 1988; Dunnell and Simek 1995; Lewarch and O’Brien 1981; Roper 1976). Dunnell (1981:125) notes that “The effect is mainly in spreading distributions rather than disrupting them, and even this effect is limited as a dynamic equilibrium is reached quite rapidly after initial plowing” (Dunnell 1983:125). Dunnell and Simek (1995)
examined the effect of artifact size loss due to plowing and found that after the initial plowing episode, the loss of artifact size diminishes drastically because once the size of the object is reduced the probably of it encountering a future impact by a plow and breaking is reduced. The type of artifact (e.g. chert versus ceramics), and the size of the object affect how much an artifact moves, is broken, and into how many pieces. Because of these factors, I checked the distribution of average weight of the artifacts at 12D491 to examine the extent of the effects of plowing on artifacts in SA2. If things are being dragged around by the plow, the high-density clusters would match the high average weight clusters. If the plow is not substantially affecting the movement of objects, there should be no discernable patterning in the interpolation, or the high-density clusters in the average weight interpolation shouldn’t be anywhere near, or similar to the circular pattern present in the frequency interpolation. The average weight interpolation shows that there are some areas with a high average weight (Figure 38). These areas are in the southern portion of the village area, and do not overlap with the circular artifact distribution or low-density plaza area. They do not match any of the artifact class patterns or occur in the proposed plaza or habitation ring area. This shows that the patterns visible in all artifact classes are present because of the archaeological record and not something created by agricultural disturbance.
Figure 38: Average weight interpolation for the village area in SA2
Ceramic Attribute Analysis

Although there were additional challenges associated with this ceramic analysis because of the fragmentary nature of the sherds, I obtained more than enough information to examine the spatial distribution of the measured variables and characterize the assemblage as a whole. The temper type was almost exclusively shell temper, the primary exterior surface treatment is a plain surface, and there is some decoration present, but it only represents a small amount of the total ceramic assemblage. The majority of sherds recovered were body sherds, but the rims which were present provided enough information to view a diverse set of profiles and characterize general vessel size as small to medium vessels. Using Hally’s (1986) classification of vessel size, all of the vessels represented in this assemblage are small vessels (less than 18 cm in vessel diameter), which are most frequently used in a cooking context at the household level. Different vessel sizes can be related to the amount of food prepared or served in them (which is directly related to the size of the social group) or the variety of processing tasks the vessel was used for (Blitz 1993:84-5; Hally 1986:271). These smaller vessels were most likely used by small groups of people: “Vessel sizes…may relate to the number of people who partook of the contents of these containers” (Munson 1994:53). Here, vessel size was very useful in characterizing the assemblage because of the homogeneity of the temper and surface treatment present (Shapire 1984).

Some of these ceramic attributes, especially the plain surface treatment and the predominate use of shell temper on whole vessels are consistent with other sites considered to be part of Griffin’s (1966) original Madisonville focus. However, the small percentage of decorated sherds does not fit with Griffin’s Madisonville grouping. This combination of a large amount of shell-tempered, plain sherds (n=3,560 at 12D491; n=3,765 at Southwind), with a very small
percentage of decoration (6 percent at 12D491; 9 percent at Southwind) is most prevalent in Mississippian sites like Angel or the Southwind site: “The overwhelming plainness of the Southwind ceramics is consistent with other Mississippian sites in the region. Plain surfaces and shell tempering (of sherds) characterize 95 percent or more of the pottery from the Angel phase town at Angel Mounds” (Munson 1994:1). These distinctive ceramic traits do not perfectly fit with Griffin’s Madisonville focus, but they are characteristic of the Late Prehistoric in Dearborn County, Indiana.

Jennison Guard (12D29), in Dearborn County, was first mentioned by Black (1934) in his survey of Dearborn and Ohio Counties (Black 1934:201) and recently re-excavated (Cook and Martin 2013). The ceramic assemblage at Guard (12D29) is primarily crushed mussel shell, with smoothed (or plain) body sherds, rim folds were present more often than they were not present, and incising was the most common form of decoration (Cook and Martin 2013:119-123). The surface assemblage at 12D491, and especially the ceramics, are consistent with the re-examination of the Jennsion Guard site, and its designation as an Early Late Prehistoric assemblage (Cook and Martin 2013).

Composite Maps and Overall Patterns

Based on the individual artifact distributions and composite interpolation maps, 12D491 has a circular structure of high-density diagnostic artifacts and an empty or low-density plaza consistent with other Late Prehistoric settlements in southeastern Indiana (Cook and Martin 2013; Swihart and Nolan 2014), southern Ohio (Brady-Rawlins 2007; Cook 2008; Nolan 2010, 2011; Vickery, Sunderhaus, and Genheimer 2000), Pennsylvania (Means 2007), and Kentucky (Dunnell, Hanson, and Hardesty 1971; Henderson 1998; Pollack and Henderson 1992). More
specifically, the high-density ring is made up of four functional parts: a habitation area, activity area, burial area, and a refuse disposal area. The plaza area is most clearly defined in the composite map, and is visible, but may be shifted slightly north, in other (bifaces, turtle shell, and lithics) distributions (Figure 39; Figure 28; Figure 31). I propose that the plaza is small (Cook 2008:138-142), approximately 30 m at its longest point and the habitation ring is 30 m at its widest point (Henderson 1998) and is most clearly defined in the composite map with high-density areas from the main artifact classes (Figure 39). Both the activity and refuse areas occupy the same radial band but are reflected by different artifact classes in different locations (Figure 39). At the western periphery, I argue for the presence of a refuse area, included in the high-density occupation zone. The refuse deposition area in the most western portion of the village, is highlighted by the three significantly overlapping high-density clusters of ceramics, lithics and fauna and the lack of Late Prehistoric diagnostic points, uniquely tempered sherds, turtle shell, and appendages. Although the sample size of human remains is small (n=2), these remains are located in the same radial ring as the refuse deposition (Figure 39). It is likely that these are two individuals because the location of the fragments which were found approximately 70 meters apart. In addition, they were not in the same transect but rather distributed perpendicular to the direction of agricultural tiling. This (Figure 39) most clearly shows a habitation ring, with discrete areas for main artifact classes extending north towards the human remains and south, nearest to the proposed plaza area. The habitation ring is also emphasized in a composite map of turtle shell, Late Prehistoric points, appendages, and the few sherds that were not exclusively shell-tempered (Figure 40). These artifact classes barely extend into the proposed refuse area, exhibit the same circular pattern around the plaza, and most closely match the lithics interpolation which could be indicative of household areas (Figure 30). (Figure 39;
Figure 40). Burnt lithics and ceramics also share a relationship. Although these distributions overlap in the refuse area, in the main habitation area, they only just touch each other and generally occupy different spaces (Figure 41). These areas could be indicative of activities related to but not taking place in the household areas such as cooking or the processing of faunal remains (Figure 41).

Along with the broader radial trends indicative of different functional uses present in the major artifact classes, there is some additional patterning present at 12D491 that exhibits a circumferential pattern and only occupies certain sections of the village. The western portion of the village, closest to (and even extending into) the plaza, has a large cluster of non-mammal fauna, cord-marked ceramics, and decorated ceramics (Figure 42). These artifact classes are less common in frequency at 12D491 than other classes, all occur in the same area, and do not exhibit a circular distribution pattern. In addition, the area on the edge and within the plaza where the highest decorated ceramic density is also the same area with vessels large enough to draw profiles occur (Figure 24). This patterning takes place in a specific western wedge of the distribution. It does not exhibit radial patterning within these artifact classes, and is closer to (if not part of) the western edge of the generally clean plaza area.
Figure 39: Composite interpolation interpretation of the main artifact classes
Figure 40: Late Prehistoric points, turtle shell, sherds that are not exclusively shell-tempered, and appendages highlight the habitation ring of the Late Prehistoric village
Figure 41: Fauna and burnt lithics
Figure 42: Cord-marked ceramics, non-mammal fauna, and decorated ceramics on the western side of the village adjacent to the plaza
CONCLUSIONS AND IMPLICATIONS FOR SPATIAL PATTERNING

From this research, it is clear that community social organization and the structure of archaeological sites can be understood through the variations in artifact density based on surface collections alone. I argue that 12D491 exhibits many types of patterning and differentiation of space including functional patterning and stylistic patterning both in radial and circumferential form. Functionally, there are four sections, 1) a very low-density circular area or plaza in the center of the overall distribution that is void of artifacts and approximately 30 m at its longest point, 2) A very dense habitation and activity zone between 30 m and 36 m at its widest point, 3) a refuse deposition zone at the western edge of the village that exhibits a large amount of overlapping the main artifact class distributions, and 4) a burial zone located in northern edge of the village in the same radial ring as the refuse area (Figure 39). Portions of these patterns are present at other sites in the region, but 12D491 does not exactly match with one Late Prehistoric or regional variation of site structure. For example, ceramics which dictate the overall pattern of the village distribution is also present at the Slone site (15Pi11) but the ceramics are the most prevalent artifact class in that assemblage; however, the highest densities occur just outside of the houses at Slone (Dunnell 1983).
Table 15: Comparison of other Late Prehistoric sites, highlighting data recovery methods, with circular structures
Su= Surface Survey, G= Geophysics, Sh= Shovel Test Pits, Ex= Excavation,

<table>
<thead>
<tr>
<th>Location</th>
<th>Circular village</th>
<th>Plaza</th>
<th>Storage/Refuse zone</th>
<th>Burial zone</th>
<th>Habitation zone</th>
<th>Western Grouping</th>
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<td><strong>12Po265</strong></td>
<td>Su, Ex</td>
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<td>Southwind</td>
<td>Posey County, Indiana</td>
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The functional patterning at 12D491 is both circumferential and radial (Dunnell 1983:147). Within the dense occupation zone, there is functional variation in the use of space represented by the lithics, ceramics, fauna, and burnt lithics (Figure 39; Figure 41). Dunnell (1983:157) suggests that projectile points are located mostly where the houses are located at the Slone site. This use of space for a specific purpose is also present in other areas of the overall village but not part of the circular distribution; it is best represented by lithics with the distinct large high-density areas for shatter, cores, and small high-density lithic scatters spread throughout the site (Figure 32; Figure 34; Figure 35). The human remain fragments also exhibit functional radial patterning, but are not on the inside of the occupation distribution adjacent to the plaza like at SunWatch, a well-known Late Prehistoric circular village (Cook 2008; Heilman et al. 1988) or at Reinhardt, in the Middle Ohio Valley (Nolan 2010). Instead, they are located in relatively the same place as the human remains at the Slone site. Although there is no evidence for a stockade at 12D491 Dunnell et al. (1971:40) note that the graves at the Slone site “...lie around the periphery of the site, between the houses and the stockade, essentially the same area as the garbage disposal.” This pattern is also seen in other Late Prehistoric sites with some variation, often where the burials are intermingled with refuse in West Virginia (Graybill 1981).

The grit temper cluster in the southern portion of the site could be representative of either functional or stylistic patterning. This discrete cluster of grit temper sherds could indicate a choice to use a temper other than shell: “The infrequent use at Southwind of tempers other than shell alone could reflect the practices of individual potters or groups of potters, which might be indicated by spatially discrete clusters of the less common types” (Munson 1994: 37); or it could indicate a different occupation that occurred in the general area of the Late Prehistoric village.
Because the grit temper cluster is so far removed from the overall circular village pattern, it is more likely that it represents a different occupation on the landscape.

The rims, and specifically the presence and absence of rim folds, exhibit stylistic patterning with an east and west group that does not create a circular pattern or wrap around the entire village area (Figure 16). At the Mayo site there is also a similar type of division (to the rim folds no rim folds division at 12D491), bisecting the circular pattern from northeast to southwest. The northern position has cord-marked ceramics and the southern portion has roughened ceramics (Dunnell 1983: 149-152). At 12D491, the presence or absence of rim folds could reflect choices made by different groups of people, or different social contexts based on a specific portion of the village.

Circumferential patterning is most visible in the western portion of the circular distribution with the presence of non-mammal fauna, cord-marked ceramics, and decorated ceramics (Figure 42). It is clear that this area if different from the overall spatial and assemblage trends in the village. In addition, these artifact classes, and specifically the pit-like decorated ceramic features, encroached into the plaza area more so than any other kinds of artifact (Figure 23). This patterning could be stylistic, designating a specific group of people, or functional, designating the allocation of this particular space for specific activities. These western areas have been interpreted in many different ways. Cook (2008) argues that Middle Mississippian influence, through periphery peers, created these types of spaces and specific contexts in the larger village distribution. Other interpretations include proximity to the plaza that is representative of a leader’s residence or social differentiation (Heilman and Hoefer 1981), indicative of solar alignment positioning (Smith 1992), or similar to Mississippian communities (Cook 2004; Nass and Yerkes 1995; Robertson 1984).
These features (i.e. variations in functional and stylistic patterning) along with the overall village structure would have been communicated on both an intra-site and inter-site scale: “Village design characteristics are often highly visible and, hence, would have been a very recognizable part of life” (Cook 2008:5). The circular pattern has been identified in various forms throughout the Late Prehistoric and across many geographic regions (Brady-Rawlins 2007; Cook 2008; Cook and Martin 2013; Graybill 1981; Henderson 1998; Means 2007; Nolan 2010; Vickery, et al 2000). However, they are not as clearly defined as other Late Prehistoric villages and only follow the general trend of a plaza with dense habitation ring. The other nuances and pattern present at 12D491 seems to be an amalgamation of pattern seen in different geographic areas and other at Late Prehistoric sites and an intermingling of concentric activity ones within the larger distribution.

Specifically in Indiana, Late Prehistoric circular villages have been further investigated (Cook and Martin 2013; Swihart and Nolan 2014), and Jennison Guard (12D29) and 12D491 share striking similarities both in assemblage composition and site structure. The ceramics from both assemblages are mostly body sherds which were plain and shell-tempered, more rims had rim folds than those who did not. However, there was a much larger variety of rim sizes at Guard (Cook and Martin 2013:119-121). Because there are not many examples of circular villages in Indiana, 12D491 not only contributes to the understanding of the Late Prehistoric in Indiana but also in Ohio and Kentucky because of the geographic location of the 12D491 distribution (Cook and Martin 2013; Nolan and Cook 2013). Guard and other sites are beginning to be dated to earlier time periods, 12D491 and Guard are suspected to be contemporaneous due to the similarity of their ceramic assemblages, spatial structure, and geographic location. 12D491 will be able to contribute to the larger understanding of the
development of circular villages, social structure, and regional interaction in the Late Prehistoric (Cook and Martin 2013; Nolan and Cook 2010; Swihart and Nolan 2014). Specifically, earlier examples of larger circular villages aggregated around a plaza do not fit with Pollack and Henderson’s (1992) model of Late Prehistoric village development throughout time which states that settlements with concentric rings of activity and an open plaza space (average of 30 m) do not show up until the Middle Late Prehistoric (Pollack and Henderson 2002: 202; Sharp and Pollack 2002). 12D491 contributes to the idea that there are circular villages on the western edge (in Indiana) of the region attributed to Fort Ancient in the Late Prehistoric, closer to regions attributed to Mississippian assemblages.

These analyses, including both the detailed ceramic attribute portion and spatial portion, were completed using a systematic sample from a surface collection. Use of archaeological data that do not require any excavation is extremely important to minimize bias due to the location of excavation units during spatial analysis. Furthermore, even though some of the ceramic attributes, especially those relating to rims, were more difficult to record and present in smaller frequencies than in other analyses, the data collected were appropriate to characterize the ceramic assemblage as a whole and contribute to the distributional analysis. These factors, along with reduced time, cost, resources, and curation space needed to collect these archaeological data, highlight the benefits of using a systematic surface survey (Dunnell and Dancey 1983; Nolan 2010; Roos and Nolan 2012). A larger number of sites could be explored if more research employed surface survey as its main approach to archaeological data instead of focusing on time intensive and expensive excavations; this would contribute to the current information know about Late Prehistoric circular villages in Indiana and enhance the overall understanding of site structure and organization in the region.
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