A Comparative Spatial Analysis of Two Communities from the Hickory Ground Site in Wetumpka, Alabama

by

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Abstract

This thesis presents analyses on the intra-site spatial arrangement of two communities from the Hickory Ground site, 1EE89, in Elmore County, Alabama. Spatially referenced archaeological datasets of a Protohistoric community and a Historic Creek community are compared to investigate how the adaptive actions of community members structured the spatial patterning of the town. Using Geographic Information Systems (GIS) and field maps taken during the 2002-2007 archaeological excavations of the Hickory Ground site, I present an 18 acre map with over 9,000 features. Statistical tests suggest Protohistoric structures are randomly nucleated around the community center, and Historic Creek structures are clustered into groups scattered away from the community center. The research presented here utilizes the archaeological community as the fundamental unit of analysis to evaluate social meaning from spatial attributes and contributes to a wider understanding of the cultural changes encountered by Native Americans during the Historic Period.

Acknowledgements

Many years of hard work went into the excavations of the Hickory Ground site under the supervision of Dr. John Cottier and Dr. Craig Sheldon. This thesis would not be possible without their efforts, nor would it have been possible without the funding provided by the Poarch Band of Creek Indians. I thank Dr. Philip Chaney for accepting me into the Geology and Geography program as my thesis committee Chair. He taught me a skill no other professor has, and that was how to "tame the dragon." I also thank Dr. Yingru Li for taking time away from her summer research to help with the spatial statistics presented in this thesis.

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I must show gratitude for my Grandpa, Vincent Paul Benedetti, who taught me how to canoe, fish, and grow dahlias. He was the first to teach me about Native American culture. The many years he spent working as an underwater physicist for the U.S. Navy in Orlando, Florida inspired me to write this thesis.

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Chapter 1 Introduction

Aboriginal culture in the American Southeast encountered significant changes in response to Euro-American expansion and colonization during the eighteenth and early nineteenth-centuries (Ashley 1988; Ethridge 1997; Ethridge and Hudson 2002; Hudson 1976; Marcoux 2008, 2009, 2010; Marcoux et al. 2013; Martin 1994; Milner 1980; Rodning 2002, 2007; Smith 1987; Waselkov 1990; Waselkov et al. 1985; Wesson 2008). At the archaeological site 1EE89, or the Historic Creek Indian town known as the Hickory Ground, a reorganization coincided with European contact. These cultural changes are represented *spatially* in the way people constructed and organized their local communities. The research offered by this thesis diachronically considers the effect of culture change on a Protohistoric community and a Historic Creek community by sampling geographic distance in a theoretically social, political, and economic way to explain the internal distribution patterns of archaeological features and structures. The archaeological remains excavated from the Hickory Ground site are remnants not only of past social realities, but also of past spatial realities.

Artifact and feature assemblages are indicators of human activities and demonstrate social organization within a spatially patterned manner. The archaeological excavation conducted at the Hickory Ground site provides an appropriate sample to describe the local levels of the Protohistoric and Historic Creek settlement plans. Local community organization may be culturally conditioned in the absence of significant environmental variability. The Protohistoric and Historic Creek communities at the Hickory Ground site represent an excellent dataset to spatially quantify culture change as the two communities developed at the same geographic locality under similar environmental settings. The lack of environmental variability in this study creates an ideal scenario to investigate the spatial consequence of culture change.

Working with GIS (Geographic Information Systems) software, ArcGIS 10.2 and its geoprocessing applications, archaeological field maps are digitized to present a dynamic map of over 9,000 features spread across 18 acres of the Hickory Ground site. A series of spatial statistics are employed to reveal patterns in the data that may not be observed with traditional descriptive analyses. To explain these intra-site patterns of archaeological phenomena distributed across space and through time, causational factors promoted by Euro-American acculturation are examined. Transcending the household and becoming manifest in the larger community plan, new socioeconomic strategies were adopted by individuals in order to succeed in a growing Euro-American economy. The Historic Creek community is viewed as a dynamically functional changing unit of analysis, an indicator for social change, and an evolutionary adaptation to contact and colonialism.

The spatial arrangements of particular communities are culturally unique; and cultural systems are reproduced in the way native people actively and rationally constructed and organized their living spaces. I suggest a change in the spatial organization of a local community reflects change in social, political, and economic systems. Building upon previous studies (Cottier 2006; Gill 2010) that have shown differences in the material remains excavated from the Protohistoric and Historic Creek occupations of the Hickory Ground, I expect to find differences in the spatial patterning among Protohistoric and Historic Creek structures.

The study of culture change during the Historic Creek period has been widely attended to by Creek archaeologists (Dickens and Chapman 1978; Fairbanks 1962; Knight 1985; Swanton

1928; Waselkov 1990; Waselkov and Smith 2000; Waselkov et al. 1982; Waselkov et al. 1985; Wesson 2008); as culture change as a process can be observed, measured, quantified, and predicted. During the late eighteenth-century, the regional Creek settlement plan is characterized by a movement of households away from major riverine towns (Ashley 1988; Saunt 1999; Swan 1855). This widely accepted regional inter-site settlement pattern of dispersion may also be occurring within the community at the local scale. I predict a series of spatial statistic tests will demonstrate a dispersion of Historic Creek structures away from the community center, and will become evident when compared to the nucleated structural arrangement of the earlier Protohistoric community.

1.1 Hypotheses:

H_1 The Protohistoric community is nucleated.

- H_{o1} The Protohistoric community is not nucleated.

H_2 The Historic Creek community is dispersed.

- H_{o2} The Historic Creek community is not dispersed.

H_3 The Protohistoric and Historic Creek communities are spatially different.

- H_{o3} There is no spatial variation between the Protohistoric and Historic Creek datasets.

Chapter 2 The Socio-geographic Structure

Geographic analyses in archaeological studies sample space to understand past human activity and behavior. The patterns in which people organize themselves over space are considered a fairly direct and accurate way to verify social organization on the ground (Adler 2002; Anselin and Getis 1992; DeMarris et al. 1996; Fast 2011; Green 1990; Hegmon 2002; Hietala and Larson 1984; Hietala and Stevens 1977; Marcus 2000), and the processes which cause site patterning are repetitive patterns in the "positioning" of adaptive systems in geographic space (Binford 1982: 6). The scientific integration of space and social relationships in the human past has developed into a sub-discipline known as *spatial archaeology* (Ashmore 2002). It can be defined as "the range of archaeological pursuits that focus on studying the spatial aspects of the archaeological record by emphasizing position, arrangement, and orientation" (Ashmore 2002: 1173). The diagram on the following page (Figure 1) was created to illustrate the theoretical framework guiding the cultural interpretations of spatial patterns in this thesis.

The socio-spatial dialectic, proposed by Edward Soja (1980) is a unique characteristic formed according to the general relations of production, which in essence are at once both social and spatial. Spatial patterns in a community can be traced directly or indirectly as an effect of active social relationships that a community practices. If communities are conceptualized as social constructs (Adler 2002), then a change in spatial structure will likely reflect a change in social structure.

To understand the socialization of space is to understand the transcription of social processes into tangible, physical, and measureable form. These quantifiable attributes are imprinted onto the local landscape. To define social change, we must be able to identify social change in the landscape at the community level. As (Zubrow 1990: 68) states, “past landscapes influence present landscapes and the landscapes of the prehistoric past will impact the landscapes of the future.” To describe the landscape of the Hickory Ground site is to discuss the relationship between people and space, or culture and place where the daily lives of people make the landscape a “social place” (Appadurai 1997; Lefebvre 1991). As Lewis Binford states, “to understand the past we must understand places” (Binford 1982: 6).

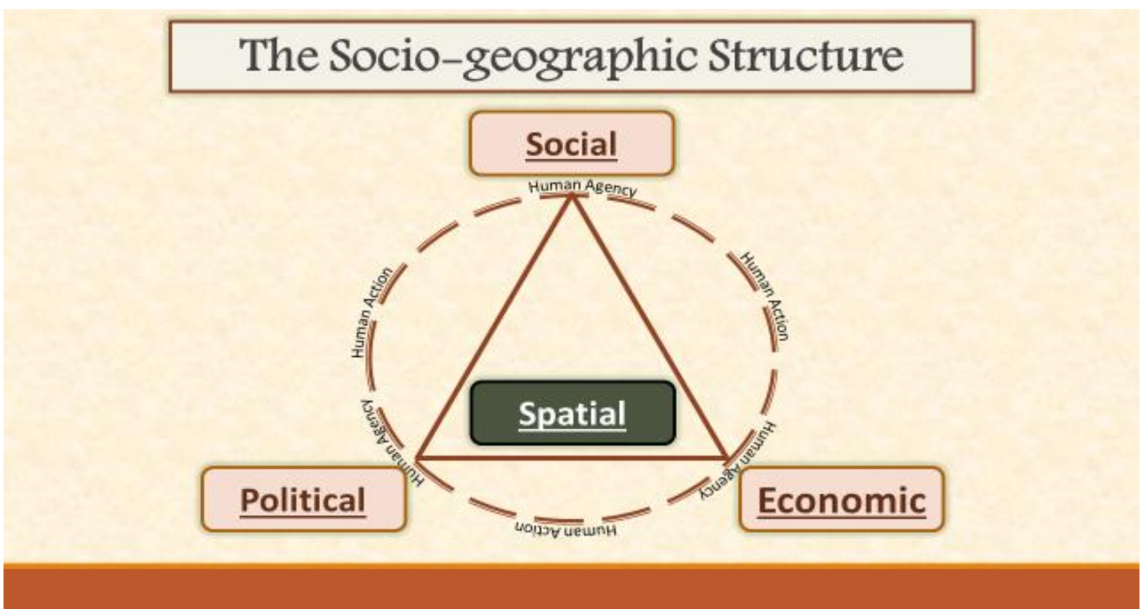


Figure 1. Diagram illustrating the theoretical framework of this thesis.

2.1 A Brief Summary of Spatial Analyses in Archaeological Studies

Spatial patterns have long been a concern of archaeologists who attempt to reconstruct social and societal organization from the spatial distribution and assemblage of artifacts and features. A number of past publications examining the concept of space in socially active ways contributed to the development of a sociospatial theoretical framework under the assumption that spatial structure and social relations are related. In 1960, Albert Spaulding systematically defined the extent of archaeological inquiry as form, temporal locus, and spatial locus (Spaulding 1960; Ashmore 2002: 1173). These dimensions were of special importance to the researcher when characterizing and analyzing artifact and feature distributions. The study of archaeological settlement patterns developed in the 1950s and 1960s (Steward 1950; Willey 1953; Chang 1968), and is generally the most widely practiced method of socializing spatial relationships around the world (Ford et al. 2009). The settlement plan refers to the units of a settlement including artifact clusters, pits, hearths, domiciles, ceremonial constructs, courtyards, plazas, gardens, refuse dumps, and so forth. The organization of these units may be grouped into more inclusive segments including house-courtyard groups, public plaza precincts, central ceremonial zones, domestic habitation zones, and others. The areas and densities of these inclusive units within a settlement plan describe relations among and between these segments within the settlement periphery (Leeds 1979: 7). Later in the 1970s, a heightened awareness of social factors and their significance to spatial analysis in archaeology took focus (Clarke 1977; Hodder and Orton 1976; Hodder (ed.) 1978; Whallon 1973 and 1974). Kent Flannery (1972) compared the spatial layout of village forms in Mesoamerica and the Middle East to establish the form of human settlement as having strategic, systematic, and social intention. Flannery's publications relate social and spatial variables in archaeology by describing socially defined units as spatially defined units.

Flannery also expressed a greater need for identifying the spatial symbolic expression and strongly encouraged its critical importance in interpreting material expression over space. Focusing on the intra-site arrangement of activities and functions, household archaeology developed in the 1980s with an increased attention to understand the purpose of households in particular places (Ashmore and Wilk 1988; Binford 1982; Hietala and Larson 1984; Kent 1984, 1990; Wilk and Rathje 1982; see Djindjian 1988 for concise review of intra-site spatial analyses techniques). Previous studies have shown space and time are two vital dimensions to archaeological theory. The research presented here takes into account the significance of spatial patterns in the record of human behavior and considers the effects they have on cultural systems.

2.2 Making Room for an Intra-Site Perspective

Spatial analyses within contemporary Creek research have been attentive to regional settlement patterns and inter-site spatial patterning. However, little intra-site systematic spatial analyses have been conducted of Creek communities. While changes in material culture and architecture have been well documented at Historic Creek sites (Knight 1985; Waselkov 1990; Waselkov et al. 1990; Waselkov and Smith 2000; Wesson 2008), the potential to investigate culture change spatially has been limited to small scale excavations. However, the 2002-2007 Hickory Ground excavations represent the second largest excavation of a Creek town in the state of Alabama (Cottier 2006). The largest Historic Creek town excavation was conducted at Fusihatchee on the Tallapoosa River, also by Auburn University. The research potential offered in comparing the datasets of these two Historic Creek sites is considered a great opportunity. However, only spatial data from the Hickory Ground site is presented at this time.

2.3 Conceptualizing the Archaeological Community

The primary perspective of this thesis research is scaled down to the local level, where the agency, action, and decision making of individuals play an active role in forming the spatial structure of the community. Structured by form and function (Yaeger and Canuto 2000; Preucel 2000), a community is a socially constituted institution (Hegmon 2002: 267) conceived by a set of relationships between social units, or households (Freeman and Audia 2006: 2) that are formed when recognizable and measureable social interactions are concentrated within geographic space. They leave archaeological phenomena from groups of residences where community members share differing degrees of repeated social interaction and shared resource use (Hegmon 2002: 263-264; Marcus 2000). The "community" concept is used as a fairly precise analytical model for archaeological research, and has been promoted in previous studies as an integral, historical, and comparative unit of analysis (Steward 1950: 21). However, the community idiom is somewhat of a convoluted term (Kolb and Snead 1997; Hegmon 2002), and has most often been used as a synonym for "house cluster" or "village" or "town" in archaeological studies (Hegmon 2002: 265). There is a need in current archaeological research to establish and clarify a working definition for the archaeological community. It is a goal of this research to support the archaeological community as a model for archaeological research, and to generate quantifiable spatial attributes for the identification of communities in the archaeological record.

The organization of space can be thought of as the expression of a set of relations embedded in some broader structure, such as the social relations of production (Harvey 1973). I propose using a structural-functionalist approach to define the archaeological community as a spatially limited, socio-geographic structure operating to form group solidarity, cohesion, and action around common interests (Fast 2011: 3; Hollingshead 1948; Murdock 1949; Murdock and Wilson 1972). This definition includes three archaeological indexes: (1) spatial patterning of activities, (2) residential nucleation, and (3) shared material culture (Yaegar and Canuto 2000: 3; Fast 2011: 4), all of which are demonstrated by the archaeological excavations at the Hickory Ground site. A shift in the organizational character of the site in the absence of environmental change may indicate a shift in site function (Binford 1982: 19). In this thesis research, I consider how the Protohistoric and Historic Creek communities functioned and reorganized to meet demands of new socioeconomic systems.

2.4 Agency in Action at the Community Level

Human behavior can be understood by the choices people make, and spatial arrangements function as adaptive strategies within communities. In an attempt to humanize spatial patterning, I suggest considering how agency activities like the organization of households into particular spatial arrangements originated from the decisions and rationality of community members. Manifest in the structure of daily life, the agency in human action animates the use of space in order to fulfill a need, and space is perceived with social and functional intent. The ways in which communities are organized represent rational thought processes, and the spatial arrangement of a community is a cognitive process requiring rational reasoning and social motive. The structural spatial histories in the Historic Creek town reflect the agency of individuals in a turbulent time of acculturation and the formation of new household identities.

Chapter 3 Study Site: The Hickory Ground (1EE89)

The Hickory Ground site covers an extent of 56 acres, of which 22 acres have been excavated. In the 1960s, archaeologists verified its location atop a high river bluff along the eastern bank of the Coosa River in Elmore County, Alabama (Figure 2). A small unnamed stream marks the northernmost boundary of the site; to the east is US Highway 231 and towards the south is a residential area. The site is within the alluvial valley of the Fall Line Hills physiographic district and represents an ideal location for human occupation. Directly across from the site and just beyond the river are floodplain terraces suitable for agricultural fields. The rich biological diversity found within the ecotonal environment of the Fall Line Hills supported indigenous human populations for thousands of years, and evidence for human activity from the Hickory Ground site may date as far back as 12,000 B.P.

The Hickory Ground, or Ocheapofa [Muskogean for "among the hickory trees (Stiggins 1989: 28, 140; Wright 2003: 85; Hawkins 1938: 38-39 and Merenes 1916: 507)], was occupied until the First Creek War of 1813-1814 and the subsequent signing of the Treaty of Fort Jackson, which ended with the destruction and abandonment of many Upper Creek towns, including the Hickory Ground, and most of the structures at the site were abandoned. After being bought and sold by land speculators in the mid-nineteenth-century, the site was utilized for agricultural purposes up until the 1970s (Gill 2010). In 1980, the site was added to the National Register of Historic Places, and a few years later the land was bought with a grant given by the Alabama Historical Commission to the Poarch Band of Creek Indians in Atmore, Alabama (Cottier 2006). In 2002, the Poarch Band acquired an ARPA (Archaeological Resources Protection Act) permit to conduct a Phase III archaeological investigation of 10 acres. Auburn archaeologists, John

Cottier and Craig Sheldon, led the investigations from May 2002 to March 2007 and examined 881 10 by 10 meter units, or 88,100 square meters. The initial 10 acre tract would become over 22 acres (Cottier 2006) and currently represents one of the largest archaeological excavations in the state of Alabama. All investigations were conducted under a valid ARPA permit, and two permits were secured.

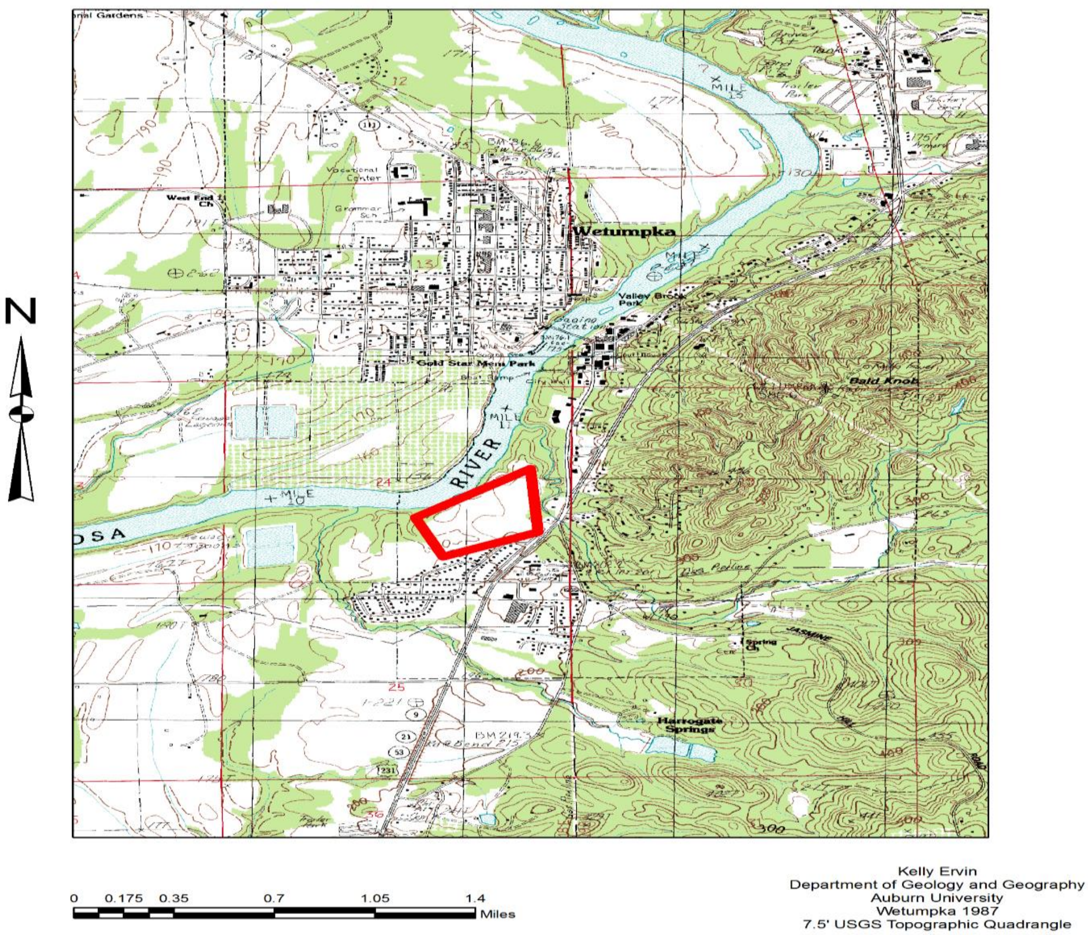


Figure 2. Map showing The Hickory Ground site (1EE89) located along the Coosa River in southwest Wetumpka. The area of major excavations is outlined in red.

The cultural chronology of human occupation at 1EE89 includes Archaic (8000-1000 B.C.), Woodland (1000 B.C.-1000 A.D.), Mississippian (1000-1500 A.D.), Protohistoric (1500-

1700 A.D.), and Historic Creek (1700 A.D.-1838 A.D.) components (See Walthall 1980 for southeastern cultural rubric). Although a few mid-late Woodland pits were uncovered during the 2002-2007 excavation seasons, the Protohistoric and Historic Creek occupations are the most prolific components of the Hickory Ground site and the major focus of this thesis.

3.1 The Protohistoric Tradition

The southeastern Protohistoric culture in North America develops following a fragmentation of the Mississippian cultural tradition around the turn of the fifteenth-century. (Hally 2008: 535-544). Contemporary southeastern Mississippian studies have shown ordered and enduring communities maintained over time (Boudreaux 2005), where power in polities was centralized and decisions were made by a small number of ruling elites (Pauketat 1994; Steponaitis 1986; Wesson 1998; Blitz 1993; Muller 1997). Soon after direct and indirect contact with Europeans during the mid-sixteenth and seventeenth-centuries, significant changes took place due to effects from disease, warfare, and population migration (Baker and Kealhofer 1996; Ethridge 1997; Smith 1987). This was a time of social disruption when small groups reorganized into individual villages and sociopolitical organization became less hierarchical and more egalitarian (Ethridge 2006; Ethridge and Hudson 2002; Gill 2010; Sheldon 1974; Smith 1987). The spatial organization of the Protohistoric community at the Hickory Ground site may reflect these cultural markers characteristic of the time.

Excavations within the Protohistoric community recovered ceramics representing a Lamar component and a Moundville component. A ceramic analysis and seriation of the Protohistoric component is suggestive of a transitional occupation with limited cultural homogeneity (see Gill 2010 for more information on the Protohistoric material culture of

1EE89). Majorities of Protohistoric features are from the northeastern portion of the site and include structures as well as household activity areas, storage pits, and burials. Additionally, there is another cluster of Protohistoric features and potential structures located near the Coosa River bank. Unfortunately, this area has been subjugated to extensive plowing and erosion, and only central fire hearths and some scattered posts remain of these structures.

3.2 The Historic Creek Tradition

Landscape analysis requires a holistic understanding of historical stimuli that actively shape both physical and cultural landscapes (Kroeber 1923, 1939). The scene of Creek country in the eighteenth-century was chaotic and characterized by social, political, and economic instabilities associated with colonial competition (Waselkov et al. 1982), disease (Baker and Kealhofer 1996), slaving, and the deerskin trade (Braund 2008; Gallay 2002: 2; Etheridge 2006 and 2003; Marcoux 2009: 4). Major changes were occurring in Creek towns as the commercial deerskin trade economy changed the daily lives and focus of household activities. During the Historic Period, sociopolitical and economic competition increased internally as the Creeks became involved with a new capitalistic economy. The cross cultural exchanges between Europeans and Creeks left a number of manifestations in the Creek landscape (Braund 2008; Crane 1928; Etheridge 2003; Martin 1994; Saunt 1999), including changes in settlement patterns, material culture, animal husbandry, architecture, demography, and social, political, and economic systems. By the time Hickory Ground had been settled during the late Tallapoosa Phase (ca. 1715-1813), intensive trade with the British had been in existence since the 1690s when Carolina traders expanded their networks west from Charles Town (Crane 1928). The Historic Creeks adapted their primary system of economic exchange from maize cultivation to trading deerskins for various goods including European made trade beads, guns, textiles, and assorted metal trinkets (Wesson 2008). Many Creeks found the opportunity to become individual trade entrepreneurs with the British and French. As systems of exchange were conducted by individual Creeks, and not corporate companies, economic autonomy was on the rise in Creek society. This new economy reduced sociopolitical centralization and increased competition for social status and political power (Wesson 2008: 40). The achievement of social power in Creek society was now more structured by the agency of individuals to acquire European material goods, than be kinship networks.

After the American Revolutionary War, the Euro-American sphere of influence moved farther and farther west, and Native American political factionalism was on the rise. Different political divisions occurred as the Creeks formed alliances with the French, British, and Americans. During the eighteenth-century in east-central Alabama, the landscape was characterized by Creek communities commonly settled along major river banks and creek bottoms. The Creek town, or talwa, was the central unit of organization for the Creek Confederacy and generally included a public square, rotunda, and chunky yard, surrounded by domestic structures, agricultural fields, and land for animal husbandry. For the Creeks, a talwa not only consisted of structures and land, but also of a common social and cultural affiliation to community members who were bound by political, hereditary, and economic systems (Braund 2009). It is during this turbulent time, that I examine how the Historic Creek community changed *spatially* to meet the needs of individuals.

3.3 Hickory Ground in the Ethnohistoric Record

The Hickory Ground settlement is well known from a number of ethnohistoric accounts (David Taitt in 1974; Mereness 1916: 507; William Bartram 1853, 1928: 366; Col. Marinus Willett in 1790, 1831: 103; Hawkins in 1796, 1938: 38-9; George Stiggins in 1814, 1989: 28, 140; Wright 2003; see also Wright 2003) as it became one of the most important Upper Creek towns in the late-eighteenth and early-nineteenth-centuries because of its prominent and significant political position in the colonial era (Wesson 2008: xxvi). The Hickory Ground site first appears on the Purcell map of 1770 where it is located near the mouth of Weoka Creek about 20 miles above the city of Wetumpka in Elmore County. However, later records including the 1780 Roberts map and 1828 Cary map place the Hickory Ground just below present-day Wetumpka (Wright 2003: 84-5). Ethnohistorical documents indicate that by 1776, Hickory Ground was occupied by Creeks who spoke the Muscogee language (Bartram 1928: 366). Benjamin Hawkins wrote in 1796 that the Hickory Ground is well known to Creeks and traders as "O-che-au-po-fau" (Hawkins 1938 (3): 38-9), and comes from the Muscogee root word *Oche-ub*, a hickory tree, and *po-fau*, in or among (Stiggins [1814] 1989: 28). Swanton describes the Hickory Ground as "one of the most important towns descended from the Coosa" (Swanton 1922: 242). The political importance of the site may have reached its peak when the Creek National Council moved to Hickory Ground from Tukabatchee in 1802 (Cottier 2006; Wright 2003: 85). The town did not play a major role in the First Creek War of 1813-1814; nonetheless, the Hickory Ground along with other Creek towns along the Coosa and Tallapoosa Rivers were abandoned at the end of the First Creek War.

From 1796 until 1816, Benjamin Hawkins, appointed U.S. Indian Agent, lived alongside the Creeks with goals to implement the U.S. government's "Civilization Plan" of the North American Indian. His letters and correspondences provide detailed descriptions of Creek culture. There have been no current population estimates for the town of Hickory Ground, but Hawkins states that the town included 40 gunmen, 300 cattle, and some horses and hogs (Foster 2003: 40s; Grant 1980: 25). Additionally, the 1825 census recorded 227 people (NA M_{234} R_{219}), and the 1832 census recorded 225 (NA T_{275} R_1).

At one time, the Hickory Ground may have been the location of the prominent Creek General Alexander McGillivray's home, or at least part of his family's residences (Willett 1831: 103; Grant 1980 (1): 25; Wright 2003: 85). According to Hawkins, Hickory Ground was settled by migrating Creeks from a neighboring town known as "Tallassu" (Foster 2003: 44-45), "Little Tallasee," or "Little Tulsa" (Wright 2003 84-5; Swanton 1922: 242). In 1772, The Creek agent David Taitt recorded the "Little Tulsa" site as located on the east bank of the Coosa River about four miles upstream from the Hickory Ground (Mereness 1916: 507). According to Swanton, the "Little Tulsa" site was home to the famous Creek leader, whose mother was Sehoy, a Creek woman from the Wind Clan and whose father was Alexander McGillivray, a Scottish trader (Swanton 1922: 242). In 1790, Col. Marinus Willett records visiting Alexander McGillivray at the Hickory Ground (Willett 1831: 103). It is believed that around the time of McGillivray's death in 1793, the inhabitants of "Little Tulsa" gradually relocated downstream to occupy the Hickory Ground. Writing in that same year, Hawkins states "The hickory ground is inhabited by those who formerly lived at the Tallassu, and the old town is a desert" (Foster 2003: 44). The possibility of Alexander McGillivray's family associated with the Hickory Ground site significantly adds to the historical meaning of the town.

3.4 The Creek Town Plan

A number of firsthand, eighteenth-century ethnohistoric accounts provide written observations on the arrangement and organization of Historic Creek towns (Adair 1968; Swan 1855; Taitt 1974; Wight 1967; see Sheldon 2010: 137-168 for a detailed review of the ethnohistoric accounts of the Creek town plan). However, the journals and sketches of William Bartram (see Figures 3 and 4), a travelling naturalist from Philadelphia, provide an incredibly instrumental resource for reconstructing the Historic Creek community. In November 1776, Bartram left Mobile and headed up the Alabama River to Upper Creek country where he visited a number of Creek towns. Bartram (1853: 55-56) states:

> "The habitations of the Muscogulges or Upper Crik towns…consist of Little Squares, or four oblong rather of four oblong square houses, encompassing a square area, exactly on the plan of the Publick Square,-every Family however have not four of these Houses-some 3,-some 2,-and some but one, according to their circumstances, of largeness of their family, &c.-but they are situated so as to admit od four building when conveniency or necessity require it-Wealthy citizens, having large Families, generally have Four Houses; and they have a particular use for each of these buildings-One serves for a Cook Room & Winter Lodging House-another for a Summer Lodging House & Hall for Receiving Visiters-and a 3d for a Granary, or Provision House, &c:-This is commonly two Stories high and divided into two apartments transversely-the lower story of one end being a potato house & for keeping such other roots & fruits as require to be kept close or defended from cold in Winter-The chamber over it is the Corn Crib-The other end of this building, both lower & upper stories are open on 3 sides-The lower story serves for a shed for their saddles, packsaddles & geers & other Lumber; the loft over it is a very spacious airy pleasant Pavilion-where the Chief of the Family reposes in the hot seasons & receives his Guests, &ca.-And the Fourth House which (completes the Square) is a Skin House or Ware-house, if the proprietor is a wealthy man, and engaged in Trade or Traffick-where he keeps his Deer Skins, Furs & Merchandize & treats with his Customers-Smaller or less Wealthy Families, make one, two or 3 houses serve all these purposes as well as they can"

The sketch below by Bartram depicts the four structure form of the Creek household compound, where L. is the lodging house, C. is the cook house, W. is the warehouse, and P. is the pavilion. The space labeled ‘area’ is the central courtyard of the household.

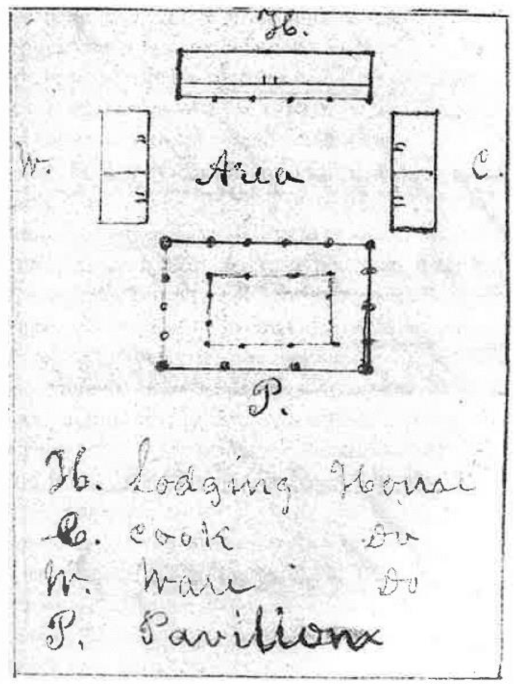


Figure 3. Bartram’s drawing of the Apalachicola Headman’s House (Copy by Edwin H. Davis, courtesy of the National Anthropological Archives, Smithsonian Institution).

> “…their houses are neat commodious buildings, a wooden frame with plastered walls and roofed with Cypress bark or shingles; every habitation consists of four oblong square houses, of one story, of the same dimensions, and so situated as to form an exact square, encompassing an area or court yard of about a quarter of an acres of ground, leaving an entrance into it at each corner” ([Bartram 1776] *Travels*, ed. DeWolf 1973: 395).

Included in Bartram’s journal is an illustration depicting a Creek community plan with rotunda, square ground, and chunky yard surrounded by a coalescence of domestic households enclosed by dashed lines, which likely represent wooden worm fences (Figure 4).

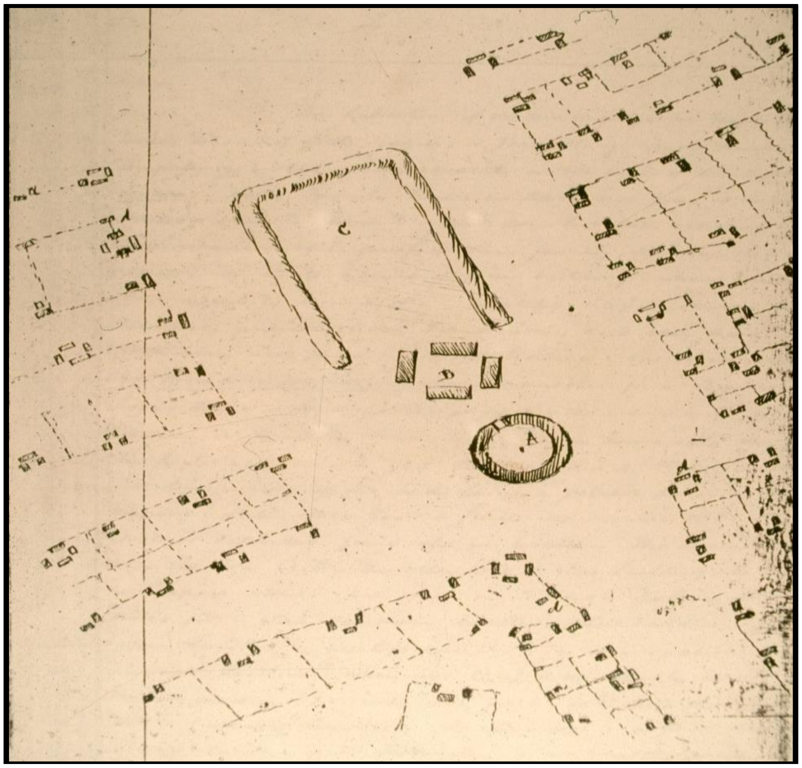


Figure 4. William Bartram’s depiction of a Creek town plan (*Plan of the Muscogee or Upper Creek Town* National Anthropological Archives, Smithsonian Institute 1789)

The map of the Hickory Ground site drafted in this thesis research clearly illustrates a first and second rotunda adjacent to a public square that is surrounded by four cabins and a possible chunky yard, also known as the ball court. However, the actual spatial arrangement of the domestic house compound is not as seamlessly organized as the Creek town plan illustrated by Bartram, which is clearly reflective of his European-American perspective.

Chapter 4 Methods

Geographic Information Systems allow for the dynamic and interactive presentation of spatially referenced archaeological data. The GIS map of Hickory Ground produced in this thesis research is not only descriptive, but also enables data manipulation and analysis. Since the development of GIS during the 1970s, and the accessibility acquired during the late 1980s by civilian academic scholars (Coppock and Rhind 1991: 21), it has been utilized in the analysis, interpretation and presentation of archaeological data (Green 1990: 3). The "time depth" dexterity of spatially referenced data is useful in diachronic studies, and may be represented in the GIS as a series of data themes (Kvamme 1989). The capability of GIS to test multiple variables over time and space may be used to develop effective techniques in the identification of culture change in the archaeological record (Savage 1990: 29). Similar studies using GIS have been conducted for the late Mississippian Town Creek site in North Carolina by Tony Boudreaux and the late Mississippian King Site in northwestern Georgia by David J. Hally (Boudreaux 2003; Hally 2008). The digitization of these archaeological communities using GIS has illustrated that both the Town Creek and the King site demonstrate spatial, architectural, and material change and continuity over time. To interpret spatial patterning from the Hickory Ground site, coordinates of archaeological features were analyzed using multiple forms of spatial statistics in order to examine relationships between spatial structure and social structure. Their results decrease the subjectivity of interpreting patterns in datasets (Allen 2009: 329). The research design of this thesis is based on the assumption that spatial relationships in a community have social meaning. A methodology flow chart depicting the data collection, preparation, and analysis is depicted in Figure 5 below.

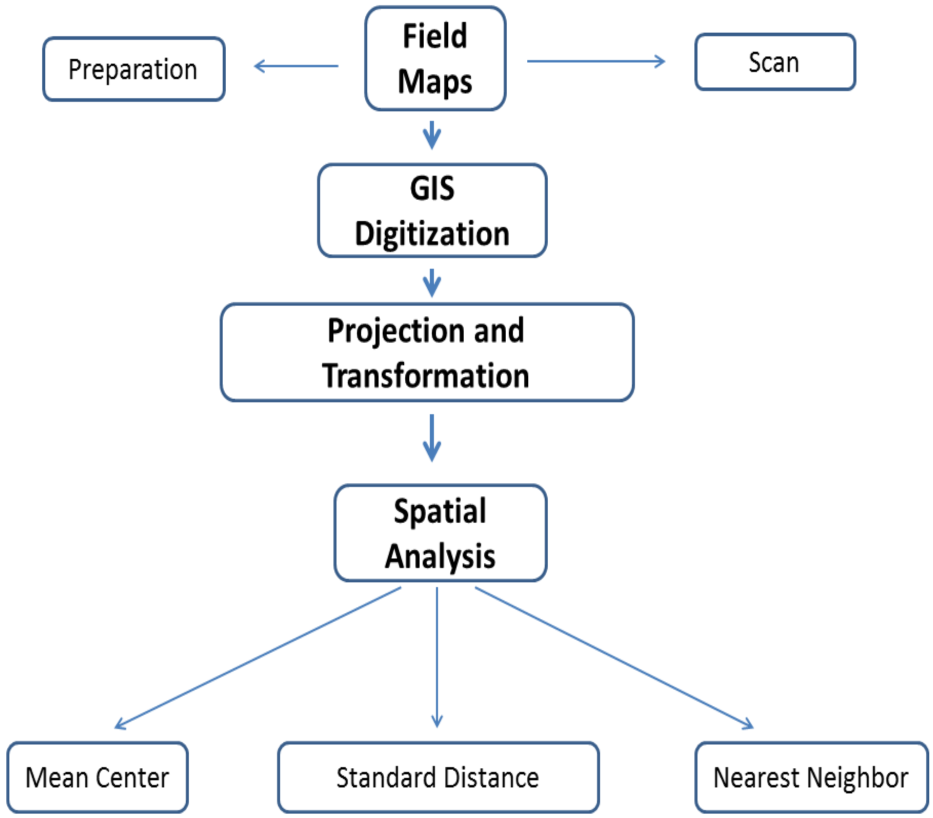


Figure 5. Flow chart showing the major steps of data collection, preparation, and analysis.

4.1 The Dataset: 1EE89 Field Maps Collection

The dataset for this report includes a total of 712 field maps recorded by Auburn University archaeologists during the 2002-2007 excavation seasons and are curated in the Auburn University archaeology laboratory's collections of the Haley Center on the university's main campus. The field maps themselves average 60 x 60 centimeters in size and represent 10 x 10 meter excavation grid units (Figure 6). A major contribution of this thesis research was to digitize and re-draw the field maps in ArcGIS 10.2, creating a spatially referenced database of over 9,000 features spread across 18 acres of the total 22 acre site.

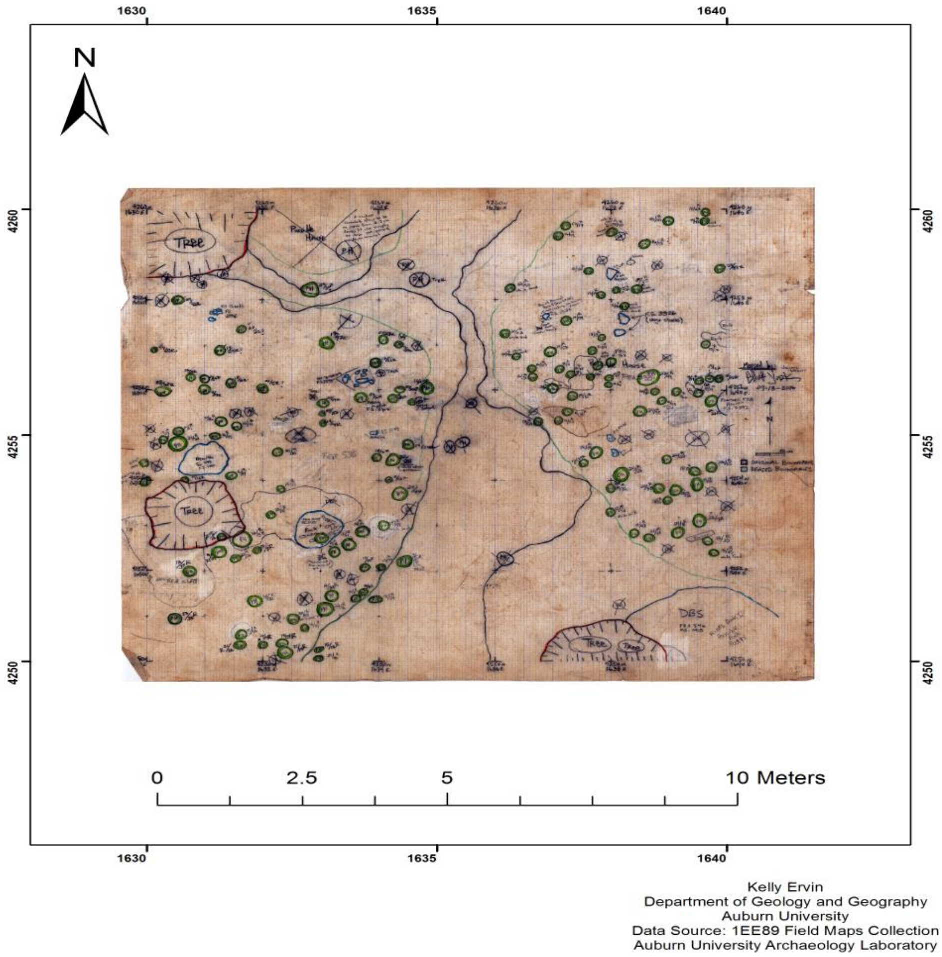


Figure 6. 1EE89 field map showing two Protohistoric structures. Postholes are marked in green, unexcavated areas in red, and all other archaeological features in blue.

4.2 From the Ground to GIS: Digitizing the Hickory Ground Site

The GIS map of Hickory Ground was digitized by entering archaeological data into ArcMap and ArcCatalog using a multi-step process. The first phase was to prepare the field maps for digitization. This included organizing them into rows according to their northern coordinates. The features were then marked with colored pencils, so that all features to be traced over in ArcMap were clearly visible and color-coded. The Hickory Ground feature forms, housed in the Auburn Archaeology laboratory, contain photographs, detailed field maps, and additional notes of each feature. These were consulted before digitizing or scanning any of the field maps.

The next step included the geo-correction and drawing of archaeological feature class shapefiles on each 10 x 10 meter excavation grid square in ArcMap. Each map was geo-registered according to the archaeological excavation grid in order to align all 712 field maps as one, similar to piecing together a giant 18 acre puzzle (Figure 7).

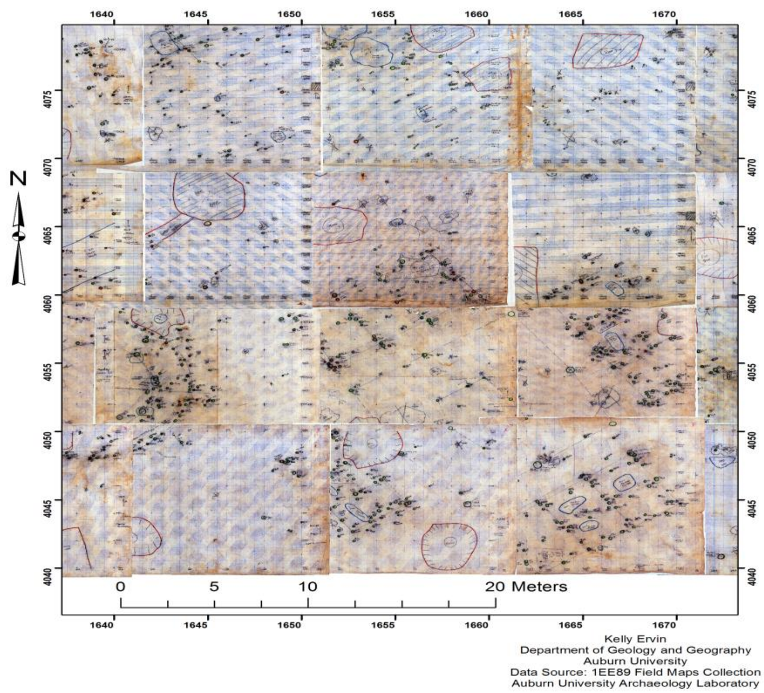


Figure 7. The map above shows a series of geo-corrected field maps depicting the Historic Creek Square Ground.

The archaeological excavation grid was set up by the Jeffcoat Engineers and Surveyors, L.L.C. of Montgomery, Alabama land surveying company and is based on a series of Northern and Eastern coordinates. The 4000 North baseline was established using a total instrument station and identified on the ground with 5 metal pins (Cottier and Sheldon, personal communication, June 2012). The excavation grid was then projected north and east from the 4000 North baseline, which marks the official boundary of tribal land owned by the Poarch Band (Figure 8). The georeferencing tool in ArcMap was used to assign the spatial location for each field map to the excavation grid. Generally, a total of four control points were selected and assigned a set of north (Y) and east (X) coordinates for each corner quadrant of each field map.

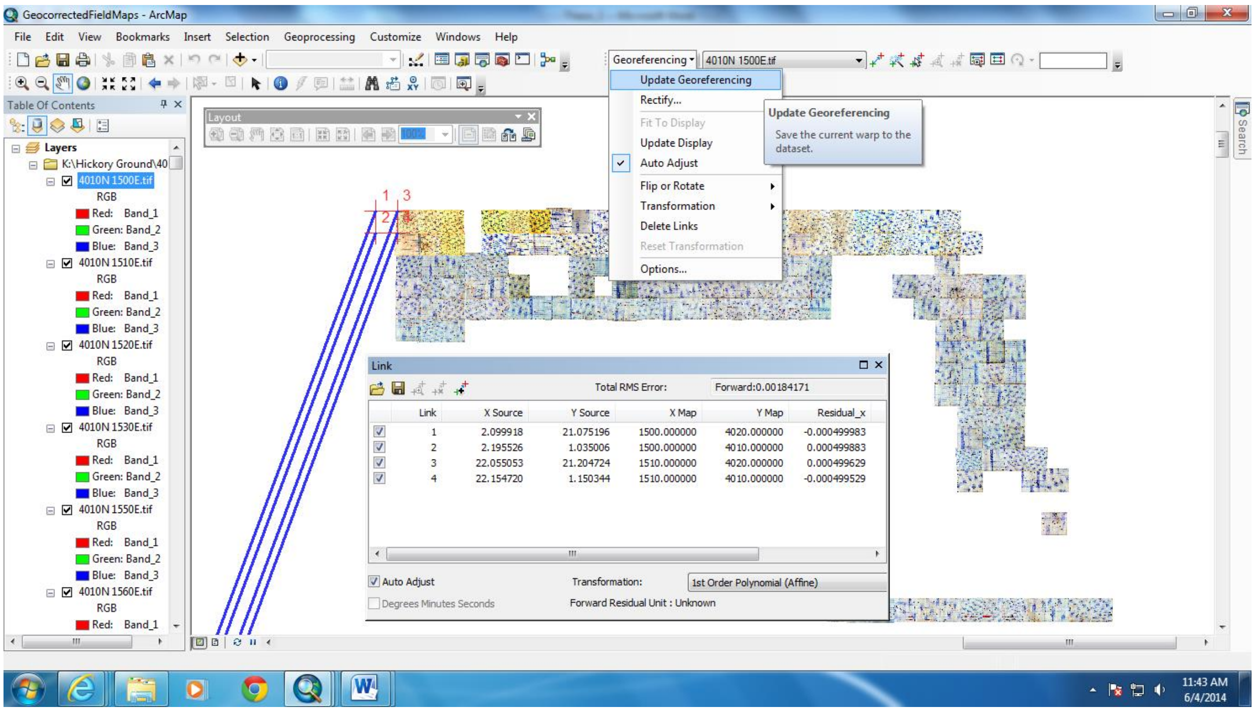


Figure 8. The above view captures the process of checking the Link Table for RMS error and 'Updating Georeferencing.' Notice the control points (numbered in red) placed at each quadrant of an individual field map located at the top left corner of the dataframe. This screen shot shows multiple field maps that have already been georeferenced to the archaeological grid.

The 18 acre map of the Hickory Ground site, representing 71,200 square meters, includes a number of shapefiles representing feature classes of burials, postholes, middens, rock hearths, fire hearths, large pits, small pits, general F.S., miscellaneous features, unexcavated, lenses, daub pits, scattered rock concentrations, bone pits, corn cob pits, Historic structures, and Protohistoric structures. A total of 17 shapefiles were generated and a total of 9,363 features were digitized across 18 acres of geographic space within the Hickory Ground site.

Of the total 9,363 features drawn on the map (see Figure 9), 806 are archaeological features other than postholes, 7,816 are postholes, and 741 are unexcavated areas of the site (primarily trees). It is important to make note of the observer variability in the identification of features at 1EE89. Of the 7,816 postholes at the site, it is possible some may have been modern postholes or remnants of tree roots which could not be precisely identified. Additionally, it is suspected that up to 30-40 percent of the postholes were missed for the Historic Creek occupation (Cottier personal communication, June 2014).

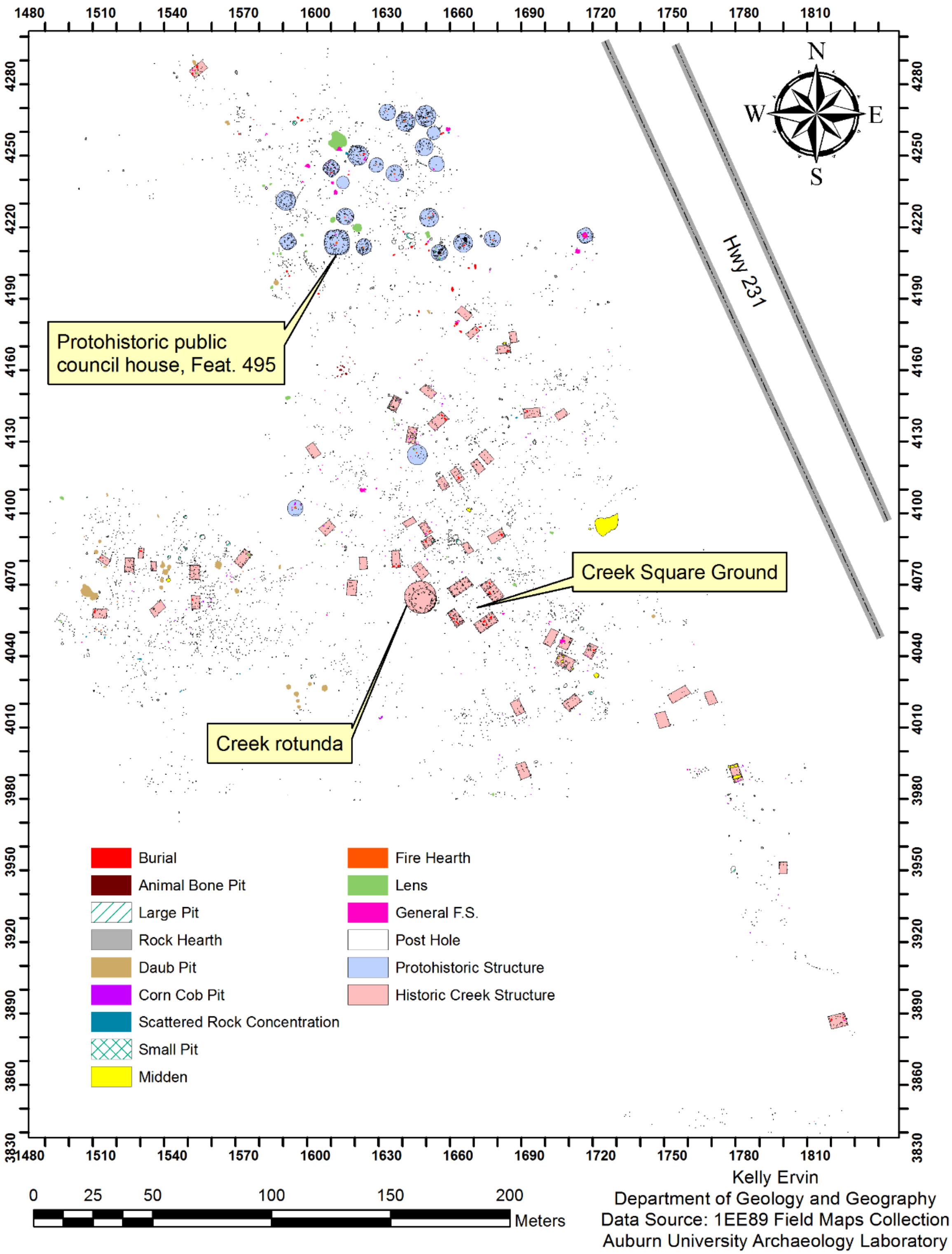


Figure 9. Map showing all geo-referenced and projected features from Hickory Ground on the excavation grid.

4.3 Projections and Transformations

In order to perform complex analytical spatial testing in ArcGIS, it is required that all features be projected to a real-world coordinate system. I chose to geo-register feature shapefiles from the excavation grid to the Universal Transverse Mercator (UTM) grid. To adjust shapefiles of archaeological features containing vector data, I followed a systematic procedure that includes the *Spatial Adjustment Toolbar* in Arc ToolBox. A geo-corrected digital orthoquad (DOQ) aerial image of southwest Wetumpka was selected as a basemap layer because it was taken in 2006 during the time Hickory Ground was being excavated. Once the *links,* or control points are set, the newly projected shapefile is added to the *Table of Contents* and appears on the survey's grid atop the DOQ basemap layer (Figure 10). This process of spatial adjustment was performed for all feature class shapefiles. All archaeological features now contain a projected coordinate system and appear in the appropriate locations on the aerial image of southwest Wetumpka (Figure 11). Data Table 1 lists the total number and average perimeter (m), area (m^2), Easting (X), and Northing (Y) values for all projected features other than postholes.

4.4 Calculating the Geodetic Centroid of Archaeological Features

The mean center, also known as the geodetic centroid, is a point calculated by averaging the (X) and (Y) values of a feature using the *Spatial Statistics Tools* of the Arc Toolbox. This location on the grid shows the average center location of a given feature, or collective feature class. Furthermore, all distance computations were calculated from feature centroid to feature centroid.

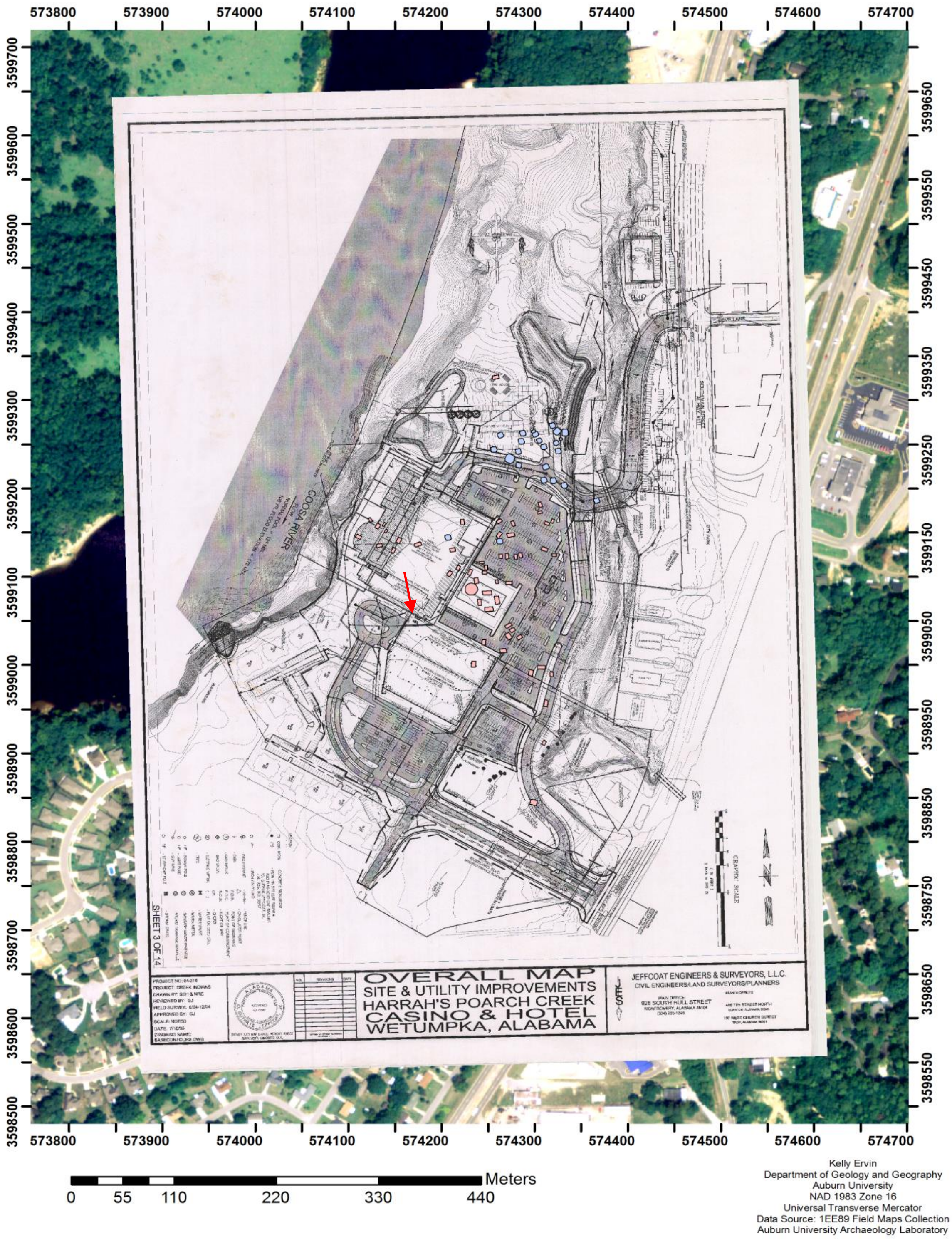


Figure 10. View showing the Historic Creek structures in rose and the Protohistoric structures in blue spatially adjusted to the Jeffcoat Engineers and Surveyors, L.L.C. map underneath the Wetumpka sw 2006 DOQ. Notice how Hwy 231 lines up on both the surveyor's grid and the orthoquad. The red arrow is pointing to the 4000 N Baseline.

Figure 11. View showing the Hickory Ground site with features projected onto the Wetumpka sw 2006 Digital Orthoquad_NAD_1983_Zone 16. Note the grid now includes UTM coordinates. The Coosa River bank is to the extreme left and Highway 231 is to the extreme right.

Table. 1 Average Feature Dimensions and Coordinates

Feature Type	Total	Perimeter (m)	Area	Easting (X)	Northing (Y)
Bone Pit	24	2.00	0.32	574259.243854	3599192.809994
Historic Burial	29	3.06	0.64	574249.33572	3599119.55145
Protohistoric Burial	27	3.12	0.69	574292.929722	3599226.843951
All other Burial	4	2.85	0.52	574208.099487	3599173.742788
Corn Cob Pit	119	1.46	0.16	574253.301567	3599105.615873
Historic Daub Pit	15	7.67	4.83	574162.375424	3599112.018646
Protohistoric Daub Pit	7	5.51	1.94	574182.651806	3599173.55304
All other Daub Pit	4	6.08	2.60	574201.227140	3599229.735023
Fire Hearth	24	2.13	0.37	574250.967837	3599201.655199
General F.S.	232	1.30	0.23	574272.971033	3599184.115256
Historic Large Pit	20	5.09	1.88	574253.546449	3599113.38846
Protohistoric Large Pit	5	3.52	0.96	574165.928842	3599157.5488
Woodland Large Pit	2	5.72	2.41	574291.807916	3599223.926755
All other Large Pit	9	3.88	1.16	574234.600075	3599191.115635
Midden	12	4.41	1.41	574292.846945	3599018.462001
Historic Small Pit	18	2.41	0.46	574256.550934	3599079.4383
Protohistoric Small Pit	22	2.44	0.67	574277.627760	3599218.612190
All other Small Pit	9	2.03	0.32	574197.88551	3599129.660897
Creek House Structure	22	19.63	23.01	574243.966326	3599110.651909
Historic Arbor	26	18.95	21.51	574249.094164	3599091.394749
Historic Rotunda	2	37.34	112.6	574232.057506	3599085.276335
Square Ground Cabin	4	26.70	40.39	574249.857656	3599072.615005
Lens	33	4.54	2.64	574244.373901	3599187.255225
Miscellaneous Feature	13	33.68	37.09	574211.210416	3599164.829801
Protohistoric Structure	25	23.22	43.60	574299.822448	3599232.781091
Rock Hearth	79	2.02	0.32	574273.372053	3599137.644809
Scattered Rock	20	2.25	0.36	574224.591904	3599113.438390

4.5 The Nearest Neighbor Statistic

The Nearest Neighbor statistic describes the average distance between points in a dataset as either significantly clustered, random or dispersed. It is utilized in this thesis research to quantify and compare the spatial distribution of Protohistoric and Historic Creek structures to their average nearest neighbor structure. The average distance between archaeological features and their single nearest neighbor is expressed with the Nearest Neighbor Ration. The expected average distance is based on a hypothetical random distribution with the same number of features covering the same total area. The Nearest Neighbor Ratio is calculated as the observed average distance between each feature and its nearest neighbor divided by the expected average distance between each feature and its nearest neighbor (Figure 12). The Ratio decreases more if a pattern is clustered (Demers 2003: 397-8); so that a Ratio of less than 1 exhibits significant clustering. If the mean nearest neighbor distance is less than the expected mean distance for a random sample, then the distribution is considered clustered. If the mean distance is greater than the expected mean distance for a random sample, then the distribution is considered random or dispersed. The nearest neighbor statistic requires projected data in order to calculate Euclidean algorithms. The coordinate systems of all tested shapefiles were first defined and then projected.

The Average Nearest Neighbor ratio is given as:

$$ANN = \frac{\bar{D}_O}{\bar{D}_E} \qquad (1)$$

where $\bar{D}_O$ is the observed mean distance between each feature and its nearest neighbor:

$$\bar{D}_O = \frac{\sum_{i=1}^{n} d_i}{n} \qquad (2)$$

and $\bar{D}_E$ is the expected mean distance for the features given in a random pattern:

$$\bar{D}_E = \frac{0.5}{\sqrt{n/A}} \qquad (3)$$

In the above equations, d_i equals the distance between feature i and it's nearest neighboring feature, n corresponds to the total number of features, and A is the area of a minimum enclosing rectangle around all features, or it's a user-specified Area value.

The average nearest neighbor z-score for the statistic is calculated as:

$$z = \frac{\bar{D}_O - \bar{D}_E}{SE} \qquad (4)$$

where:

$$SE = \frac{0.26136}{\sqrt{n^2/A}} \qquad (5)$$

Figure 12. The Nearest Neighbor Statistic (Ebdon 1985).

4.6 The Standard Distance Statistic

The Standard Distance statistic provides a summarized measure for the compactness of a set of points around a geographic mean center (Allen 2009: 304-10). The Standard Distance statistic thus describes how dispersed archaeological features are from their geographic mean center, or in contrast, how compacted they are. This statistic is the same as the Standard Deviation statistic that measures the distribution of a set of data values around a statistical mean. For this study, I utilize the Standard Distance statistic to measure the degree to which the Protohistoric and Historic Creek structures are concentrated or dispersed around their associated mean center. The Standard Distance Statistic quantifies the amount of dispersion in a set of features by calculating the square root of the average of the squared differences of values from an average value, or mean (Allen 2009: 305)(see Figure 13 below). In the case presented by this thesis, the average value, or mean, is calculated from the average distance of all features to a community centroid.

The Standard Distance is given as:

$$SD = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{X})^2}{n} + \frac{\sum_{i=1}^{n}(y_i - \bar{Y})^2}{n}} \qquad (1)$$

where x_i and y_i are the coordinates for feature i, $\{\bar{X}, \bar{Y}\}$ represents the Mean Center for the features, and n is equal to the total number of features.

The Weighted Standard Distance extends to the following:

$$SD_w = \sqrt{\frac{\sum_{i=1}^{n} w_i(x_i - \bar{X})^2}{\sum_{i=1}^{n} w_i} + \frac{\sum_{i=1}^{n} w_i(y_i - \bar{Y})^2}{\sum_{i=1}^{n} w_i}} \qquad (2)$$

where w_i is the weight at feature i.

Figure 13. The Standard Distance Statistic (Mitchell 2005).

This spatial statistic provides a single value representing the deviation of feature distances around the mean center from the average. This value is called the Standard Distance Index, and is actually a distance represented in (m); so that the distribution of a set of features can be represented on a map by drawing a circle with a radius equivalent to the Standard Distance Index. The Standard Distance statistic in ArcMap 10.2 produces a circle with a radius equivalent to the Standard Distance Index. If the underlying spatial pattern of the input features is concentrated in the center with fewer features towards the periphery, then it is considered a normal spatial distribution. A normal spatial distribution demonstrates one standard deviation circle that covers approximately 68 percent of the features. A two standard deviation circle will contain approximately 95 percent of the features, and a three standard deviation circle will encompass approximately 99 percent of the features.

In order to compute the Standard Distance statistic, feature centroids must be calculated for use in Euclidean distance computations. The Protohistoric and Historic Creek structures at Hickory Ground represent the input feature classes that contain a distribution of feature centroids, of which the Standard Distance is calculated. Once successfully computed for each input feature class, ArcMap generates a new attribute table that includes geometry of the standard distance circle, including the average X and Y values for the circle and a Standard Distance Index. The Standard Distance test was performed for one and two Standard Deviations to examine how compacted or dispersed the structures are from their mean center point. A large Standard Distance measure indicates that the data points are dispersed far from the mean, while a small standard deviation indicates they are compacted closely around the mean. The larger the Standard Distance Index value, the more variation of individual distances from the group average distance; furthermore, the larger the Standard Distance Index, the more dispersed a dataset is from its average mean center.

Chapter 5 Results and Discussions

To best understand change in the landscape at the Hickory Ground, causes are inferred from observed effects. In which case, the observed effects are the spatial arrangements and organizations of archaeological features across space. Causes for these patterns can be understood as implicated in social, political, and economic systems, of which major changes occurred during the postcontact period.

5.1 Test Results: Mean Center, Nearest Neighbor, and Standard Distance

The Mean Center, Nearest Neighbor, and Standard Distance statistics were calculated in ArcMap to identify spatial patterns in the geographic coordinates of archaeological features distributed across the Hickory Ground site. The Mean Center statistic was calculated as a necessary pre-requisite for the Standard Distance statistic. Both the Nearest Neighbor and Standard Distance statistics were specifically selected to test the hypotheses of this thesis and answer such questions concerning the cluster or dispersion of a set of data points. Additionally, statistic tests were run on the datasets that included either all Protohistoric and Historic Creek structures and features or only structures. All tests produced similar results. It must be noted, however, that the mean center calculation for Protohistoric structures and features produced a significantly different result.

5.1.1 Mean Center Results

The Mean Center was calculated by averaging the (X) and (Y) values for all structures in the Protohistoric and Historic Creek communities, respectively (Table 2).

Table 2. Mean Center Results for Structures

Occupation	X Coordinate (UTM)	Y Coordinate (UTM)
Protohistoric structures	574299.822448	3599232.781092
Historic Creek structures	574246.430613	3599097.622556

Results show the mean center of the Protohistoric community located 26.78 meters east of the public council house (Figure 14), and the mean center of the Historic Creek community located 18.18 meters northeast from the Historic Creek public council house. An additional mean center test was calculated to include structures with features for both occupations. The Historic Creek structure and feature mean center did not change locations, but the Protohistoric center point moved to a new location, 15.8 meters south of the public council house. (Table 3).

Table 3. Mean Center Results for Structures and Features

Occupation	X Coordinate (UTM)	Y Coordinate (UTM)
Protohistoric	574274.059955	3599217.748039
Historic Creek	574244.436686	3599096.879009

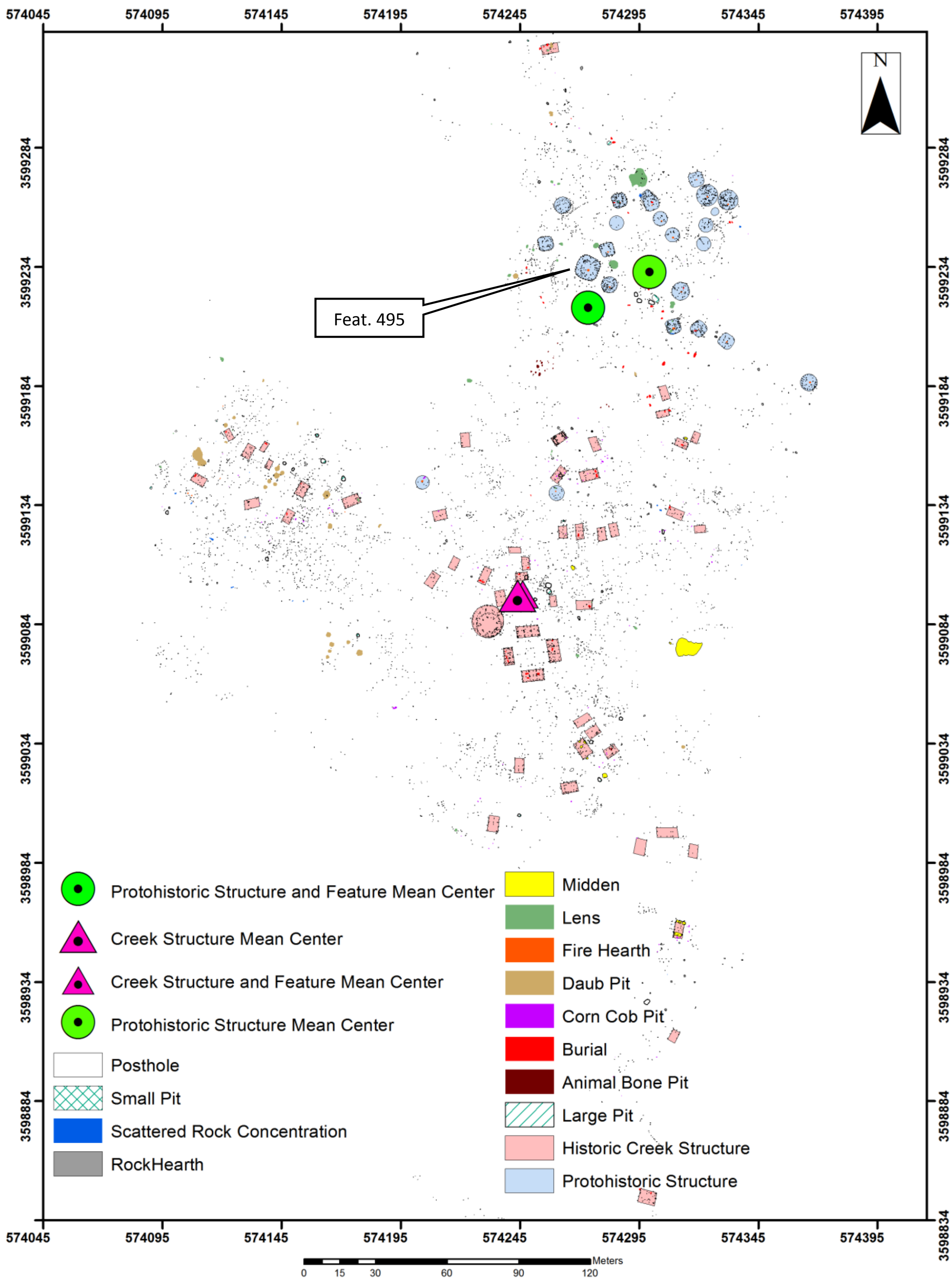


Figure 14. Map showing the mean center results. Notice how the Protohistoric mean center changes locations around Feat. 495, the public council house.

Activities serving the highest number of community functions will be located in the central area of settlement (Leeds 1979: 46). In both computations, the geographic mean center is considerably close to the public council houses, so that at the core of the Protohistoric and Historic Creek communities was public space. Building upon the Protohistoric structure mean center, the occupational plan of the community appears to be centered on what may be an open plaza area. Since centroids were calculated near the public structures and a possible plaza, these may have been the locations for the most intra-site activity, intra-settlement movement, and the exchange of information and goods.

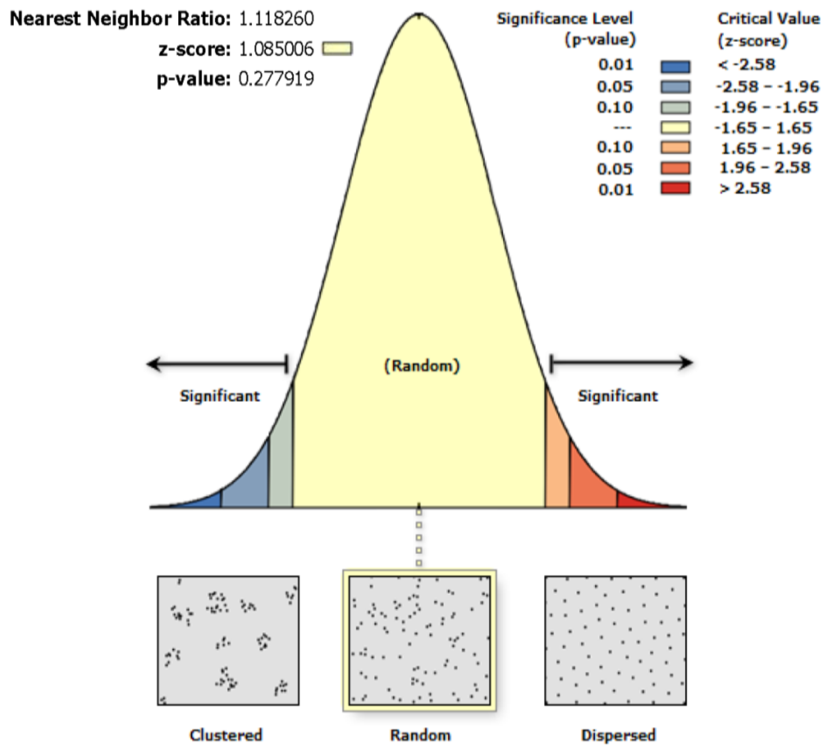
5.1.2 The Nearest Neighbor Result

The Nearest Neighbor Statistic calculates the level of significant clustering or dispersion of a set of features. The Average Nearest Neighbor statistic in ArcMap returns five results: observed mean distance between features, expected mean distance between features, Nearest Neighbor Ratio, z-score, and p-value. A probability (p-value) of less than 0.05 is considered a statistically significant result, or one that was very unlikely to have occurred by chance. Any group with a p-value of more than 0.05 is not considered statistically significant and does not justify the rejection of the null hypothesis, which states that there is no variation in the spatial data for the Protohistoric and Historic Creek communities.

Results of the Nearest Neighbor statistic suggest the Protohistoric structures are randomly distributed throughout the study area (Figure 15) and the Historic Creek structures are clustered into groups (Figure 16). The Nearest Neighbor statistic returned the following results for the Protohistoric structures, observed mean distance (average distance to nearest neighbor): 15.8091 meters, Nearest Neighbor Ratio: 1.118260, z-score: 1.085006, and p-value (probability): 0.277919.

Average Nearest Neighbor Summary

Average Nearest Neighbor Summary



Given the z-score of 1.09, the pattern does not appear to be significantly different than random.

Average Nearest Neighbor Summary

Observed Mean Distance:	15.8091 Meters
Expected Mean Distance:	14.1373 Meters
Nearest Neighbor Ratio:	1.118260
z-score:	1.085006
p-value:	0.277919

Dataset Information

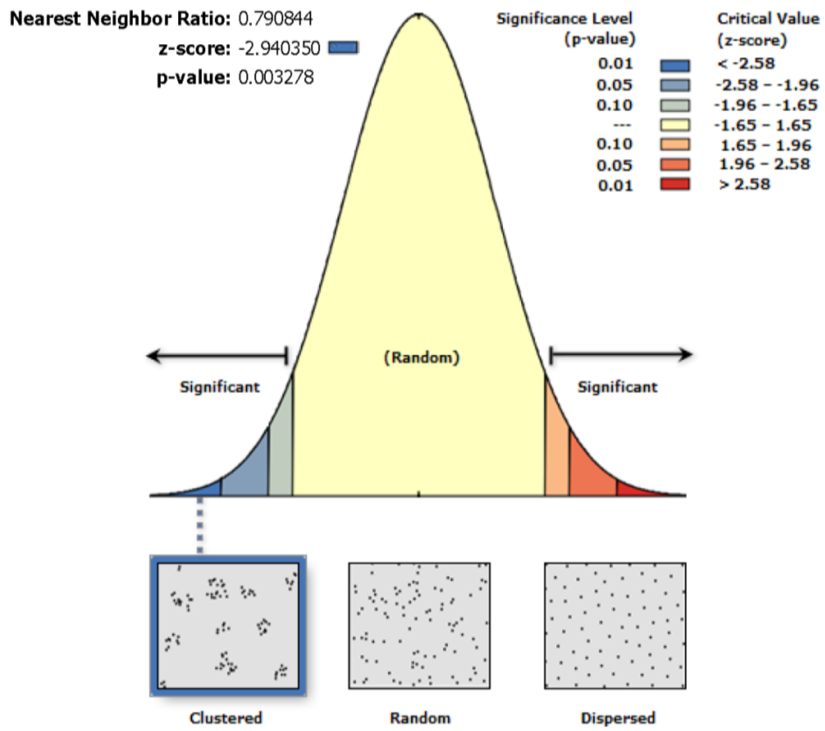
Input Feature Class:	ProtohistoricStructure_copy_
Distance Method:	EUCLIDEAN
Study Area:	18387.329617
Selection Set:	False

NearestNeighbor_Result_ProtohistoricStructures.html[6/5/2014 12:19:28 PM]

Figure 15. Results of the Protohistoric Nearest Neighbor statistic

Average Nearest Neighbor Summary

Average Nearest Neighbor Summary



Given the z-score of -2.94, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

Average Nearest Neighbor Summary

Observed Mean Distance:	16.4773 Meters
Expected Mean Distance:	20.8351 Meters
Nearest Neighbor Ratio:	0.790844
z-score:	-2.940350
p-value:	0.003278

Dataset Information

Input Feature Class:	CreekStructure_copy_Project
Distance Method:	EUCLIDEAN
Study Area:	93765.653397
Selection Set:	False

NearestNeighbor_Result_HistoricStructures.html[6/5/2014 12:06:30 PM]

Figure 16. Results of the Historic Creek Nearest Neighbor statistic

The Nearest Neighbor statistic returned the following results for the Historic Creek structures, observed mean distance (average distance to nearest neighbor): 16.4773 meters, Nearest Neighbor Index Ratio: 0.790844, z-score: -2.940350, and p-value (probability): 0.003278. A house cluster can be described as a coresidence which facilitates regular face-to-face interaction (Varien 1999: 4; Murdock 1949; Fast 2011: 3), and houses that are clustered together can be described as socially bounded. These groups likely represent the matrilineally bound household compounds as reported by European and American travelers in the Creek countryside (Bartram 1928; Adair 1968; Swan 1855; Taitt 1974; Wight 1967).

5.1.3 Standard Distance Results

The Protohistoric Standard Distance Index when calculated for one Standard Deviation is 49.05 meters (Table 4).

Table 4. Protohistoric Standard Distance Results (1 Standard Deviation)

Circle Perimeter (m)	Circle Area (m)	Easting Center (X)	Northing Center (Y)	StdDist Index (m)
308.16	7556.53	574299.822448	3599232.781090	49.05

The Historic Creek Standard Distance Index when calculated for one Standard Deviation is 94.38 meters (Table 5).

Table 5. Historic Creek Standard Distance Results (1 Standard Deviation)

Circle Perimeter (m)	Circle Area (m)	Easting Center (X)	Northing Center (Y)	StdDist Index (m)
593.02	27984.30	574246.430612	3599097.622560	94.38

The majority of Protohistoric structures are included within one standard deviation (Standard Distance Circle), so that the distances of Protohistoric structures to their mean center do not exhibit as much variation from the group average as do the Historic Creek structures (Figure 17). In other words, a higher number of individual Historic Creek structures lie outside one standard deviation from the group average and are thus dispersed away from the mean community center. The Historic Creek house clusters located outside the standard deviation circle provide further evidence to demonstrate the dispersed nature of the historic occupation.

The Standard Distance statistic was also computed for two Standard Deviations. The Protohistoric Standard Distance Index value when calculated for two Standard Deviations is 97.81 meters (Table 6).

Table 6. Protohistoric Standard Distance Results (2 Standard Deviations)

Circle Perimeter (m)	Circle Area (m)	Easting Center (X)	Northing Center (Y)	StdDist Index (m)
614.55	30053.41	574300.29045	3599232.85966	97.81

The Historic Creek Standard Distance Index value when calculated for two Standard Deviations is 188.77 meters (Table 7).

Table 7. Historic Creek Standard Distance Results (2 Standard Deviations)

Circle Perimeter (m)	Circle Area (m)	Easting Center (X)	Northing Center (Y)	StdDist Index (m)
1186.04	111937.60	574246.431322	3599097.620460	188.77

The results show that the centroid of the Historic Creek structures actually lies outside the two Standard Deviation circle calculated for the Protohistoric structures (Figure 18). This shows that the community center has moved to a different location of the site; furthermore there is a difference not only in the spatial structure of the two communities but also a difference in spatial location. The collective results of the Standard Distance Statistic support the hypothesis of Protohistoric community nucleation and Historic Creek community dispersion.

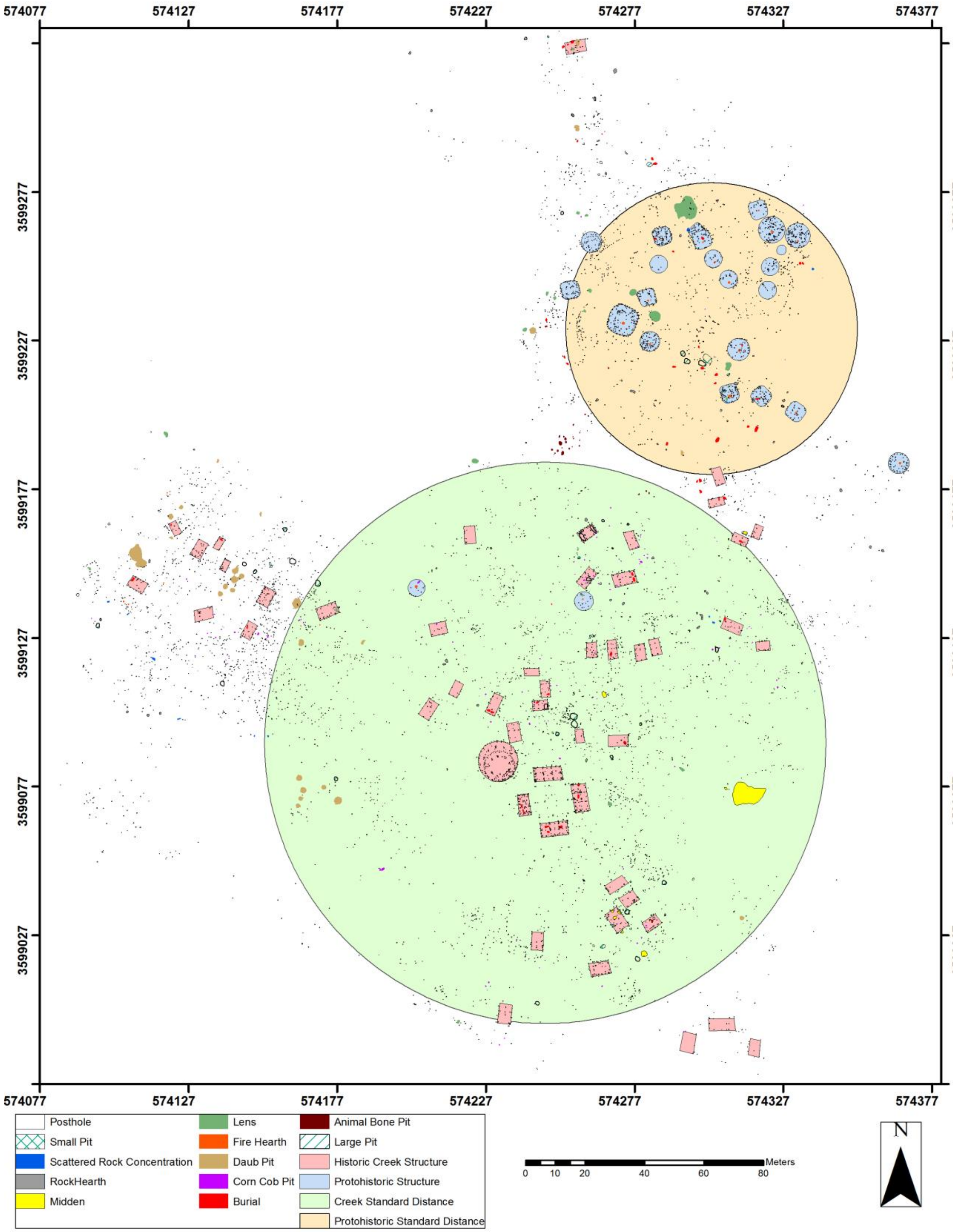


Figure 17. Results of the Standard Distance Statistic computed for one Standard Deviation.

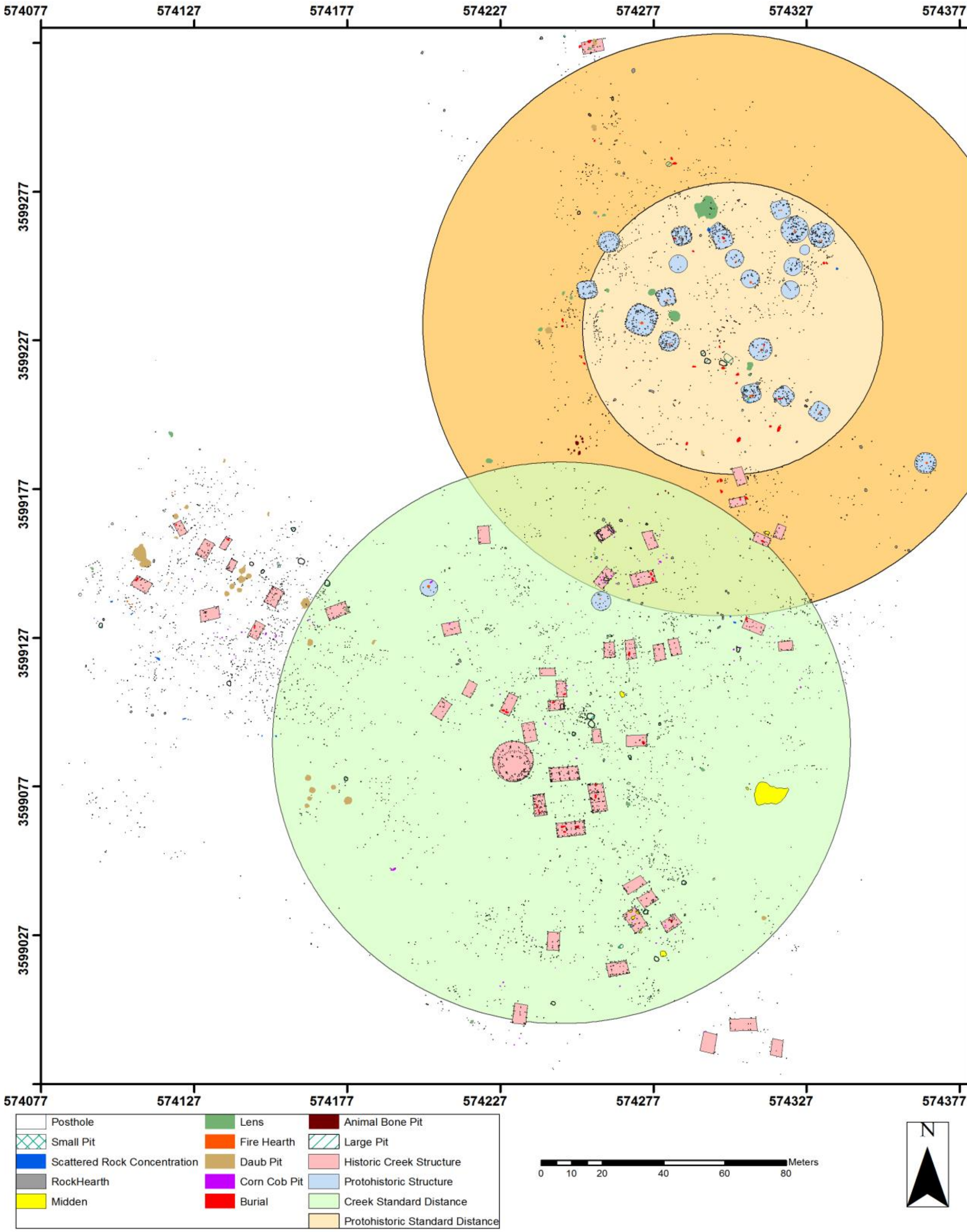


Figure 18. Results of the Standard Distance Statistic computed for 2 Standard Deviations. Notice the mean center of the Historic Creek structures is located outside the Protohistoric two Standard Deviation circle.

5.2 Synthesizing the Sociospatial

Communities have a particular way of structuring human interaction (Peterson and Drennan 2005: 22) and human interaction has a particular way of structuring community space. Defined as the movement of individuals within particular areas (Wiley 1971: 4), interaction is a fundamental attribute of the community, which can be described as a shared space by a population that habitually interacts and procures physical form from the patterned interactions between households (Peterson and Drennan 2005: 5). These interactions are central to everyday life for the community members, who become agents of social and spatial action. It is the nature of these interfaces that build communities (Peterson and Drennan 2005: 28), and the repeated exchanges of individuals socially reproduces group cohesion (Kolb and Snead 1997: 611).

Previous studies have identified communities in the archaeological record by quantifying interaction patterns of varying intensities (Hill 1968, 1970; Longacre 1964, 1970; Peterson and Drennan 2005). Interaction intensities between households can be quantified using spatial values, including the distances between residential structures and the distances between residential structures and public structures. Social relations may be spatially negotiated depending on two variables: nearness or remoteness. Although not always necessarily true, the Distance-Interaction Principle, proposed by Peterson and Drennan (2005), suggests households located closest to one another would have interacted the most, and house clusters tend to form when interaction with neighbors is high.

Community members are linked together in relationships of economic production and the regulation of resources (Binford 1982; Hegmon 2002: 267; Kolb and Snead 1997; Peterson and Drennan 2005: 23). The French social philosopher and a leading spatial theorist of the twentieth-century, Henri Lefebvre, suggests that spatial and territorial conflict are implicated with class conflict, and when put together may be the causational factor behind drastic social transformations (Lefebvre 1974). If an increase in the diversity of socioeconomic status among households increased during the eighteenth-century, the Creek community may have become arranged in a sociospatially hierarchical way. The spatial concentration of economic production may function as dominant centers for local control (Soja 1980), and hierarchies may be established by looking at the intra-orientation and distance of peripheral clusters with respect to the center (Leeds 1979: 316). There are more statistically significant clustered groups in the Historic Creek community than in the Protohistoric community. If there is a lack of socioeconomic difference among Protohistoric households, then the randomly nucleated Protohistoric community arrangement is more representative of an egalitarian population. As Trigger indicates, hierarchy and spatial segmentation share a positive relationship (Trigger 1972: 578). Multiple levels of spatial and societal order may be represented by multiple geographic centers; however, to say that a community with more spatial variation represents a hierarchical community requires more supporting evidence (Vin Steponaitis, personal communication, April 2014). Spatially, the Historic Creek household and community are expanding and becoming more complex. This development in the community may demonstrate varying levels of sociospatial interaction as suggested by the results of the spatial statistics.

Social hierarchies operating within a community may be replicated in spatial boundaries. Social relations of production may be the most obvious set of spatial boundaries (Soja 1980), and are embedded into systems of economic exchange by serving community members in either material loss or material gain, and essentially act as the constant driving force for community modes of production. Identifying sociospatial patterns within archaeological sites may demonstrate power relations and social orders. The Creek community is aggregated into spatially distinct sub-populations. These social units are the matrilineally bound household compounds; where a household is best defined as, "the smallest grouping with the maximum corporate function" (Hammel 1980: 251). Building upon Hammel's definition, Ashmore and Wilk (1988: 6) suggest these functions may include "one or more of the following: production, consumption, pooling of resources, reproduction, coresidence, and shared ownership." This development in the Historic Creek community plan may be a socioeconomic adaptation to the Creek's involvement with the European deerskin trade as individuals find increasing economic entrepreneurship prospects.

Economic opportunity is channeled through social structure, and social structure is reflected in spatial structure, and opportunities are either granted or withheld from community members depending on their organization connections (Freeman and Audia 2006). It may be that opportunity in the Protohistoric community was more centrally structured than in the Historic Creek community where the domestic structures are moving away from the community core. These conclusions are supported by the Standard Distance statistic which demonstrates the closeness and concentration of Protohistoric structures to one another versus the dispersion of the Historic Creek structures from the public rotunda and Square Ground.

Changing forms of local communities indicate very basic shifts in the ways people relate to one another. A change in community organization is a change in the structure of these interactions. By detecting shifting structural patterns of interaction within two locally scaled communities over time and space, I assume networks of community interaction are present in the organization of the Protohistoric and Historic Creek settlements. Patterns of Protohistoric interaction are statistically considered random, but were likely concentrated into one center, the public council house. Patterns of Historic Creek interaction are collected into numerous centers, including the Square Ground and Rotunda located in public space and individual household compounds located in domestic space. Based upon the aggregation of Creek compounds away from the community core, it is suggested that during the Historic Period, a rise in the social, political, and economic autonomy of the Creek household occurs.

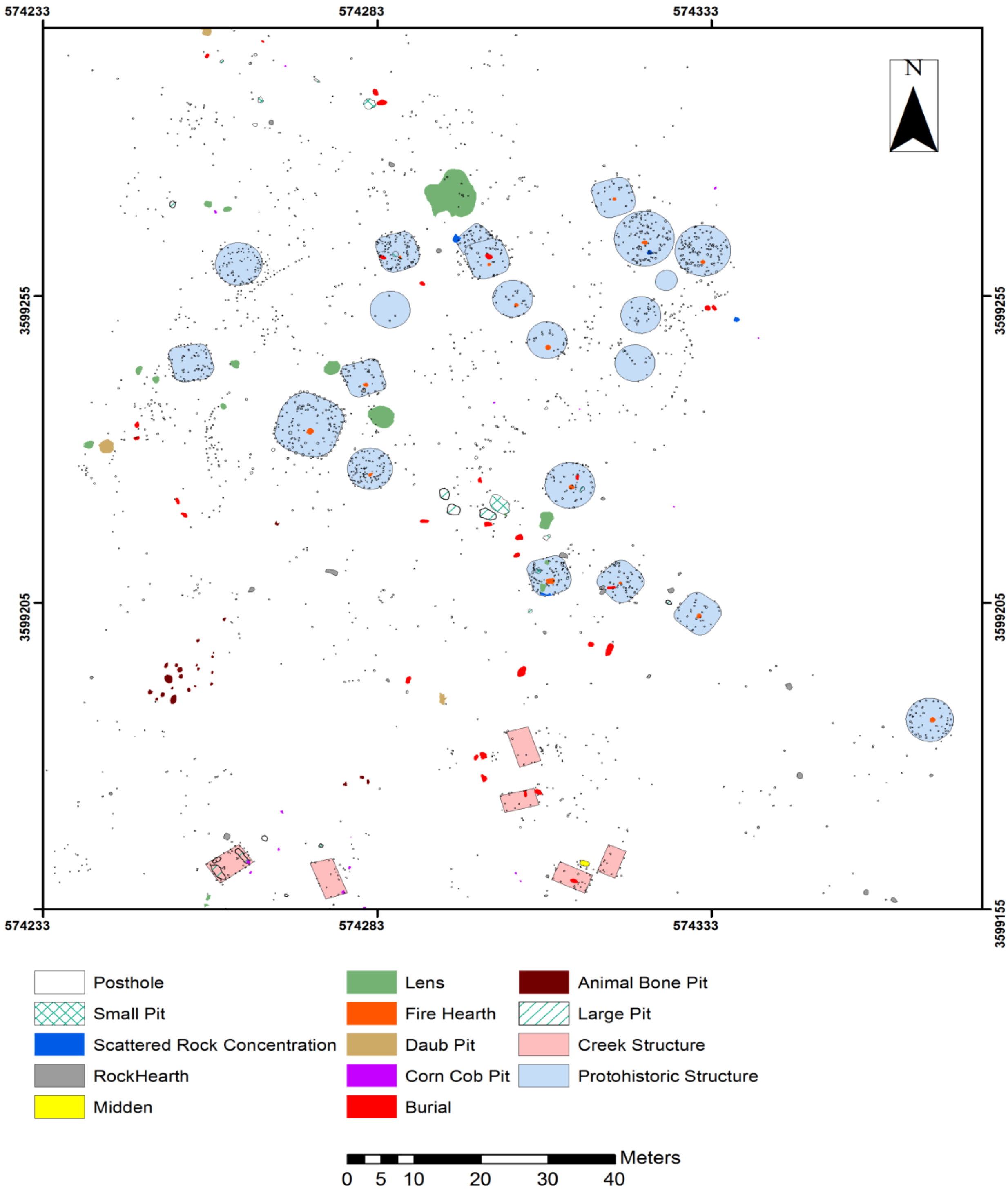


Figure 19. Map showing the compact Protohistoric community at the northern portion of the site. Notice the public council house, Feature 495.

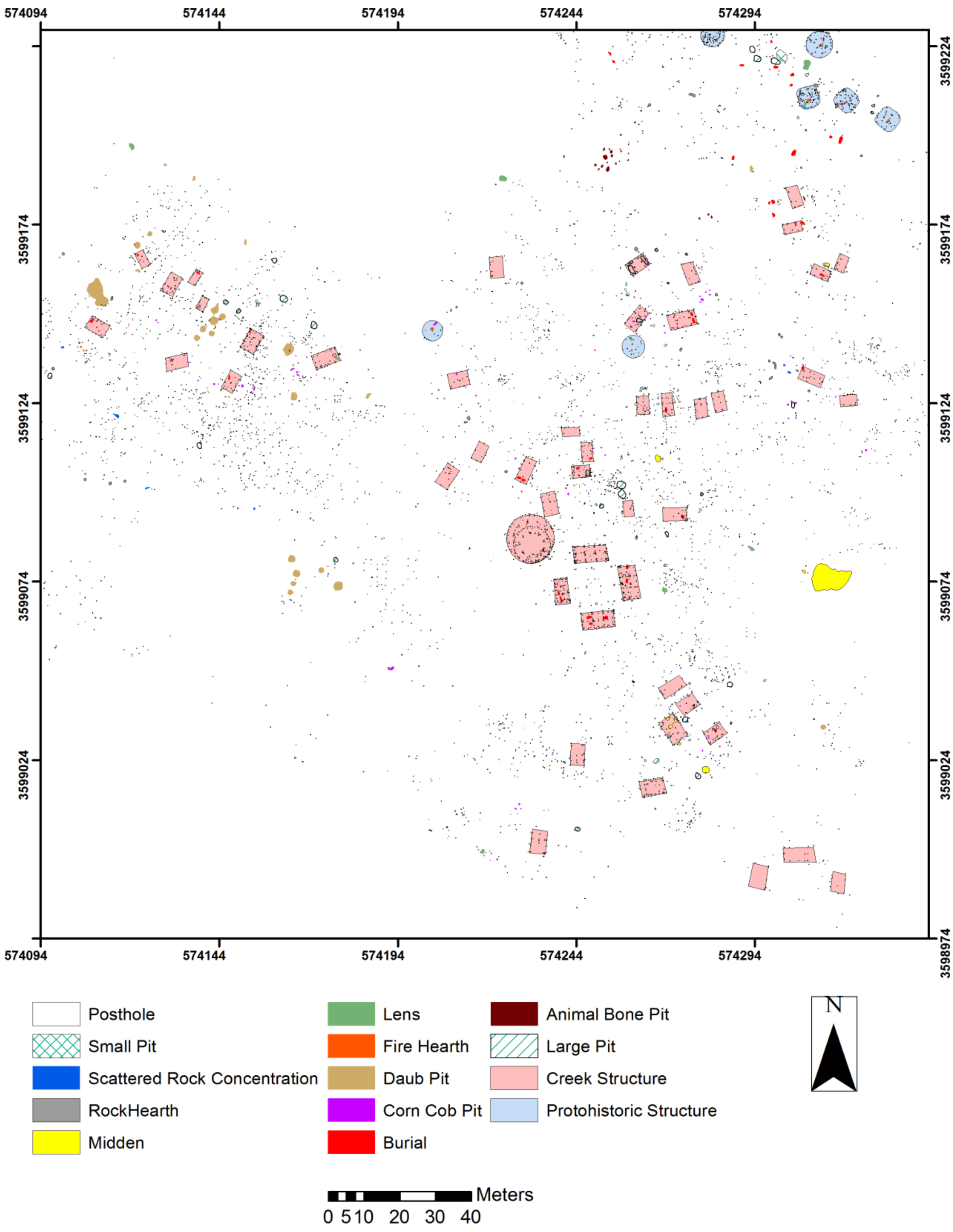


Figure 20. Map of the Historic Creek community.

During the Historic Creek occupation, some community members orient themselves outward toward the periphery. For the Creeks, to build a domestic household away from the Square Ground separated themselves spatially, socially, and visually from the community center.

5.3 The Protohistoric Community

The distribution of Protohistoric structures appears to be compacted around the Protohistoric public structure, Feature 495. The calculated mean center point falls very near to the public council house and possible plaza area (see Figure 16). The Protohistoric community appears to be lacking the spatial segmentation of residential sub-sets that is present in the Historic Creek structural arrangement. The arrangement of Protohistoric domestic houses near a centrally shared public structure suggests a community focused ideology. It is suggested Protohistoric households shared equally distributed resources produced by collective community efforts (Ethridge 2006; Ethridge and Hudson 2002; Gill 2010; Sheldon 1974; Smith 1987). The nucleation of Protohistoric structures to the community core may demonstrate this form of socioeconomic system.

The soils at 1EE89 are strongly acidic and have been subjected to extensive cultivation and erosion. Identification of structural patterns in the southwest corner of the site became problematic due to multiple occupations and site formation processes that decreased archaeological visibility within these highly disturbed areas. This is especially true for the southwestern portion of the site (Gill 2010); however, a number of Protohistoric features were identified and represent former Protohistoric structures based on specific evidence of hearths and postholes. When calculated to include all Protohistoric structures and features, the mean center point moved nearer and south to the public council house by 15.80 meters (Table 3). Likely at one time, the Protohistoric community included the southwestern area of the site as previously mentioned.

5.4 The Historic Creek Community

As the Historic Period of the American southeastern region progressed, escalating interactions with Euro-Americans caused a series of changes to take place that are evident in the material culture, as well as the spatial culture of the Creek town. The increasing availability of European trade goods to individuals challenged the existing social order (Braund 2008), and as Wesson (2008: 154) states, "the desire to acquire European goods eventually undermined the very social networks that formed the essential structuring principles of community life." The agency of strategic decisions made by individuals and household groups to adapt to a changing economic system are manifest in the community organization of the Historic Creek town. The practice of household based trading may be inherent in the establishment of clustered household compounds farther and farther away from the community core, but many factors led in to this movement. As Hillier and Hanson (1984: 2) suggest, "the ordering of space in buildings is really about the ordering of relations between people" (Rogers 1995: 11). The spatial patterns of the Creek community at Hickory Ground are thought to reflect kinship networks and interhousehold contest and competition for trade affiliations with Euro-Americans.

The community is a spatial medium through which Creek towns adapted to the changing economy introduced by Euro-Americans. As Rodning (2011: 166) states in his paper on Cherokee public architecture, "an adaptation can be defined as an alteration or change in form or structure, in response to changing conditions, and adaptations combine new and old elements that are both innovative and traditional." The Historic Creek community demonstrates a degree of specialized household production that developed as an adaptation to succeed in new systems of economic exchange. The number of corn cob pits clustered around Creek arbors greatly increases during the eighteenth-century as the demand for deerskins draws the southeastern Native American groups into a capitalistic market economy. A settlement is organized both spatially and functionally so that the widest range of activities can occur within it (Leeds 1979: 45), and direct relations exist between the spatial patterns of the data and the differential activities of a community (Binford 1964: 425). The *longue duree* or daily patterns of community member activities likely played a large part in deciding where to locate residences. Individual shade arbors may have one or a few corn cob pits clustered nearby which demonstrates economic activities taking place at the household level (Figure 21). Corn cob pits, or smudge pits are small round to oval features containing charred corn cobs and are commonly clustered around Creek arbors. These corn cob pits were used to process and tan deer hides intended for the European deer skin trade. The number of corn cob pits associated with Historic Creek compounds at Hickory Ground is far greater than the number of corn cob pits associated with the Protohistoric households. There are 101 corn cob pits clustered around Historic Creek arbors, and only 18 in the Protohistoric portion of the site.

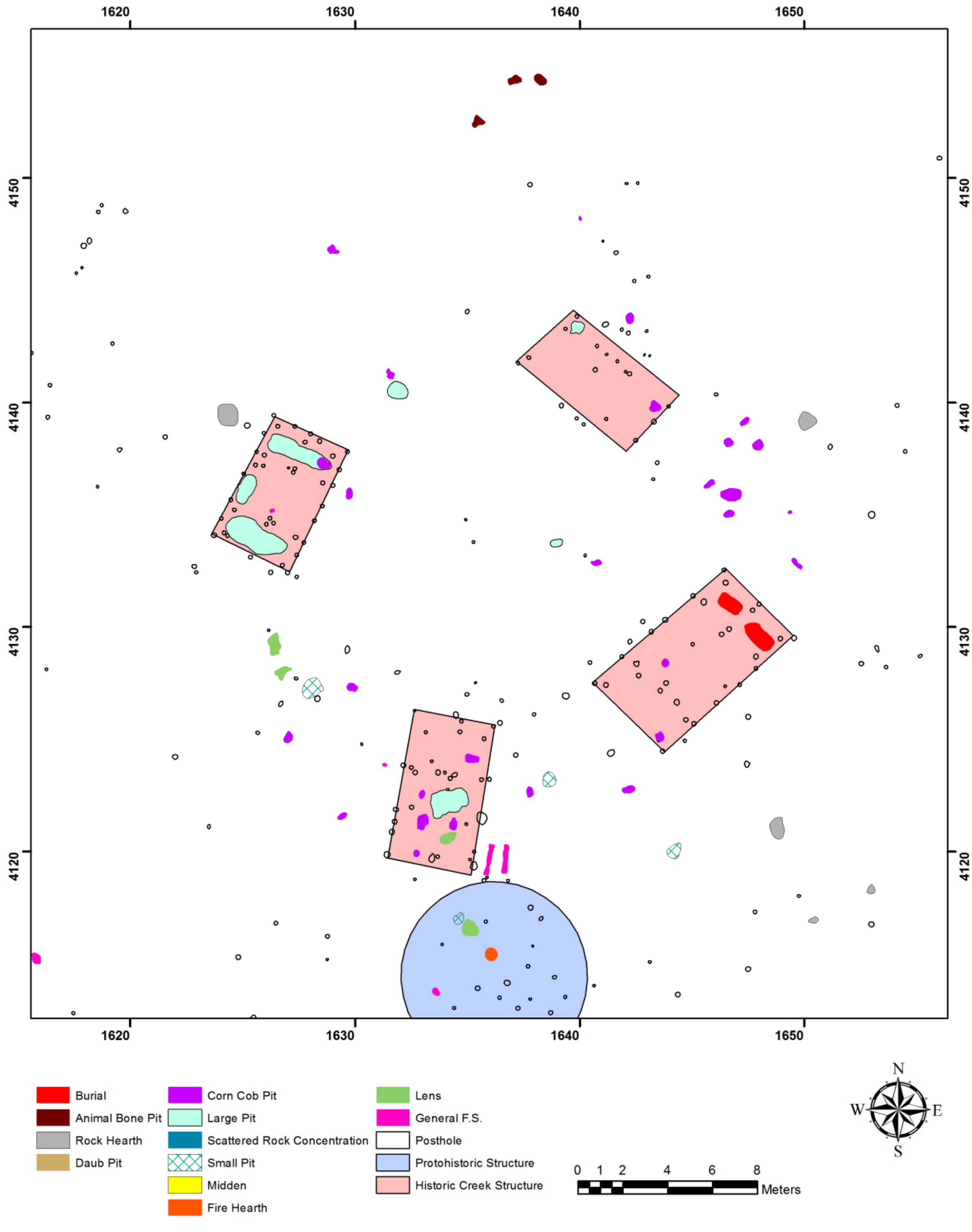


Figure 21. Map showing a Creek house compound with central courtyard and household activity area including corn cob pits and storage pits.

The Historic Creek domestic courtyard is the open space at the center of these compounds, and is curated at the household level by household members negotiating the terms of use with one another. The centrality of courtyards and their proximity to nearby houses and arbors indicate they were the locations of shared household tasks that may include food processing, cooking, pottery making, and other crafts production (Nelson 2014). The daily lives and activities of people sharing these courtyard spaces were inherently and necessarily intertwined (Robin 2002: 257). While a rise of the Historic Creek household ensues into the Historic period, I suggest the household thus becomes a core unit of decision making. The Creek household or huti was the smallest unit of social identification for the Historic Creeks (Swanton 1928; Wesson 2008: 23).

Shifts in sociopolitical power and systems of economic exchange caused major cultural changes to take place including a decrease in central control and a movement of clustered domestic structures away from the community's mean center. The dispersal of Historic Creek households away from the council house and Public Square ground expresses the autonomy of sociopolitical and economic interests of individuals living at the Hickory Ground.

This dispersal increased into the late Historic Period, and is due to a number of factors including the division of once communal lands into private land allotments, while house groups on the peripheries were likely built in a better position for fencing in house gardens and to secure additional land for fencing livestock in pasture land (Saunt 1999; Sheldon 1974: 12; Wesson 2008). Politically, the establishment of households on the periphery of the site instead of within visible range of the council house and Square Ground may have been a way to resist elite hegemony (Wesson 2008: 55-6). Political factionalism may have also caused a more dispersed settlement plan to develop (Rodning 2011: 139). Seeking protection from slave raids and European westward expansion, many southeastern aboriginal groups, however ethnically and linguistically distinct from the Creeks, joined many Creek towns; thus causing a population increase (Braund 1986, 2008; Etheridge 2003). This movement and coming together of people may have caused a dispersive settlement plan in the community and the establishment of a larger public rotunda to accommodate a larger and more diverse community.

5.5 Finding Common Ground: The Cherokee and Creek Community

Interestingly, similar changes in the spatial arrangement of households and communities are occurring around the same time for other historic Native American groups in the southeastern region. Houses were spaced less than 15 meters apart at the Mississippian and Protohistoric communities of the Rymer site in Eastern Tennessee (Schroedl 1998; Sullivan 1995), the King site in northeast Georgia (Hally 1988), and the Coweta Creek site in western North Carolina (Rodning 2004), while Historic Cherokee houses are spaced 25-50 meters at the Townsend site and the Chota-Tanasee site, both in Tennessee (see Marcoux 2010: 130-1; Schroedl 1986). This increase in space between structures within communities of the southern Appalachia region (Marcoux 2009: 7) is also a general trend which occurs within the Historic Creek community at Hickory Ground, however the distance between Creek structures at the Hickory Ground is comparably far lower than the average distances between Cherokee structures. As Marcoux (2009) suggests, Cherokee towns during the eighteenth-century changed in a number of ways, and it is suggested that this change in household and community form for both the Cherokee (Schroedl 1986: 542) and Creek (Sheldon 1997; Waselkov 1990) was an effect of the deerskin trade as well as other forms of acculturative processes including changes in household-based subsistence strategies and internal competition for prestige trade items (Riggs 1989; Wesson 2008). During the eighteenth-century, and after the decline of the deerskin trade, public townhouses and communal identity becomes detached from the landscape, and the maintenance of public structures becomes less frequent over time (Hally 2008; Rodning 2002 and 2007; Schroedl 1978, 1989, and 2009). Research considering Historic Creek and Cherokee settlement patterns has demonstrated a general trend of dispersion and the migration of households away from the riverside towns of the eighteenth-century and continued into the early nineteenth-century (Ashley 1988; Rodning 2004 and 2011; Marcoux 2008 and 2009; Schroedl 1986, 2000; Waselkov 1990). By the early nineteenth-century, Cherokee (Schroedl 2000: 225) and Creek households were often scattered as farmsteads throughout the land.

Chapter 6 Summary and Conclusions

My initial three hypotheses state: the Protohistoric community is nucleated (H_1), the Historic Creek community is dispersed (H_2), and spatial relationships in a community are culturally conditioned (H_3). I found results to reject the null hypothesis (H_{o3}), as significant variation exists between the two datasets. However, supporting my initial two hypotheses was not as obvious. The positioning of Protohistoric structures around their mean center demonstrates a lower Standard Distance Index value than the arrangement of the Historic Creek structures around their mean center. The Historic Creek community is observed statistically as dispersed by the Standard Distance Statistic; thus supporting H_2. However, results of the Nearest Neighbor Statistic for the Protohistoric structures suggest a random distribution to one another, and this was not predicted. Additionally, the average distance among Protohistoric structures and their nearest neighbor is a lower value than the average distance among Historic Creek structures and their nearest neighbor by only less than one meter. I may still consider the Protohistoric community as nucleated around its center, but only when compared to the Standard Distance results of the Historic Creek structures. The Nearest Neighbor statistic did not show the significant clustering of the Protohistoric structures that I had expected, but instead found the structures to be randomly distributed. In doing this research, I found there are many variations in spatial dimensions to be sampled and quantified; these include the distances from one point to another and distances from one point to the population mean. My initial hypotheses had not directly considered these variations in cluster or dispersion.

The ways in which people make use of space are culturally conditioned and socially produced; thus space is a cultural marker that can be quantified into numerical distances. Intra-occupational dynamics led to differences in the Protohistoric and Historic Creek community arrangements. The arrival of Europeans greatly influenced and changed Native American culture in the southeastern region. A reorganization of Native American southeastern culture occurred after European contact, and traditional Historic Creek ways of life underwent social, political, and economic changes during the postcontact period. The restructuring of the Protohistoric community and the formation of the Historic Creek community is thought of as an adaptive strategy to encourage stability within the local landscape. If spatial relationships have social meanings, and local community organization is culturally conditioned, then changes in culture can be spatially quantified. It is at once both social and physical. The effect of culture change on a community is the reorganization of space. This thesis research offers spatially referenced cultural data in an attempt to scientifically represent the human perception of space over time. A reconstruction of the Protohistoric and Historic Creek local settlement plans at the Hickory Ground site inherently presents a view of past social, political, and economic systems at work as they are reflected and fostered by the particular spatial configurations of these two archaeological communities.

6.1 Future Research

The spatial sampling of artifact and feature distributions within a particular archaeological site produces numerical patterns. It may be reasonable to hypothesize the same patterns for other archaeological sites which fit into similar temporal, environmental, industrial, and functional frameworks (Hietala and Stevens 1977; Hietala and Larson 1984). The Creek town of Fusihatchee, located on the Tallapoosa is currently being digitized and spatially analyzed by a graduate student at AUM under the supervision of Terry Winemiller and Craig Sheldon. I suggest a spatial comparison of the Protohistoric and Historic Creek communities at Hickory Ground and Fusihatchee.

During the postcontact period, more formal systems of exchange fueled the burgeoning deerskin trade and new European material goods were exposed to southeastern Native Americans. The large magnitude of these highly valued trade items circulating through Creek society brought prestige to members of the community who had access to them (Wesson 2008). It would be a worthwhile avenue to research the spatial locations of those Creek households with the most prestige items. I would like to pair an artifact analysis with spatial analysis to better understand the socialization of space at Fusihatchee and Hickory Ground. I believe this is an integral research dimension that is lacking from my current spatial analysis. However informative, results of the spatial statistics are not certain without other supporting evidence; primarily material items from archaeological sites and their supplementary spatial attributes and social qualities. The following questions may be answered by pairing together a spatial and material analysis:

Which house compounds are furthest away from the public structure and which are closest to the public structures and how do the artifacts in these structures compare?

What features occur within the domestic habitation zones and what features occur within the public zones?

Can the spatial positioning of structures represent hierarchical ranking in the community?

The excavations of the Creek towns of Fusihatchee (1EE191) and Hickory Ground (1EE89) in the last two decades represent two of the largest archaeological excavations in the southeast and offer comprehensive data to study Creek culture change in the Euro-American postcontact era (Sheldon 1997; Wesson 2008). With such a large permitting dataset, I formulated many questions over the course of this research. These questions are beyond the scope of this current thesis, but will hopefully be attended to in the future. Some of these questions include:

Does spatial variation represent sociopolitical and socioeconomic complexity?

Do geographic centroids represent cultural centers?

Where are the spatial boundaries of intra-community interaction networks?

What areas of the site are characterized by a low density of features and postholes and why?

Are structures located closest to the public structures more involved with community decision making?

The Western capitalistic economy has expanded to become a global economy. Physical processes, including culture change, are quantifiable and therefore predictable. With the research presented here, we may be able to better predict what happens to a society when major social, political, and economic changes occur. We can use the research offered by this thesis not only to view culture change in the past, but also to make predictions for the future.

"Somewhere there is a map of how it can be done."

-Ben Stein

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