

NETWORK HISTORIES OF SOUTHERN APPALACHIA, AD 600-1600

by

JOHN JACOB LULEWICZ

(Under the Direction of Jennifer A. Birch)

ABSTRACT

This research explores the ways that social networks articulated with major sociopolitical transformations across Southern Appalachia between AD 600 and 1600. This study focuses on the broad, regional connections between members of Southern Appalachian societies and conceptualizes social networks as forms of social capital available to actors mediating shifting political landscapes. To do so, I use a database of over 350,000 ceramic artifacts and 300 radiocarbon dates (68 of which are newly reported here) to 1) evaluate the timing and tempo of sociopolitical change, 2) identify critical historical junctures in sociopolitical timelines, 3) and explore how the structures of regional social networks articulated with these timelines over a 1,000 year period. I argue that while two critical transitions occurred across Southern Appalachia, one at roughly AD 1150 characterized by the hierarchization of political structures, and one at roughly AD 1325 characterized by the collapse of a major socio-religious center, the social networks through which Southern Appalachian societies were constituted remained unaltered. I propose that regional patterns of kinship, exchange, and communality served to mediate critical social transformations that would otherwise have generated significant amounts of social uncertainty.

INDEX WORDS: Southeastern Archaeology, Social Networks, Collective Action, Political Organization, Woodland, Mississippian, Chronology, Bayesian, Ceramics

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by

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DEDICATION

For Isabelle

(and Joey and Walter and Sebastian and Olive and Dusty and Natasha and Pik)

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CHAPTER 1: INTRODUCTION

In 1540, Spanish explorer Hernando de Soto, traveling across the southernmost stretch of the Appalachian Mountains, encountered a political landscape characterized by a number of autonomous villages loosely bound together under the influence of a single powerful chief residing at the town of Coosa in modern day northern Georgia (Figure 1) (Hudson 1997, 1988; Hudson et al. 1985; Smith 2000). Once over the Appalachian summit into what is today eastern Tennessee, it took de Soto and his men 24 days to travel from the northernmost reaches of the Coosa chief's influence down through northern Georgia and into present day eastern Alabama, where the southern reaches of Coosa's prominence extended (DePratter et al. 1985; Hudson et al. 1988:723). Twenty-seven years later, on his second expedition through the interior (Figure 1), Juan Pardo and his men, following a similar route as de Soto had taken, found themselves in Coosa territory (Hudson et al. 1985).

Taken as a region, the communities comprising the Coosa political entity at the time of European contact were culturally, linguistically, and socially diverse. Indeed, based on a study of place names recorded in ethnohistoric accounts, peoples living across what is today northern Georgia and eastern Alabama seem to have been speaking particular dialects of Eastern Muskogean languages that were distinct from the Koasati dialect being spoken by groups who were living to the north in present-day eastern Tennessee (Booker et al.

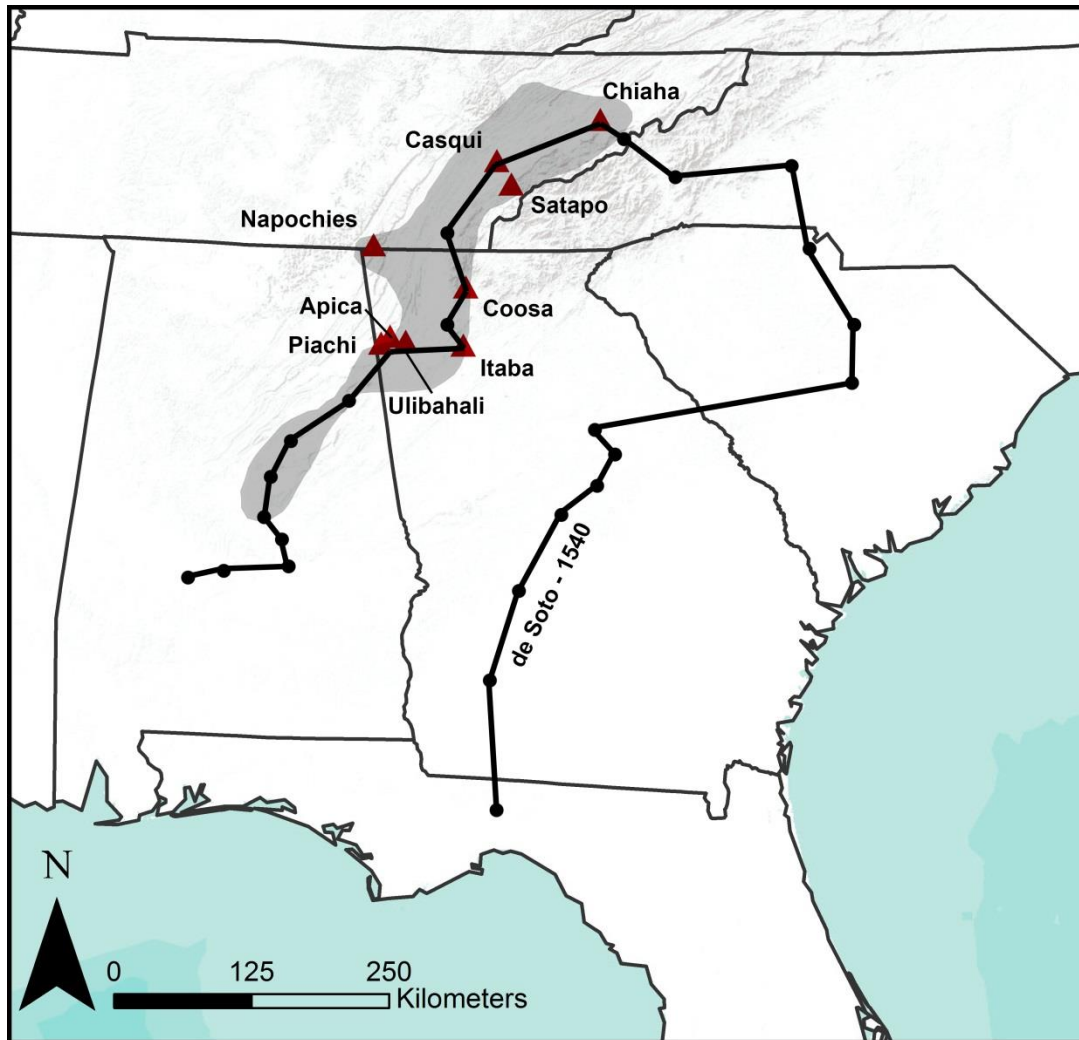


Figure 1.1. Map showing Hernando de Soto's 1540 route (black line). Major sites in the study area visited by de Soto are indicated by red triangles. The estimated extent of Coosa's influence over the region is depicted in grey. (Information adapted from Hudson et al. 1985)

1992; Hudson 1990; Smith 2000). While the extent of authority that the chief of Coosa could wield over the communities throughout this region remains ambiguous, and despite the sociocultural diversity of peoples encompassed within the bounds of Coosa influence, one incident from Juan Pardo's 1567 expedition does provide some insights into the political coordination among these Southern Appalachian villages. When Pardo reached the town of Satapo (Figure

1) in 1567 he learned of a plot to defeat him by surprise attack (Hudson et al. 1985:731). “The chief of Coosa and his warriors had come to Satapo and, together with the chiefs of Satapo, Chiaha, Casqui, and Uchi, planned a series of ambushes on Pardo as he marched southward” (Hudson et al. 1985:731). While this anecdote does not prove any formal relations of domination, tribute, or authority, what it does demonstrate is the power of Southern Appalachian sociopolitical networks in facilitating and accessing collective action across autonomous communities with diverse interests, sociocultural backgrounds, and histories.

In this dissertation, I demonstrate that the networks and relationships tying these Southern Appalachian communities together in 1567 were some of the most enduring features of Southern Appalachian societies, extending as far back as 1,000 years, if not further. Just as these relationships served as durable, robust social resources in the context of a shifting political landscape, in this case characterized by increasing interactions with European powers, the deep histories of interaction, kinship, and political affiliation producing these networks likewise served similar purposes across historical junctures located deeper in time. As such, I explore a 1,000 year history (~AD 600-1600) of social networks across the Southern Appalachian region of the Southeastern United States with particular attention paid to how networks articulated with major institutional changes throughout the course of this history. What I offer is a deep time perspective on the ways that social networks serve as the relational foundations through which collective action is accessed and organized, especially as a

means of mediating and buffering against the social, political, and economic uncertainties generated by shifting political landscapes.

In the following chapters I engage a body of social theory concerned with social networks and collective action 1) to illuminate the structural characteristics of social networks that defined and gave form to Southern Appalachian societies between AD 600 and 1600; 2) to evaluate how these networks were altered (or not) across critical historical junctures (especially major reorganizations of sociopolitical landscapes); and 3) to explore the institutions and mechanisms through which people managed social, political, and economic uncertainty generated at these historical turning points. More specifically, I evaluate two major episodes of sociopolitical change throughout this 1,000 year history. The first, at roughly AD 1150, is associated with the emergence of hierarchical political systems, institutionalized inequalities, elaborate religious practices, and intensified agricultural economies. The second historical juncture, situated roughly 200 years later ca. AD 1325, is defined by the collapse of the major politico-religious center of Etowah in northwestern Georgia and the subsequent reorganization of the wider Southern Appalachian political landscape.

To achieve these goals, I draw on multiscalar datasets of over 350,000 ceramic materials, 180 radiocarbon dates, as well as information on settlement patterns, mortuary practices, architectural traditions, and the distribution of ritual paraphernalia that lend insight into both community-scale histories and broad regional trends. What I argue is that despite the critical transformation of sociopolitical institutions, the networks and relationships upon which these

institutions were enacted were some of the most robust, durable features of Southern Appalachian societies, remaining structurally intact over 1,000 years. Further, because the following study draws primarily on ceramic datasets, the networks presented in the following chapters represent networks enacted through common relationships, not just those enacted by elites or a ruling class. In this way, this study adopts a bottom-up perspective, rooted in the widespread relationships that formed the durable foundations of Southern Appalachian sociopolitics.

Social Networks, Collective Action, and History

To achieve the goals outlined above, and described in more detail below, I draw on a number of diverse bodies of literature that allow for the focus of this study to be placed on the connections between people as the foundations of society and on the power of these relationships among members of society to affect or mediate social change. More specifically, in the following chapters I articulate a conceptual framework that brings together method and theory concerned with concepts of collective action, social capital, social networks, time reckoning, and history.

In referencing the literature on collective action, I am most concerned with the roles of collective behaviors in the context of social change and uncertainty and with how organizations of social relationships underlie collective actions and the structures of society. Generally, theories of collective action are situated in

contexts where there are groups of individuals, some common interest among them, and the potential for conflict and tension between common interest and individual interests (Olson 1965:8). Approaches offered within the last two decades have begun to understand collective action in a much broader sense (cf. Hardin 1968; Olson 1965) and have explored the role of collective behaviors in social change and social movements (e.g., Adger 2003; Diani and McAdam 2003) as well as the social relationships that underlie collective actions (e.g. Ahn and Ostrom 2002; Crowe 2007; Fukuyama 2001; Ostrom and Kahn 2007; Rudd 2000; Scholz et al. 2008; Woollock and Narayn 2000). Indeed this recognition “that social context matters for collective action (e.g. Coase 1960; March and Olsen 1984; Nee and Ingram 1998; North 1990; Ostrom 1990; Portes 1998; Sandler 2002; Smelser and Swedberg 1994; Williamson 1985) has led to the viewpoint that social relationships themselves can “constitute resources that individuals can appropriate to assist them in increasing their well-being” (Rudd 2000:132). Beyond a concern with self-interest, placing the focus instead on the practice of collective behaviors, Barnes (2001:32-33) posits that:

“[Collective actions] indeed are not stable essences, but neither are they clusters of habitual individual actions. Shared practices are the accomplishments of competent members of collectives. They are accomplishments readily achieved by, and routinely to be expected of members acting together, but they nonetheless have to be generated on every occasion, by agents concerned all the time to retain coordination and alignment with each other in order to bring them about.”

The idea of collective actions as shared practices, in need of continual maintenance and generation, inherently subject to transformation, failure, or durability, should be generally palatable to the contemporary archaeologist as we are seasoned in the investigation of shared practices, including how they vary across both time and space, through the materiality of the archaeological record. From this perspective, we can understand the maintenance of traditions, the rejection or adoption of new practices, and indeed the transformation of organizational structures and sociopolitical institutions as issues of collective action. As Adger (2003:388) makes clear, the capacity to adapt is bound up in a society's ability to act collectively. The key here is that the very capacity of social groups to act in their collective interests depends on the quality of the formal institutions in which they participate (Adger 2003; Evans 1996; Ostrom 1996; Woolcock and Narayan 2000:234). "Collective action requires networks and flows of information between individuals and groups to oil the wheels of decision making. These networks are usefully described as an asset of an individual or a society..." (Adger 2003:389).

Most importantly, it is relations of trust, reciprocity, and exchange, including norms of behavior and interactions, and the networks binding people together, which enable people to act collectively (Ahn and Ostrom 2002; Coleman 2000; Hardin 2002; Fukuyama 1995; North 1990; Ostrom 1998; Putnam 2000; Rudd 2000). We can refer to these resources as social capital. Indeed, social practices and collective action emerge from cycles of trust and reciprocity enacted through social networks which we can also consider to be

forms of social capital. At the group level, increased returns to participation in shared practices are achieved through an increase in the level of generalized social trust (Fukuyama 1995; Putnam 1993) and through the institutionalization of mechanisms of trust, reputation, and reciprocity (North 1990). In the context of the study presented here, I conceptualize these processes as the relationships through which shared practices emerge from cycles of trust and reciprocity enacted through social networks and institutions.

Social relationships themselves constitute fundamental resources that individuals can appropriate to assist them in facilitating collective action. By taking social networks, relationships among peoples and communities, as the focus, we become concerned with how groups employ or leverage their relationships to others in particular historical circumstances. In an explicitly historical framework like the one adopted here, we can begin to understand how the deep historical roots of relational structures, or social networks, can shape organizational outcomes and condition or mediate social change.

Indeed, it has been well established that both overall network structure, including characteristics related to the density of relationships, the size of the network, the kinds of ties constituting the network, and an actor's position within a social network play central roles in affecting organizational outcomes and in facilitating collective responses to shifting sociopolitical conditions (see Diani 2003 and Oliver and Myers 2003 for reviews on the roles of node positions and network structure on conditioning social movements and change). The relationships constituting society can be considered major components of

societal trust, modes of reciprocity, and thus the conditional “stuff” through which societal transformations are mediated. These effects and conditions may take the form of structuring flows of information, conditioning how actors are influenced by other actors, shaping opportunities for interaction, or constraining the spread of practices. In any case, the structures and attributes of social networks, and the societal characteristics they produce, are measurable and thus comparable. As such, in this study I use formal social network analyses, combined with high-resolution, regional political histories to evaluate Southern Appalachian societies and provide new insights on how network structures define sociopolitical organizations and condition historically contingent processes of social change.

While there is no unified “social network approach,” as these approaches remain a loose confederation of diverse methods and theories, all such network perspectives converge on a shared anti-categorical imperative (Emirbayer and Goodwin 1994). That is, network approaches share an understanding that social behavior must be understood by way of involvement in structured social relations. With this understanding, we can move beyond black box approaches that attempt to explain social phenomena through the use of top-down models of sociopolitical or economic structures towards approaches that can parse these kinds of structures into their constituent elements of entities and relationships (Emirbayer and Goodwin 1994). As such, by approaching the sociopolitical histories of Southern Appalachia from the bottom-up, through the relationships upon which social, political, and economic institutions are built, I move the study of Southeastern political systems beyond the use of typological approaches that

have historically been constructed using ethnographic analogies, ethnohistoric accounts, and cross-cultural comparisons that emphasize the political activities of elites and the ruling class. In the following chapters, I contribute to the study not only of Indigenous Southeastern political systems and society but to the sociopolitical structures and processes of small-scale, non-state societies more generally. Through network histories, I provide important new insights on the scale, structure, and stability of small-scale hierarchical societies that challenge more normative conceptions of political systems and processes of change.

Finally, the framework employed moves beyond strict, normative archaeological periodizations rooted in archaeological modes of time reckoning towards chronologies that approach real or experienced time that isn't essentialized. To do so, I build high-resolution community and regional-scale chronologies that approach generational time-scales and in some cases achieve decadal resolutions. In addition to the refinement of extant archaeological chronologies, I take a more unconventional, deep-time perspective to sociopolitical change across Southern Appalachia. By doing so, I emphasize the deep, historical roots of social, political, and economic relationships that constitute Southern Appalachian social histories.

Southern Appalachia, AD 600-1600

This study is centered upon the Southern Appalachian region of the southeastern United States between ca. AD 600 and 1600 (Figure 1.2). The

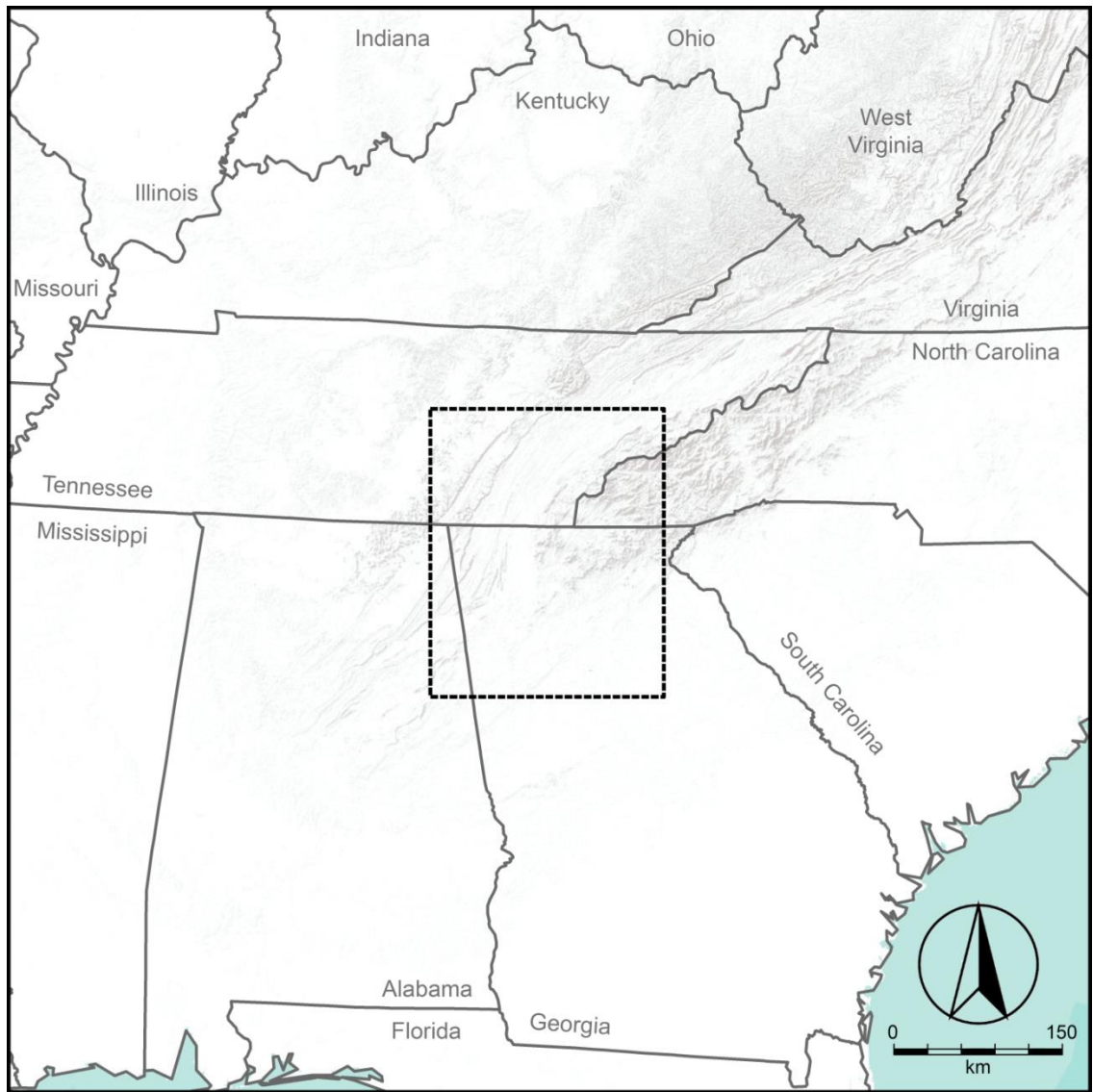


Figure 1.2. Map outlining the Southern Appalachian study area.

regional focus and geographic scale of this study is somewhat unconventional compared to the extant literature of the region, as the Southern Appalachian region studied here includes two localities with independent research histories: one in what is today northern Georgia and one in eastern Tennessee. The archaeologies of the two localities have been carried out almost independently of one another. While references are often made between researchers working in

both areas (e.g., King 2007, 2003; King and Sawyer 2017; Sullivan 2016), the two localities are rarely, if ever, incorporated or evaluated within a single program of research. Both regions, like in many parts of North America, were subject to archaeological research as early as the late 19th century (e.g. Jones 1873; Polhemus 2002; Thomas 1894) and both continued to be the subject of intensive archaeological work during the WPA-era of the 1930s and 1940s (e.g. Lewis and Kneberg 1946; Lewis et al. 1995; Sears 1958; Wauchope 1966; see Dye 2016; Lyon 1996). Through the 1960s, 70s, and 80s, excavations and regional surveys conducted in the context of legislatively-enabled reservoir projects added measurably to the archaeological record of Southern Appalachia (e.g., Caldwell 2011; Faulkner and Graham 1966; Gleeson 1970; Kimball 1985; Salo 1969; Wood 1987). These long histories of field investigations, like the history of Southeastern archaeology more generally, have produced some of the most detailed archaeological records of sociopolitical reorganization in the world, specifically in regards to the emergence of chiefdoms.

Over ten centuries of sociopolitical development, two sets of related sociocultural and political traditions emerged within the Southern Appalachian region: one in modern-day eastern Tennessee and one in northern Georgia. While groups from the two regions historically interacted with one another and shared certain cultural traits, local variations were significant enough to have produced two distinct historical trajectories of social and cultural development. In support of this archaeological evidence, it is clear that at the time of European contact, the groups occupying northern Georgia and eastern Tennessee spoke

distinct dialects of a Muskogean language (see Bartram 1958; Hudson 1990; Smith 2000). These varied histories, however, remain masked by a reliance on neoevolutionary terminology, particularly the chiefdom concept, to explain not only the organization of Southern Appalachian societies, but also the processes through which these organizational structures unfolded through time. At over 21 hectares in areal extent (King 2003:51), Etowah represents the largest, most complex archaeological site in the Southern Appalachian region. Emerging at ca. A.D. 1150 as a place of major sociopolitical activity, the scale and complexity of the Etowah site is unrivaled by any other Mississippian site in the region. The rest of the northwestern Georgia landscape remained dotted with small to modestly-sized mound and village complexes (see King 2003). In eastern Tennessee however, no single mega-site emerged, and the landscape remained densely populated with a number of modest, closely spaced mound and village communities, isolated communal burial mounds, and single household farmsteads. The period considered here captures the historical trajectories through which these diverse political landscapes were shaped.

The case of social changes investigated here, using archaeological data from the Southern Appalachian region of the U.S. Southeast, is usually couched in terms of understanding processes of “Mississippianization.” Rooted in the culture-historic frameworks of Southeastern archaeology, “Mississippianization” refers to a package of social changes including the emergence of socioeconomic hierarchies, the founding of institutionalized leadership, the adoption of widespread politicoreligious ideologies/practices, and the intensification of maize

agriculture (see Blitz 2010; Anderson and Sassaman 2012 for overviews). The term itself is derived from a cultural evolutionist context whereby “Mississippianization” is defined as the movement into the Mississippian temporal and cultural phase of the regional culture-historic framework (ca. AD 1000-1600). This study bypasses discussions of “Mississippianization” by exploring how social networks were reorganized and institutional change was negotiated in the context of critical social transitions.

To explore these social networks in a historical perspective the following must be accomplished: 1) the culture-historic framework for the region, based in part on ceramic data, needs to be abandoned in favor of a more dynamic, non-essentialized conceptualization of local histories, 2) organizational structures must be described within a relational perspective that bypasses neoevolutionary political classifications, 3) the changes constituting what is traditionally referred to as “Mississippianization” must be uncoupled from one another in order to identify local instances of institutional change (and perhaps different temporalities of certain organizational changes), 4) the timing and temporality of changes, at the regional, local, and community scales must be refined, and 5) the articulation between sociospatial scales must be investigated to identify the scales at which institutional changes were enacted, social networks were constituted, and collective action was facilitated. The data and methods necessary to carry out each of these tasks and address the explicit research questions presented below are described in the following section. The archaeological data employed and analyses undertaken towards these ends are presented in Table 1.1.

Table 1.1. The organization of this study.

Question Set	Task	Data	Chapter(s)
1	Regional ceramic seriations, construction of a regional Bayesian radiocarbon chronology, construction of high-resolution platform mound chronologies; elucidating institutional histories	Ceramic surface decorations and tempering agents from over 70 sites; 233 radiocarbon dates; platform mound stratigraphies; extant datasets of mortuary practices, architectural traditions, and ritual paraphernalia	4,5,6
2	Elucidating the structures of social networks across Southern Appalachia from AD 600 to 1600	Databases on ceramic surface decorations and tempering agents to explore two kinds of networks, one predicated on communities of practice and one on patterns of social signaling	7
3	Articulating network structures with evidence for institutional change	Measurements and indices related to network structures, precise temporal frameworks for institutional change	6,7,8

Objectives and Guiding Questions

Ultimately, two sets of objectives define this study. The first set of objectives and research questions is concerned with exploring the timing and temporality of sociopolitical transformation and major historical junctures across the region between AD 600 and 1600. By way of high-resolution community and regional scale chronologies, I elucidate two major historical moments of critical reorganizations of the political landscape of Southern Appalachia. The first of these major shifts is associated with classic processes of Mississippianization including the emergence of hierarchical political entities, the adoption of shared religious practices, and the intensification of maize agriculture while the second

shift is associated with the collapse of Etowah as a major political-religious center and the concomitant reorganization of Southern Appalachian societies.

The second research objective of this study is to determine the nature and scale of these social changes from the bottom-up, exploring in particular how the structures of Southern Appalachian social networks varied through time and articulated with the changes generated at critical historical junctures. More specifically, the goal is to explore the structural characteristics of social networks to determine the different kinds of social capital that would have been available to members of Southern Appalachian societies in the context of an evolving sociopolitical terrain. To accomplish these objectives, I have laid out three sets of research questions and outlined the data used to address these questions.

Question Set 1 (Timing and Temporality): When did major sociopolitical transformations occur? At which points in this one thousand year timeline would heightened levels of social, political, and economic uncertainty been generated by major reorganizations of the political landscape? When were practices and traditions (e.g., the use of earthen platform mounds, particular mortuary practices, certain architectural traditions, etc....) adopted by Southern Appalachian societies and when did they fall out of use?

Data and Analyses: Extant sociopolitical histories for the Southern Appalachian region are largely based on ceramic materials (e.g. King 2003, 1996; Kimball 1985; Lewis et al. 1995). Thus, one of the goals is to uncouple temporality and

chronology from these extant neoevolutionary phases. To do so, I conduct a large scale, regional ceramic seriation using two attributes, temper and mode of surface decorations (e.g. sand-tempered simple-stamped, limestone-tempered plain, shell-tempered cordmarked) using a dataset of roughly 300 ceramic assemblages totaling over 350,000 sherds. Using the distribution of ceramic attribute combinations across the Southern Appalachian region, I use multi-dimensional statistics to seriate/order ceramic assemblages. Once ordered, I use this seriation as *a priori* information to evaluate 233 AMS dates (68 of which are newly reported here) within a Bayesian interpretive framework. The result is a new, attribute-based ceramic chronology for the entirety of Southern Appalachia which I use to reevaluate, at a coarse-grained scale, the timing of major sociopolitical transformations across northern Georgia and eastern Tennessee. Beyond this, I also use the results of this seriation to temporally situate social network analyses, where particular ceramic assemblages need to be assigned to common intervals of time.

I then integrate temporal information on regional ceramic variation with information on a number of other material variables including platform mound construction, mortuary complexes, architectural traditions, and the use of ritual paraphernalia. To achieve a finer resolution understanding of these changes compared to the resolution offered by the regional ceramic seriation, I integrate stratigraphic information from twenty platform mounds across the region with extant and new AMS radiocarbon data within a Bayesian interpretive framework. The result is a series of high-resolution platform mound chronologies. Using

these new timelines I elucidate the timing and temporality of changing material practices across the region. While the broad sequence of sociopolitical change offered by the regional ceramic seriation provides a resolution situated at roughly the generational or multi-generational scale, the platform mound chronologies provide a decadal to sub-decadal resolution of major material disjunctures evidencing critical social transformations.

Question Set 2 (Social Networks): Given the kinds of sociopolitical change evidenced by new regional and community-scale chronologies, how durable were the social relationships through which new institutions were built, adopted, or transformed? Were social networks transformed in the face of sociopolitical uncertainty? Or, alternatively, were underlying relational structures unaffected by shifting sociopolitical institutions and landscapes? How did sociopolitical changes articulate with the organization of regional and local networks?

Data and Analyses: Using regional ceramic seriations and community-scale chronologies, three time intervals are defined for the social network analyses that bookend major historical junctures: one at ca. AD 1150 associated with the emergence of political hierarchies and one at ca. AD 1325 associated with the collapse of central places. Across these three time intervals, changes to two kinds of social networks are examined: one based on the highly-visible decorative attributes adorning the exterior of ceramic vessels and one based on low-visibility technological choices (e.g., Carr 1995; Parkinson 2006; Voss and

Young 1995). While high-visibility, decorative attributes likely reflect patterns and networks of social signaling (e.g., Birch and Hart 2018; Bliege-Bird and Smith 2005; Bowser 2000; Degoy 2008; Dietler and Herbich 1998, 1994) lower visibility technological choices likely reflect more intimate networks of interaction and information exchange through communities of practice (e.g., Crown 2014; Gosselain 2000, 1998; Wendrich 2012; Wenger 1998). As such, the networks presented throughout this study represent first and foremost the social worlds and relational fields within which potters were embedded. I argue here that these networks represent the basic relationships through which Southern Appalachian societies would have been organized and would have been subject to similar pressures as other networks in the context of sociopolitical uncertainty. As such, I argue that these networks provide reliable proxies for societal organization and for identifying substantial changes to relational structures.

Once networks are built from ceramic data, I evaluate a number of measures related to network structures and the positions of nodes (or communities) within these networks to identify how network properties either changed, or remained stable, in the context of regional sociopolitical transformations. Importantly, because of the separation between high and low visibility attributes, I evaluate which kinds of relationships were most flexible, and alternatively which were most stable, as new sociopolitical practices and institutions were adopted or extant organizations were transformed.

Question Set 3 (Social Capital and Organizational Change): Given the structures of social networks across Southern Appalachia, what kinds of social capital were available, and at which sociospatial scales, in producing the collective response to a changing sociopolitical landscape? How did the structure of social networks, and thus the availability of different kinds of social capital, affect the ways that communities actively managed sociopolitical uncertainty and shifting political landscapes?

Data and Analyses: Using the networks constructed from ceramic attributes described above, I evaluate a number of network properties related to network cohesion and structure to identify the types of social capital that would have been produced by and available to Southern Appalachian societies accessing collective actions in the context of an evolving social, political, and economic conditions. In this way, I draw on a conceptual framework that considers the relationships between network structure, social capital, and collective action. Using the high-resolution temporalities of changes to material practices and traditions, I articulate the timing and scale of major institutional changes in each region with particular network structures. In this way, I provide insight into how different forms and kinds of networks structured major sociopolitical changes across the Southern Appalachian region between AD 600 and 1600.

This information on the deep historical characteristics of Southern Appalachian social networks will also be used to shed new light on the scale, structure, and stability of political systems among small-scale, non-state

societies, particularly those commonly referred to as chiefdoms. By understanding the organization of Southern Appalachian societies from the bottom-up, and from such a deep-time perspective, I am able to provide new interpretations of sociopolitical variability across both space and time. In particular, I demonstrate the extant narratives predicated on the political strategies of elites and the ruling class do not accurately represent the relationships established across wider Southern Appalachian societies. I show that contrary to narratives that consider these political systems to be general unstable, the network underlying political strategies, behaviors, and institutions were some of the most enduring features of Southern Appalachian societies. Additionally, I demonstrate the multi-scalar properties of sociopolitical power and social capital and argue that we must look beyond more limited social and spatial scales in characterizing and explaining processes of sociopolitical transformation across the Southeastern United States. Finally, I illuminate significant temporal variability in Southern Appalachian political landscapes, especially in comparing the network structures underlying political formations in the sixteenth century with those characterizing preceding centuries.

Outline

This study is organized as follows: In Chapter 2 I provide a background on the archaeology of Southern Appalachia focusing on the period between AD 600 and 1600. I focus explicitly on extant narratives for sociopolitical development across the region, identifying the base from which the current study has been

built. In Chapter 3, I present a conceptual framework rooted in collective action and social networks from which the goals of this study (as well as the appropriate data, analyses, and interpretive frameworks) have been derived. In Chapter 4 I conduct a regional ceramic seriation for Southern Appalachia. In Chapter 5, using radiocarbon data and the seriations produced in Chapter 4 to build an absolute Bayesian radiocarbon chronology for major changes to the composition of ceramic assemblages through time across both northern Georgia and eastern Tennessee. With this absolute timeline, I outline a broad, regional narrative for sociopolitical developments across the region. In Chapter 6, I produce fine-scale chronologies of changes to material practices including mortuary traditions, architectural traditions, mound-building practices, community organization, settlement patterns, and ritual participation using data from twenty earthen platform mounds across the region.

Using these chronologies, I identify two major historical junctures, both of which I argue would have contributed to an environment of heightened social uncertainty: one at ca. AD 1150 which I interpret as the development of hierarchical and centralized political organizations and one at ca. AD 1325 characterized by the collapse/ abandonment of a major central place. In Chapter 7, I investigate changes to the structures of two kinds of social networks that constituted Southern Appalachian societies and explore the kinds of social capital that would have been available to communities in the context of shifting political landscapes. Finally, in the concluding chapter, I show that while the histories of Southern Appalachian sociopolitics were undoubtedly characterized

by significant institutional change, the underlying networks through which these changes were mediated and negotiated remained historically durable over the entire millennium. That is, while certain characteristics of network structures were emphasized and deemphasized over time, even in the context of major social transitions, their structural integrity remained intact, as they were never dissolved, broken down, or transformed in the face critical episodes of change and transformation.

CHAPTER 2: SOUTHERN APPALACHIA, AD 600-1600

The Southern Appalachian region of the U.S. Southeast has been a locus of archaeological research for over a hundred years (e.g. Jones 1873; Polhemus 2002 [Moore 1915]; Thomas 1894). Many of the primary contributions of over a century's worth of archaeological work include insights about the formation of early villages (e.g. Cobb and Garrow 1996; Markin 2007; Schroedl et al. 1985), the intensification of maize agriculture (e.g. Markin 2007), and the development of complex, regional political systems (e.g. Birch et al. 2016; Cobb and King 2005; Hally 1996; Harle 2010; King 2003; Little 1999; Markin 2007, 2015; Schroedl et al. 1990; Sullivan 2007, 2006, 2016; Sullivan and Rodning 2001, 2011). Although populations living across the Southern Appalachian region are argued to have been politically integrated through a system of chieftaincies at the time of European contact (e.g. Hudson 1998; Hudson et al. 1985; Smith 2000), and in spite of the region serving as part of the core of the historic Creek and Cherokee territories (e.g. Royce 1887), research trajectories on either side of the modern-day Tennessee-Georgia geopolitical boundary have remained generally distinct (cf. King 2007; King and Sawyer 2017). At the macroregional scale, in the context of the greater Southeast, the populations of Southern Appalachia left notably similar archaeological signatures, especially in regard to the use of shared iconographical styles (King 2007; King and Sawyer 2017), the

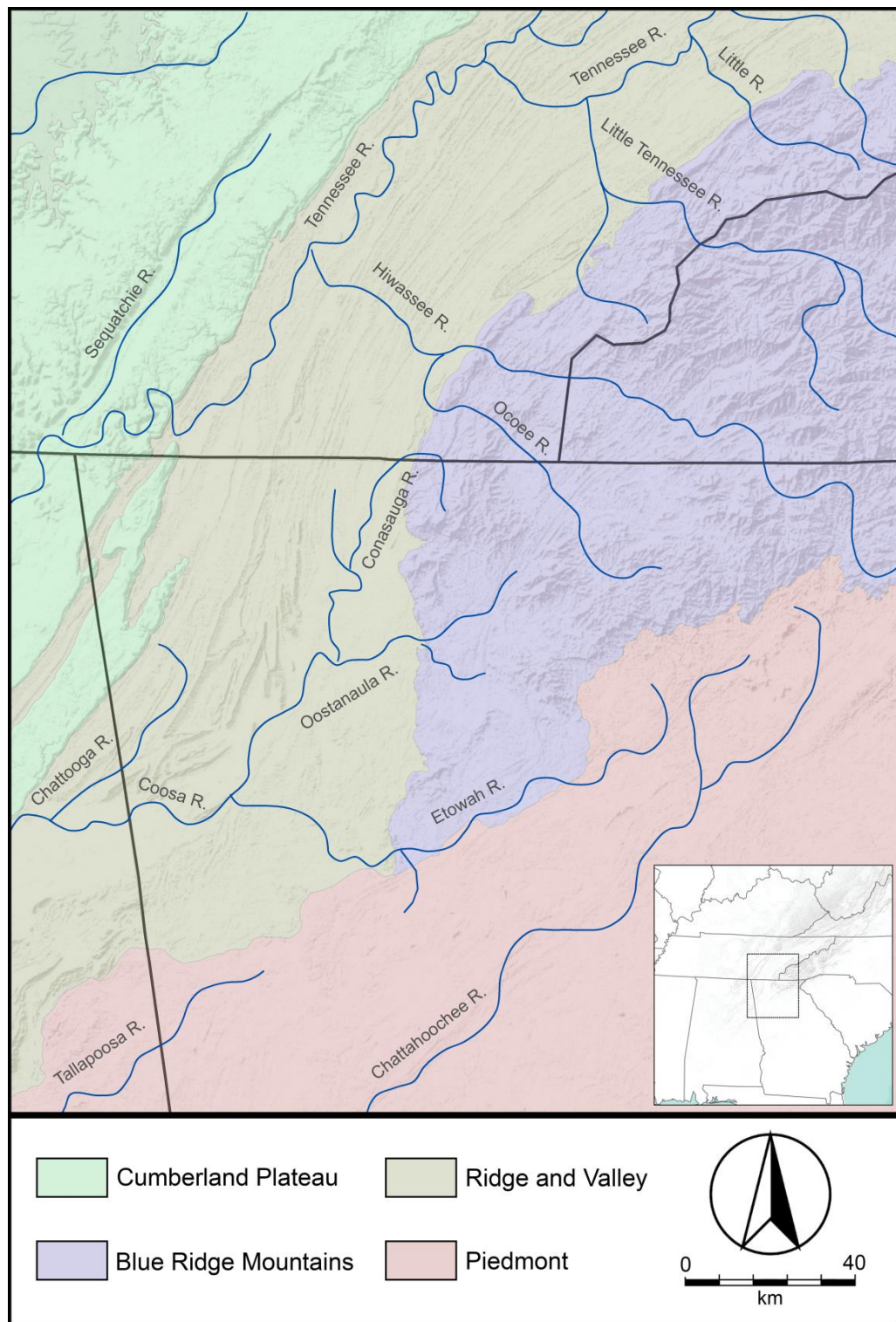


Figure 2.1. Map of the Southern Appalachian study area showing major rivers and ecoregions mentioned in the text.

construction of mounded architecture (see King 2003, 1996; Lewis et al. 1995), and even genetic similarities (Harle 2010; McCarthy 2011). At a more local scale however, the populations living along the Tennessee River and its tributaries in southeastern Tennessee, those living along the Etowah River and in the neighboring Oostanaula and Chattahoochee River valleys in northern Georgia (Figure 2.1) exhibited markedly distinct regional manifestations of a broader Mississippian pattern. These regional variants included differences in regional settlement patterns, mortuary traditions, community organization, ceramic materials, and ultimately sociopolitical organization. In this chapter, I introduce the geographic and cultural boundaries of the Southern Appalachian region and provide a discussion of both its physical and social environments. As part of this overview, I provide an outline of the extant sociopolitical history and use this to contextualize the current study. In Chapter 3, I illustrate how an approach rooted in social networks and collective action can contribute to this long history of archaeological work aimed at elucidating processes of social transformation.

The Southern Appalachian “Region”

The Southern Appalachian region encompasses the southernmost portions of the Appalachian Mountains as they generally grade into the rolling foothills of the Piedmont (Figure 2.1). It is bounded to the west by the rising Cumberland Plateau, to the east by the southern extent of the Appalachian Summit or Blue Ridge Mountains, and generally follows the long, parallel sequences of ridges and valleys running northeast-southwest into the

northernmost extent of the Piedmont physiographic zone (Figure 2.1). The Southern Appalachians have also been referred to as the “Deep South” (e.g. King 2012) or the “Hightower” region, referring to the geographic core of a distinct iconographic style (e.g. King 2007; King and Sawyer 2017). The majority of sites included in this study from eastern Tennessee are located along the Tennessee River and its major tributaries, notably the Hiwassee, Little Tennessee, and Tellico Rivers (Figure 2.2, Table 2.1). In Georgia, sites included in this study are concentrated along the Etowah, Oostanaula, and Chattahoochee Rivers (Figure 2.2, Table 2.1). Across both eastern Tennessee and northern Georgia, many of the archaeological collections used in this study are the product of intensive full coverage surveys and large scale excavation projects (discussed below) resulting from cultural assessment and recovery related to dam and reservoir projects which include the Nickajack (Faulkner and Graham 1966), Chickamauga (Lewis et al. 1995), Watts Bar (Koerner and Dalton-Carriger 2016), and Tellico Reservoirs (e.g. Davis et al. 1982; Gleeson 1970; Kimball 1985; Salo 1969) in eastern Tennessee and the Allatoona (Caldwell 2011), Buford, and Carter’s Dam (Kelly 1972, 1970, 1966) projects in northern Georgia (also Wauchope 1966) (Figure 2.2).

Physiographically, the Southern Appalachian region is characterized by quite a dramatic landscape. The major concentrations of sites in southeastern Tennessee are located throughout what the Great Valley of East Tennessee located between the Cumberland Plateau and the Appalachian Mountains

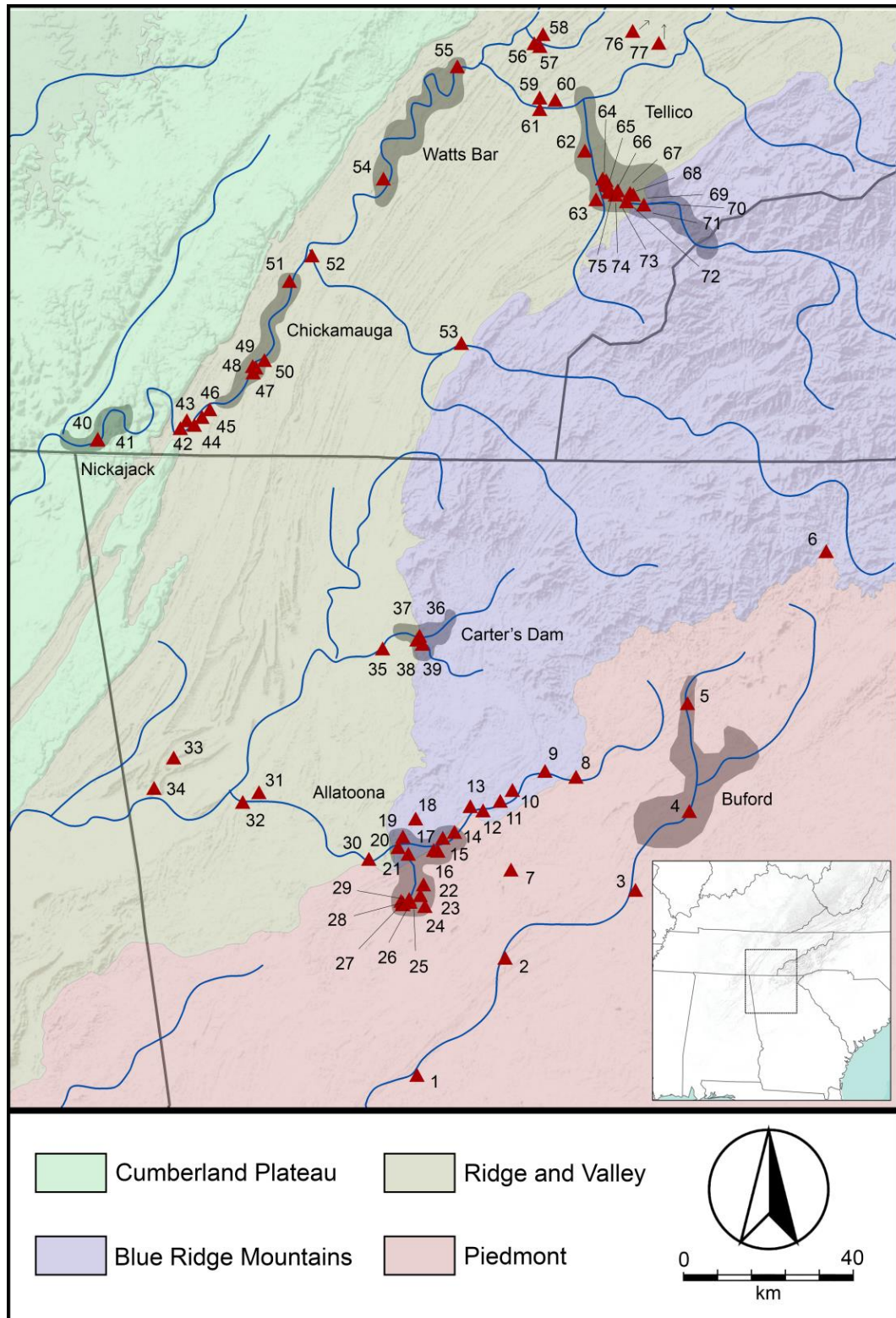


Figure 2.2. Map of the Southern Appalachian study area showing sites used in this study. Site numbers correspond to site names in Table 2.1. Reservoir projects mentioned in text are highlighted in grey for reference.

Table 2.1. Sites used in this study, mapped in Figure 2.2.

1. Anneewakee Creek, 9Do2*†	27. Little Allatoona, 9Co60*	53. Hiwassee Old Town, 40Pk3*†
2. Sibley, 9Co75*	28. 9Co59*	54. Leuty, 40Rh7*†
3. Rivermoore, 9Gw70*†	29. 9Co57*	55. DeArmond, 40Re12*†
4. Summerour, 9Fo16*†	30. Etowah, 9Br1*†	56. 40Re108*
5. Chestatee, 9Lu7*	31. Rush, 9FI163†	57. 40Re124*†
6. 9Hm2*	32. Whitehead Farm II, 9FI193*†	58. 40Rh141†
7. Woodstock, 9Ck2*	33. Plant Hammond, 9FI3*†	59. Kitrell Mound, 40Ld183†
8. Horseshoe Bend, 9Ck4*	34. King, 9FI5†	60. Higgs, 40Ld45*†
9. Long Swamp, 9Ck1*†	35. Thompson, 9Go4*	61. Kimberly-Clark, 40Ld208*†
10. Avery, 9Ck1182†	36. Sixtoe Field, 9Mu100*†	62. Bat Creek, 40Ld24*†
11. Hickory Log, 9Ck9*†	37. Bell Field, 9Mu101*†	63. 40Mr32*
12. 9Ck47*	38. Little Egypt, 9Mu102*†	64. Tellico Blockhouse, 40Mr50*†
13. 9Ck62*	39. Potts Tract, 9Mu103*†	65. Patrick, 40Mr40*†
14. Wilbanks, 9Ck5*†	40. Westmoreland-Barber, 40Mi11*†	66. Icehouse Bottom, 40Mr23*†
15. Woodstock Fort, 9Ck85*†	41. Lay, 40Mi20*†	67. 40Mr21*
16. 9Ck46†	42. Moccasin Bend, 40Ha63*	68. 40Mr41*
17. 9Ck105*	43. Heritage Place, 40Ha210*†	69. Toqua, 40Mr6*†
18. 9Br139*	44. Hampton Place, 40Ha146†	70. Mayfield I, 40Mr26*
19. Raccoon Creek, 9Br26*	45. Fishing Center, 40Ha102†	71. Mayfield II, 40Mr27*
20. 9Br73*	46. Williams Island, 40Ha60†	72. Citico, 40Mr7*
21. 9Br60*	47. Dallas, 40Ha1*†	73. Bacon Bend, 40Mr25*
22. 9Co73*	48. Davis, 40Ha2*†	74. Martin Farm, 40Mr20*†
23. 9Co45*†	49. Hixon, 40Ha3*†	75. Tomotley, 40Mr5*†
24. 9Co52*	50. Ledford Island, 40By13†	76. Cox, 40An19†
25. 9Co46*	51. Sale Creek, 40Ha10*	77. Fains Island, 40Je1†
26. 9Co55*	52. Hiwassee Island, 40Mg31*†	

(specifically the Blue Ridge physiographic province) (Lewis et al. 1995:39). This Great Valley represents the Tennessee portion of the Ridge and Valley physiographic province which is defined by successions of parallel ridges and valleys that run parallel to the Appalachian Summit to the east (Figure 2.1). Given this landscape, mobility in and out of the area on foot or by watercraft would have been greatly constrained as there are only two practical ways into the southeastern Tennessee region. The first is up through northeastern Alabama or northwestern Georgia down and around the Cumberland Plateau. The second is from the north end of the Cumberland Gap. Both the French Broad and the Holston Rivers could facilitate entrances in and out of the north end of the region while the only real access east into the Appalachians is the Hiwassee or Little Tennessee Rivers. Because of the dramatic landscape of the Ridge and Valley province, where ridges are steep and valleys are narrow, floodplains average

only 500 feet wide (Davis 1990). Along the Little Tennessee River in particular, these narrow valleys are constituted by series of up to ten terraces covering over 80 vertical feet (Davis 1990). This dramatic landscape generally grades into the Piedmont region as it swoops down into extreme northwestern Georgia and northeastern Alabama. At the southern extent of the Ridge and Valley province it abuts both the Blue Ridge Mountains and the Piedmont physiographic provinces (Figure 2.1). It's at this physiographic junction that many of the Georgia archaeological sites are concentrated (Figure 2.2; Table 2.1).

In Georgia, the dramatic nature of the Ridge and Valley province is only present in the extreme northwestern portion of the state. The eastern half of the Ridge and Valley region, referred to as the Great Valley District (Clark and Zisa 1976; Hally 2008), is generally flat as it grades into the rolling hills of the Piedmont. Across the Great Valley District, hills rarely measure over 30 meters in height (Hally 2008). Despite this physiographic variability, climatic conditions are relatively uniform and mild across the entire Southern Appalachian study area (Bramlett 1965). Defined as temperate continental and humid mesothermal (Thorntwaite 1948), the region exhibits a definite seasonal rhythm (ibid.) with an annual average rainfall of 51" and a mean temperature of 60° Fahrenheit (Lewis et al. 1995). With rainfall distributed evenly throughout each of the four seasons, and an average of 140 days with over .01" of rain, the average growing season will often last between 200 and 250 days (Davis 1990). It is assumed that these modern climatic conditions stabilized sometime around 9500 BP while many of the modern floodplains of eastern Tennessee likely took form ca. 3000 BP (Davis

1990). The combination of physiographic differences and differences in soil characteristics has resulted in a markedly uneven distribution of resources across the region as variation in the distribution of plant taxa are heavily correlated to these natural conditions (Davis 1990; Lewis et al. 1995). While the majority of the region can be defined by the presence of mixed deciduous and coniferous forests, including oak, hickory, walnut, red cedar, and pine, Davis (1990:31) points out that across southeastern Tennessee, nut-bearing trees make up ca. 85% of upland tree taxa and only 59% of taxa found across river terraces (Davis 1990:31). Today defined as an oak-chestnut forest region (Braun 1950), over 60 species of trees and woody shrubs have been identified (Davis 1990). Archaeologically, faunal assemblages seem to have been equally diverse. At the Toqua site (40Mr6) Bogan (1980:54) identified over 100 species that included deer, bear, bison, panther, wolf, fox, raccoon, opossum, beaver, otter, rabbit, squirrel, turkey, geese, duck, pheasant, turtles, frog, etc. Geologically, the Ridge and Valley province is made up of a variety of dolomites, limestones, shales, slates, and other sedimentary rocks (Lewis et al. 1995) from which seven distinct local chert types have been identified (Davis 1990). The Piedmont is primarily metamorphic and igneous features (Clark and Zisa 1976) and yields such resources as galena, ochre, mica, graphite, quartz, and schists. In sum, the Southern Appalachian region is rich in both faunal and plant resources, provides access to a number of unique physiographic zones from which distinct natural resource communities may be exploited, and provided constraints in the form of

geographic and physiographic features that likely worked to shape both regional and macroregional interactions.

In the context of the broader Southeastern United States, the Southern Appalachian region has a distinct archaeological signature and has historically contributed invaluable to wider discussions of political organization, social transformations, macroregional interactions, and ideological traditions. For example, King (Cobb and King 2005; King 2007; King and Sawyer 2017) has referred to it as the Hightower Region, deriving from the well-defined regional Hightower artistic style (Muller 1989). Further, as Hally (2007) and others (e.g. Brain and Phillips 1996) have pointed out, the Southern Appalachian region was heavily associated with the production, consumption, and exchange of shell gorgets. As Hally (2007:227) notes, “of the 19 gorget styles represented by five or more sites in the Brain and Phillips [1996] inventory, 12 are centered in eastern Tennessee while only seven are located elsewhere.” It seems that the drainages of eastern Tennessee, along with those of northwestern Georgia and northeastern Alabama, held a distinct and, at least to some extent, unified position within the wider Southeastern social, cultural, and political world.

Possibly the most notable aspect of the Southern Appalachian archaeological record is the site of Etowah (9Br1) in northwestern Georgia. Often discussed in the same contexts as Cahokia and Moundville, Etowah represented one of the most profound manifestations of Mississippian culture across the Southeastern United States and provides one of the richest cases on the emergence of sociopolitical complexity. As such it has contributed to discussions

concerning the centralization of political authority, the formation of large, aggregate villages, the adoption of new, widespread politico-ritual traditions, the maintenance of a large-scale political economy underwritten by intensified maize agriculture, and the forging of institutionalized socioeconomic inequalities. In regard to the historical roots of these critical transformations, the Southern Appalachian region also hosts a rich archaeological record of Late Woodland societies (ca. AD 600-1000) including multiple early sub-structure platform mounds (e.g. Pluckhahn 1996; Schroedl et al. 1985; Lewis et al. 1995; Williams 2014), large public architecture (Sullivan and Koerner 2010), and possibly some of the earliest evidence for wall-trench architecture outside of the vicinity of Cahokia (e.g. Schroedl et al. 1985; Sullivan 2009). Finally, Southern Appalachia has been argued to have been the geographic locale for the paramount chiefdom of Coosa at the time of Spanish contact (Hudson et al. 1985; Smith 2000; cf. Harle 2010), a purported political entity centered at the site of Little Egypt (9Mu102) in northwestern Georgia, whose expanse encompassed many of the communities throughout southeastern Tennessee, through northwestern Georgia, and southwest into northern Alabama. Although the populations living across the region undoubtedly shared deep historical connections with one another, when considered more carefully, distinct localities with unique historical trajectories do begin to come into focus.

These differences are most conspicuously reflected in the archaeological record as differences in regional settlement patterns, mortuary traditions, and ceramic materials, all of which will be discussed in more detail below. Briefly

however, the regional settlement patterns in eastern Tennessee and northwestern Georgia vary quite significantly. In general, there seems to have been a much denser concentration of more closely spaced communities across eastern Tennessee, especially after the emergence of major sociopolitical centers. While a single, large 30 hectare community eventually emerged in northwestern Georgia, at the site of Etowah, no center comparable in scale seems to have emerged in eastern Tennessee. Instead there seems to have been many moderately sized mound centers located in geographic proximity to other emergent centers. Additionally, while it seems that most of the northwestern Georgia populations relocated either to Etowah or one of a handful of single-mound centers across the Etowah, Oostanaula, and Chattahoochee River valleys, the settlement pattern across eastern Tennessee remained variable, as populations either moved to major centers, remained in small villages, or occupied individual homesteads.

Relatedly, the populations of eastern Tennessee engaged in communal, regional burial traditions for over five hundred years, between ca. AD 700 and 1250 (Cole 1975; Schroedl 1973). These Hamilton burial mounds as they are called, are ubiquitous across southeastern Tennessee and are often found unassociated with contemporary villages, likely having served multiple communities. No such regional integrative institutions seem to have existed across northwestern Georgia. Instead, some have suggested that early sub-structure mounds may have emerged as local central places out of sustained interactions among local groups within river valleys, but not to the geographic

extent witnessed in eastern Tennessee (e.g. Birch et al. 2016). Given the differences in settlement patterns and mortuary traditions, Sullivan (2009) has argued that the populations of eastern Tennessee may have practiced a decidedly less hierarchical form of sociopolitical organization than what has been suggested for northwestern Georgia, and indeed for the region more broadly.

Lastly, at a broad scale, the populations of eastern Tennessee and northwestern Georgia each seem to have represented distinct communities of practice in terms of ceramic manufacture and consumption. Techniques and modes of production, particularly choices related to temper types and surface decoration, are highly distinguished between the two localities. While in eastern Tennessee ceramics grade temporally from limestone to shell tempering, and from fabric and cordmarked surfaces to plain and incised, those in Georgia are overwhelming sand/grit tempered, dominated by complicated stamping and plain or polished surfaces. These differences suggest that while deep historical connections likely existed, and interactions between the two localities undoubtedly were commonplace, each retained distinct cultural traditions and unique social, political, and cultural trajectories. General differences and similarities reflected in both the culture-history and the history of archaeological investigations for each locality are outlined in more detail below.

History of Investigations: Northwestern Georgia

The earliest excavations across northern Georgia, especially at the Etowah site and along the Etowah River, were conducted by the Bureau of

American Ethnology under the direction of Cyrus Thomas and John Rogan (King 2007:33). These excavations targeted only major mounds, and especially the burial goods and ritual paraphernalia interred within them (e.g. Thomas 1894). Excavations of the same nature continued into the early 1930s at Etowah and across the river valley with Warren K. Moorehead and colleagues' work (Moorehead 1932). Investigations across the region exhibiting more modern standards and archaeological principles essentially began with the work of Robert Wauchope in the late 1930s and early 1940s who, working for the WPA, directed a large regional survey of most of northern Georgia (Wauchope 1939a, 1939b, 1940a, 1940b, 1966). Wauchope's goals were to identify and evaluate the archaeological resources across northern Georgia and he worked to establish a ceramic chronology which continues to form the basis of the current extant chronology for the region (Wauchope 1948, 1950, 1966). Later work by William Sears (University of Michigan and Florida Museum of Natural History) (1958a, 1958b), Joseph Caldwell (University of Georgia) (1953, 1957, 1958, 2011), Arthur Kelly (University of Georgia), Lewis Larson (University of West Georgia) (Kelly and Larson 1957; Larson 1971a, 1971b, 1989), Charles Fairbanks (University of Florida) (1950), and especially re-analyses conducted by King (University of Georgia and Pennsylvania State University) (1996, 1997, 2001, 2003) would continue to refine the ceramic chronology upon which an extant sociopolitical chronology would eventually be based.

Beginning in the late 1950s and extending through the late 1970s, much of the archaeological work conducted in northern Georgia was directed towards

areas of eventual inundation by dam and reservoir projects (Figure 3.2). Joseph Caldwell surveyed the areas around the Allatoona and Buford Reservoirs (Caldwell 1953, 1957, 2011) while Arthur Kelly, and then subsequently David Hally, surveyed sites around Carter's Lake in the Oostanaula-Conasauga River valley just north of the Etowah River valley (Hally 1970, 1979; Kelly 1972; Kelly et al. 1966). Coming out of a major period of data accumulation resultant from the various WPA surveys and subsequent reservoir projects, a number of syntheses were published through the Laboratory Series of the University of Georgia's Laboratory of Archaeology that aimed to summarize and expound on the temporal and spatial distribution of archaeological cultures across northern Georgia (Hally and Langford 1988; Hally and Rudolph 1986; Smith 1992; Wood and Bowen 1995; Wynn 1990). Contributing to these efforts are a number of theses and dissertations including Maureen Meyers's (1994) thesis on natural factors affecting the settlement of Mississippian chiefdoms, Bobby Southerlin's (1993) work on Mississippian settlement patterns in the Etowah River valley, Ramie Gougeon's (2002) study of household archaeology at Little Egypt, an investigation of the Woodstock period by Julie Markin (2007), and especially Adam King's work at Etowah and surrounding mound centers (King 1996, 1997, 2001, 2003). King's work in particular built on a century's worth of archaeological investigations and data from Etowah and across the Etowah River valley. His formal re-analysis of ceramic materials, architectural data, mound stratigraphy, and contribution of new radiocarbon dates forms the basis of the currently accepted interpretations of the sociopolitical history for the region outlined below.

History of Investigations: Eastern Tennessee

While the history of investigations across northern Georgia is highly variable in terms of institutional affiliation, quality, extent, scope, and products, the history of archaeological investigations across eastern Tennessee can be defined by centralization and cohesiveness due in large part to the formation of the Tennessee Valley Authority (TVA) as early as 1933. By the beginning of the Great Depression and the emergence of the New Deal archaeologies of the WPA and other governmental agencies (Dye 2016; Means 2013; Meeks 2009; Pritchard 2009) little was known of the archaeological resources of eastern Tennessee (Jennings 1994). Headed by William S. Webb, though directed by Thomas M.N. Lewis, all archaeological projects conducted by the TVA through the 1930s and 1940s in preparation for dam and reservoir projects constituted a centralized affair (Lyon 1996), with all or most artifacts and subsequent analysis and classification eventually funneled through the University of Tennessee. While Lewis directed many of the reservoir projects, the painstaking processes of classification and laboratory analyses were developed and undertaken primarily by Madeleine Kneberg (Lewis and Kneberg 1939; Sullivan, 1999). The ceramic types, classifications, and descriptions established by Lewis and Kneberg throughout their work across eastern Tennessee, especially in the Chickamauga Basin and at the Hiwassee Island site (Lewis and Kneberg 1941; Lewis et al. 1995) persist to this day and continue to serve as the extant classificatory system.

After the New Deal era, reservoir projects, extensive surveys, and intensive excavations have continued with some intensity by TVA archaeologists, and archaeologists associated with the University of Tennessee, and have included those around the Nickajack Reservoir (Faulkner and Graham 1966), along the Tellico and Little Tennessee Rivers (Chapman 1973; Cridlebaugh 1981; Davis 1990; Gleeson 1970; Guthe and Bistline 1978; Kimball 1985; Polhemus 1977, 1987; Salo 1969; Schroedl 1975, 1978; Schroedl et al. 1985), adjacent to the Watts Barr reservoir (Koerner 2005; Schroedl 1990), and re-analyses of materials from the Chickamauga area (Sullivan 2007, 2009, 2016; Lewis et al. 1995). A number of theses and dissertations have taken advantage of the extensive collections amassed from across eastern Tennessee curated at the McClung Museum of Natural and Cultural History at the University of Tennessee in Knoxville. These include in particular Shannon Koerner's work on the DeArmond site in the Watts Barr Reservoir (Koerner 2005), Michaelyn Harle and Donna McCarthy's work on biological affinity (Harle 2003, 2010; McCarthy 2011), and studies of mortuary patterning by Patricia Cole (1975) and James Hatch (1974). Given the long institutional history of archaeological work across eastern Tennessee, the body of literature concerning the social, political, and economic organization and characteristics of the societies that occupied the area are generally coherent and has been employed in a number of well-organized syntheses that aim to outline eastern Tennessee's native cultural history. Given the contrasts between the archaeology conducted in eastern Tennessee, especially in regard to the scope, extent, and goals of both projects and

individual researchers, considerations and interpretations that encompass the records of both eastern Tennessee and northern Georgia are severely lacking. The outline of the extant culture-history presented below synthesizes work from both eastern Tennessee and northern Georgia to highlight major social, political, and economic developments across the Southern Appalachian region as well as to highlight differences between the historical trajectories of each locality.

The Extant Sociopolitical Chronology for Southern Appalachia

The following overview of the extant sociopolitical chronology for Southern Appalachia highlights the major characteristics that have been used to define the culture-histories of eastern Tennessee and northern Georgia. The summary presented here specifically covers the period between AD 600 and 1600. Throughout this period, across both localities, major changes over this one-thousand-year period included the shift towards residential sedentism and the emergence of villages, the centralization of political authority, the institutionalization of socioeconomic inequalities, and the intensification of maize agriculture. Changes in the archaeological record that reflect these societal transformations generally include changes to ceramic technology, architectural traditions, regional settlement patterns, community organization, and mortuary practices. The extant culture-histories for northern Georgia and eastern Tennessee have been constructed independently of one another and constitute distinct bodies of literature, intellectual histories, and interpretations. Spanning the period between AD 600 and 1600, the chronologies for both localities cover

the end of the Woodland period through the Late Mississippian periods (Figure 2.3). The northern Georgia chronology is often split into five culture phases (with sub-phases) that include the Late Woodland Napier phase, the Terminal Late Woodland/Emergent Mississippian Woodstock phase, and the Mississippian Etowah, Wilbanks, and Lamar phases (Figure Mississippian II Hiwassee Island phase, and the Mississippian III Dallas/Mouse Creek phases (Figure 2.3). The following summary considers the culture-histories of each locality in reference to one another to highlight the broad social, political, and economic changes that define the history of the Southern Appalachian region while also defining the

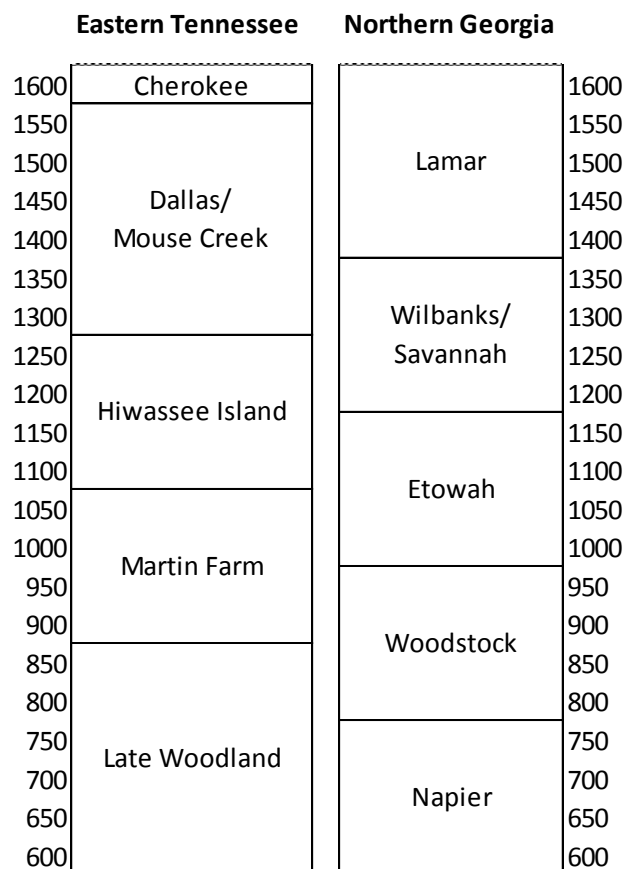


Figure 2.3. Southern Appalachian cultural chronologies.

differences between the historical trajectories of eastern Tennessee and northern Georgia societies. As such, while culture-historical phases or periods are referenced, the following discussion is divided into four parts defined by the major defining social, political, and economic characteristics common to both localities.

The “Good Gray Cultures,” AD 600-800

In 1963 Stephen Williams, referencing the period “following the Hopewell climax and preceding the rise of the Mississippian cultures,” noted the “resurgence at this time of what one might refer to as the ‘good gray cultures’” (Williams 1963:297).

“These are, in the north, cultures described as generalized Hopewell without the fancy ceremonialism. The ceramic tradition continues basically Woodland, and there is evidence of a considerable amount of regional variation in these cultures. Some of these cultures continue the Burial Mound tradition without any of the elaboration found in the Hopewellian, and, on the whole, ceremonialism of these cultures is considerably reduced. Also reduced or absent is evidence of distant trade connections” (Williams 1963:297).

He further noted that this period, between AD 300 and 700, “is perhaps the least known segment of Eastern prehistory” (Williams 1963:296) and that “there is a significant gap in our archaeological information and it remains something of a mystery as to what was actually going on at this time” (Williams 1963:296).

Indeed, across both northwestern Georgia and eastern Tennessee, compared to the preceding and succeeding Middle Woodland and Mississippian periods, the Late Woodland has continued to garner the least amount of archaeological

attention. As such, while not as mysterious as Williams may have suggested, the social, political, and economic processes constituting Late Woodland period societies remain ambiguous and undertheorized.

Studies focusing on this period in northwestern Georgia have primarily focused on defining ceramic complexes (e.g. Markin and Knight 2015; Rudolph 1991) and on the few identified, low platform mounds that have been dated to the period (e.g. Pluckhahn 1996; Williams 2014). In terms of ceramics, the period is characterized by the transition from Middle Woodland Swift Creek complicated stamped ceramics towards the Napier complicated stamped styles. Compared to classical Swift Creek complicated stamped ceramics, by AD 600 the remnants of these traditions, referred to as the Swift Creek B-Complex (Rudolph 1991), exhibit much more abstract motifs and a much more restricted inventory of designs. Between AD 600 and 900, these Swift Creek B-Complex ceramics do seem to be found in context with the succeeding Napier complicated stamped ceramics, defined by geometric (primarily rectilinear) motifs, and Woodstock complicated stamped ceramics defined primarily by a restricted inventory of geometric shapes executed with broader lands and grooves (Markin and Knight 2015; Rudolph 1991; Wauchope 1966). These ceramic associations, combined with a limited set of radiocarbon determinations have been used to assign two platform mounds in northwestern Georgia to the Late Woodland phase: Summerour (9Fo16) and Anneewakee Creek (9Do2). At both of these sites, low platform mounds have been excavated to reveal multiple construction episodes, features, and superimposed structures (Caldwell 1953; Dickens 1972; Pluckhahn

1996; Williams 2014). Unfortunately, modern standards of excavation were not implemented during the excavation of each of the mounds. Further, no investigations were ever undertaken on the villages associated with these mounds. Overall, the data produced from the archaeological record for between AD 600 and 900 for northern Georgia has remained generally undertheorized (although see Birch et al. 2016; Cobb and Garrow 1996; Little 1999; Markin 2007; Steere 2017). Despite this lack of attention, it seems that the Late Woodland period social history for northwestern Georgia generally follows trends identified across the broader southeastern United States. This pattern has been aptly described by Cobb and Nassaney (1995:217):

“We suggest that from the macroperspective the scale of social reproduction was altered during the Late Woodland period. There seems to have been a contraction in the spatial extent of the alliance networks that forged and replicated social relations. Groups became more dependent on close-range ties to obtain goods central to effecting daily social transactions...Imported items found during the Late Woodland period were likely used in the transactions of daily ritual occasions, such as puberty rights, bride-wealth payments, and religious fees.”

These general patterns are reflected clearly in the major contraction of interaction spheres across Georgia as evidenced by the disappearance of the region-wide distribution of Swift Creek ceramics and the emergence of more distinct ceramic style zones, and increased diversity, across the state (Birch et al. 2016; Williams 2014). Similarly, Steere (2011:316) points out that, in regards to household architecture, “houses become more dissimilar at a macroregional scale, but more similar at the scale of the single site and region” and that in Southern Appalachian in particular, “there seems to be more architectural

variability.” He goes on to argue that “this could point to a more localized level of social integration; marriage alliances and the social process of house construction would have been more circumscribed, resulting in a pattern of regional similarity and macroregional differences in houses” (Steere 2011:316). Unfortunately, there have been little to no intensive investigations of settlements dating to between AD 600 and 900. While ambiguous, it seems that settlements were small, seasonal encampments or hamlets with little evidence for any substantial, sedentary occupations as populations remained reliant on natural animal and plant resources.

While changes across northwestern Georgia, especially in terms of ceramic technology and style, are apparent at ca. AD 600, no such changes in the archaeological record of eastern Tennessee between AD 300 and 900 are as apparent. This period, between AD 300 and 900 in eastern Tennessee, is often referred to as the Late Woodland or Woodland III period, and can include the Icehouse Bottom, Roane-Rhea, Westmoreland-Barber, Connestee, and Candy Creek phases or complexes (Chapman 1973; Keel 2001; Kimball 1985; Kimball 1985; Kneberg 1961; Lewis 1959; McCollough and Faulkner 1973; Schroedl et al. 1990). As Schroedl et al. (1990:182) point out, “A comprehensive Late Woodland period settlement-subsistence model is still far from completely developed.” Beyond studies aimed at investigating ceramic complexes and changes (discussed in Chapter 4), only a handful of studies have targeted other aspects of the Late Woodland period in eastern Tennessee.

Lewis and Kneberg (1941, 1946) identified a number of shell middens across the Chickamauga and Watts Bar basins that they interpreted as individual households despite any archaeological evidence for structures (Schroedl et al. 1990:181). These middens were subsequently interpreted as evidence for year-round occupations by Lewis and Kneberg who described the overall Late Woodland settlement pattern as consisting of households “strung out along the riverbanks” (Lewis and Kneberg 1946:36) with individual or clustered burial mounds located near households but away from the rivers and were assumed to represent centralized localities for communities which were otherwise loosely organized (Lewis and Kneberg 1946:36; Schroedl et al. 1990:181). Schroedl et al. (1990:181) note that since the 1930s, only two Late Woodland shell middens have been investigated (McCollough and Faulkner 1973) that, despite continued lack of evidence for domestic structures, have nevertheless provided faunal and botanical datasets that have been used to evaluate Lewis and Kneberg’s model. McCollough and Faulkner (1973:124-129) argue that small shell middens located on upper terraces represent winter and early spring base camps occupied by small family groups while upland caves and rockshelters were used by men as hunting camps (Schroedl et al. 1990:181-182). They pose that “summer and fall settlements of band size were located in the floodplain zone...where some type of incipient horticulture was practiced and the wild plant and animal foods of the riverine environment could be exploited” (McCollough and Faulkner 1973:127). In contrast, Prescott (1977:43) argues that evidence points to spring-summer and

fall occupations. The nature of the extant Late Woodland period investigations is summarized by Schroedl et al. (1990:182):

“...shell middens are confined primarily to the Chickamauga and Watts bar areas on the main Tennessee River. None are reported from major tributaries such as the Little Tennessee River, and the character of Late Woodland period sites in these areas is virtually unknown. Ceramic collections from caves and rockshelters in the Cumberland Plateau suggest frequent and intensive use of the area during the Late Woodland period. However, almost none of these materials have been recovered or studied by professional archaeologists.”

Indeed this dearth of knowledge on Late Woodland societies is exemplified in the fact that only a single example of an eastern Tennessee Late Woodland structure exists (Sullivan and Koerner 2010).

The best documented features of Late Woodland societies in eastern Tennessee are burial mounds, referred to as the Hamilton burial mounds and denoting a distinct cultural phase in the extant chronology extending from ca. AD 700 through 1250 (Schroedl 1973) beginning in the Late Woodland and terminating towards the beginning of the Hiwassee Island phase. There are roughly 200 of these burial mounds across the Watts Bar reservoir area (Cole 1975) and over 50 have been recorded in the Tellico reservoir area (Thomas 1894; Kimball 1985). As Schroedl et al. (1990:183) point out, these mounds have been an object of study for over 100 years by both amateur and professional archaeologists and, as such, mound sizes and burial populations have been hard to characterize. The mounds are generally no taller than 2m and, on average, have a diameter of 20m with numbers of internments ranging widely from single individuals to over 100 burials (Lewis and Kneberg 1946; Schroedl 1978). There

is usually a main tomb underneath the first layer of the mound with a number of mound construction layers and burial additions added on throughout its use (Schroedl et al. 1990:183). While a variety of artifact types have been identified as grave goods, including drilled marine shell, triangular points, small celts, steatite pipes, and bone artifacts, the majority of internments have no associated grave goods (Cole 1975; Lewis and Kneberg 1946; Schroedl 1978). Cole (1975) has suggests the existence of three burial mound clusters across eastern Tennessee that she argues may represent subregional Late Woodland groups and may have served as territorial markers. As mentioned above, while these traditions may have begun by AD 700, they continued for over 500 years even as major social, political, and economic changes were enacted across the region.

Early Villages, AD 800-1150

Evidence for early villages and more intensive occupations, including palisades, substantial storage and midden accumulation, and defined architectural features, generally suggests increased sedentism and the beginnings of year-round occupations by AD 800 and throughout the Woodstock period in northern Georgia and the Martin Farm period in eastern Tennessee. Across northern Georgia, over 150 Woodstock components have been identified (Cobb and Garrow 1996; Pluckhahn 1994) and include both seasonal or specialized occupations as well as sites evidencing longer-term occupations. As Pluckhahn (1994) and Markin (2007) point out, smaller sites are generally found along the floodplains of streams while larger, probable residential sites tend to be

located in upland areas adjacent to larger streams and larger floodplains. While a variety of site sizes have been identified (e.g. Gresham 1987; Ledbetter et al. 1987), sites generally range between 1.5ha at the largest down to small encampments and rock shelters (Cobb and Garrow 1996:28). While a number of Woodstock sites have been intensively investigated (e.g. Bloom et al. 1988; Cable 2000; Caldwell 1953; Crook 1982; Hally 1970; Birch and Lulewicz 2014; Smith 1985; Smith 1987; Webb, n.d.) only two whole villages have been uncovered as well as a third partially uncovered: Hickory Log (9Ck9) (Webb, n.d.), Woodstock Fort (9Ck85) (Caldwell 1953), and 9To48 (Cable 2000; Cable and Gard 2000) (Figure 2.4). Each of these three sites is surrounded by a multi-walled palisade, although temporal control is not fine enough to evaluate whether walls were contemporary or rebuilt. While all three sites have yielded copious amounts of features including hundred to thousands of probable post-holes, only one, Woodstock Fort, has yielded architectural features argued to date to the Woodstock period (Caldwell 1953).

Recently, Markin (2007, 2015) has argued that the Woodstock period exhibits evidence for significant demographic shifts, transformations in social and political organization, and the mass intensification of maize agricultural into an existing horticultural system. Markin (2007:228-229) concludes that:



Figure 2.4. Plan maps of excavated Woodstock villages. A) Hickory Log (9Ck9); B) 9To48; C) Woodstock Fort (9Ck85).

“In north Georgia, centralized political institutions developed not in imitation of neighboring systems to the north in Tennessee and west in Alabama, but within existing tribal organizations in response to ‘population growth, subsistence intensification, [and] decreased mobility’ (Nassaney 1992:132)...a pattern of increased cultivation of maize seen in other Emergent Mississippian phases should also be evidenced in the Woodstock botanical assemblage. Although there is no current evidence to suggest the existence of administrative centers in the Woodstock phase, the phase experiences the first steps toward the development of independent, small-scale polities and settlements into integrated, multisite territorial entities that are differentiated from similarly clustered neighboring entities.”

Markin’s (2007, 2015) assessments are primarily based on regional settlement pattern analyses, ceramic assemblages, and macrobotanical analyses that indicate an increase of maize in archaeological features at ca. AD 800-900 from roughly 2-13% of macrobotanical remains to comprising 43-82% of remains during the Woodstock period, a pattern that she points out is consistent with the Emergent Mississippian phase at Cahokia and the West Jefferson phase at Moundville (Markin 2007:229). Both Markin (2007, 2015) and Birch et al. (2016) suggest that some of the earliest mound centers across northern Georgia, emerging at roughly AD 1100, were likely rooted in the sociopolitics of the Woodstock period and likely represented local foci of interaction across the landscape. While Birch et al. (2016) stop here, Markin (2007, 2015) posits that these mounds were likely indicative of the regional consolidation of local polities into the powerful chiefdoms recognized in later Mississippian phases.

From a macroregional perspective, Little (1999), like Markin (2007, 2015), also argues for an interaction based approach to the emergence of Mississippian societies. Like both Markin (2007, 2015) and Birch et al. (2016), Little’s (1999) interpretations also rely on the historical roots of Mississippian societies in the

Woodstock period. In sum, Little argues that “prior to Etowah’s emergence, portions of the Valley and Ridge province in northwest Georgia and northeast Alabama apparently were occupied by four contiguously-located, small scale groups” (1999:54). These groups are known archaeologically as the Coker Ford, Cane Creek, Ellis, and Woodstock cultural complexes. Referencing evidence for fortifications, Little argues that it was at this time, after the emergence of the bow and arrow and during the critical intensification of maize agricultural, that warfare and hostilities began to increase across the region (Little 1999:54). He goes on to argue that, based on the presence of minority ceramic types across each of the four cultural complexes, cooperative, non-violent interactions must have taken place among these four groups as a necessity, “to reduce the potential negative impact of inhabiting a region characterized by pervasive warfare” (Little 1999:54). It is from this backdrop, of “armed aggression or the threat of such force,” that Little argues the Etowah community, and chiefdom, emerged through a regional sociocultural and political coalescence (Little 1999:54). While there is little doubt that the sociopolitical interactions that characterized the Woodstock period substantively structured subsequent sociopolitical organization and mediated the emergence of new socioeconomic traditions, the exact nature of these relationships remain generalized and ambiguous. Further, interpretations continue to be premised on the assumption that chiefdom political organizations undoubtedly emerged. Thus, much of the research on, and theorization of, the Woodstock period remains tautological.

By AD 900, critical social changes were also taking place in eastern Tennessee. Referred to as the Martin Farm phase, and known primarily from intensive excavations at the Martin Farm site (40Mr20) (Salo 1969; Schroedl et al. 1985), the period between AD 900 and 1100, like the Woodstock period in northern Georgia, generally represents an Emergent Mississippian cultural and temporal phase. The Martin Farm site likely represents a small, 0.5 ha village that has yielded evidence for structures, both single-post and wall-trench styles, a substructure platform mound, and a substantial ditch feature associated with the platform mound (Schroedl et al. 1985, 1990). As Schroedl et al. (1990:187) point out,

“the placement of this [ditch] feature near the platform mound and the overall relation of these features to structures and other facilities, including probable storage pits, suggests a degree of site complexity not heretofore recognized for occupations dating circa AD 900 in east Tennessee.”

Throughout the Little Tennessee River area, the Martin Farm site represents one of seventeen Martin Farm phase sites. Although all others except for the Martin Farm site are known only from surface collections, each of these sites likely represents small residences (Schroedl et al. 1990:188). While explicit evidence of substructure mound-use during this period is restricted to Martin Farm, Schroedl et al. (1990:188) suggest the possibility that there may be Martin Farm stages for the mounds at both Bat Creek (40Ld24) and Bussell Island (40Ld17). Beyond yielding the earliest evidence for platform mounds in the region (although the Davis site (40Ha2) may also have an early platform mound), the Martin Farm period also played host to the introduction of two other decidedly

“Mississippian” traits: shell tempered ceramic technology and wall trench architecture. Given these major changes in the archaeological record at this time, a number of models have been proposed, that hinge on the data from Martin Farm phase contexts, which attempt to explain “Mississippian” origins in eastern Tennessee.

“At least three models have been proposed to describe the Woodland-Mississippian transition in eastern Tennessee. Lewis and Kneberg (1946) used an ethnic replacement model based on culture group migration, territorial invasion, sometimes violent confrontation, and indigenous culture extinction or absorption. Faulkner (1972, 1975) and Schroedl et al. (1985) have entertained a more subtle, and perhaps as a result more vague process of culture diffusion or Mississippianization that tends to include elements of both the migration model and the in situ cultural development model, the third perspective. Faulkner (1972, 1975) and Schroedl et al. (1985) also consider in situ cultural development with minimal external influence. This view has enjoyed the greatest recent support (Boyd et al. 1983; Helmkamp 1985; Schroedl 1978; Schroedl et al. 1985)” (Schroedl et al. 1990:189).

Schroedl et al. (1990:190) go on to explain that

“The formal recognition of in situ culture development is comparatively recent in east Tennessee (Faulkner 1975, Schroedl 1973, 1978). No attempts, however, have been made to associate the archaeological record of the Woodland-Mississippian transition with a specific model of internal culture change. Instead, chronology and artifact assemblage pattern studies have been made as convincing evidence that such a model is both plausible and appropriate (see Kimball 1985; Davis et al. 1982; Schroedl et al. 1985).”

Similar to Markin (2007, 2015), Schroedl et al. (1990:192) and others working in eastern Tennessee (e.g. Helmkamp 1985:158), also conclude that increased sociopolitical complexity and major changes identified in the archaeological record of eastern Tennessee between AD 900 and 1100 are

directly related to economic efficiency in regards to the intensification of maize agriculture. It is at this time that tropical maize varieties are replaced by local variants which were much less susceptible to microclimatic fluctuations (Helmkamp 1984, 1985). In Helmkamp's (1984, 1985) perspective, a subsequent intensification of agricultural production would have led to competition over land. Schroedl et al. (1990:192) propose merely that intensification would have led to major demographic changes, namely population growth, for which extant sociopolitical systems were not suited to provide structure. As Helmkamp (1985:158) summarizes, Late Woodland populations were

“small-scale localized non-hierarchical systems with highly impermeable boundaries and cooperative decision making that may not have had the information and material processing capacities and, probably more importantly, means of implementation necessary to cope with the increasing volume and complexity of a maturing agricultural economy.”

This thus encouraged the emergence of the “centralized systems and ranking access to roles of power” (Helmkamp 1985:158) that characterized the succeeding Mississippian periods.

Politico-Religious Fluorescence, AD 1150-1350

The current understanding of the sociopolitical organization of societies that persisted between ca. AD 1000 and 1400 across northern Georgia is derived primarily from work by Adam King (King 1996, 2001, 2003, 2004, 2007, 2010, 2012) and David Hally (Hally 1993, 1996; Hally and Langford 1988; Hally and Rudolph 1986). Admittedly, these extant interpretations are based almost solely

on investigations of sites within the Etowah River valley and, to a lesser extent, those in the Carter's Dam area north of the Etowah River valley. The extant sociopolitical chronology for northern Georgia is described as follows.

Following the Woodstock phase is the Etowah phase, often split into an Early Etowah phase and a Late Etowah phase. King (2003) argues that the Early Etowah phase represents the first occupation of the Etowah site. While the extent of occupation at this time was modest, King (2001, 2003) argues, based on evidence for feasting and communal activities possibly related to the first stages of mound construction, that new social institutions began to emerge that were corporate in orientation, emphasizing cooperation and group solidarity (*sensu* Blanton et al. 1996). The Late Etowah phase is argued to have been a continuation of the developments witnessed during the Early Etowah phase. From AD 1200-1250, it is argued, using ceramic evidence (Rudolph and Hally 1985; Stephenson et al. 1996) that the Etowah River valley was abandoned (Cobb and King 2005; King 2003, 2001). Based on this argument, Cobb and King (2005) have argued for cycles of abandonment as critical mechanisms of social and cultural change at Etowah. Following this abandonment episode, the Early Wilbanks phase represents the apex of Etowah's Mississippian cultural expression. During this phase, King (2003) argues that, following the reoccupation of the site, strategies of social and political organization shifted from a corporate orientation to a network-based orientation within which social inequalities and political hierarchies were made explicit through the control of widely shared ideologies and elaborate religious knowledge (*sensu* Blanton et al.

1996). It is during this phase that the bulk of mound construction was completed, large-scale population aggregation at Etowah occurred, construction began on the ditch and palisade complex, and the extent of Etowah's influence throughout the region was at its height. The Late Wilbanks phase generally represents the continuation of developments that characterized the Early Wilbanks phase. At the end of the Late Wilbanks phase however, at approximately AD 1375 (per the extant chronology), Etowah underwent a rapid and violent abandonment (King 2003:78).

While it is commonly argued that the developmental history outlined for Etowah represents concomitant changes in the organization of social relations across the entire region—and specifically through vertical political integration centered at Etowah—these claims have yet to be formally or quantitatively demonstrated. While histories of political centers have provided insight into the dynamics of change, these sites have been poorly linked into the wider social landscape and underrepresent the majority of regional populations. Furthermore, research on these critical sociopolitical transformations tends to be situated at the point at which changes are first observed (ca. AD 1000) and thus disregards the historical conditions within which change was rooted (but see Birch et al. 2016; Cobb and Garrow 1996; Little 1999; Markin 2007, 2015).

Just north of the Etowah River valley, in the Oostanaula River valley, the Sixtoe Field (9Mu100) and Bell Field (9Mu101) sites have provided further information about this critical period across northern Georgia. As Birch et al. (2016) argue, early on Etowah was likely one among a number of local loci of

interaction both across the Etowah River valley and beyond. One of these contemporary loci was the Sixtoe Field (9Mu100) site which, like Etowah, has yielded evidence for large scale feasting activities and communal, corporate-like sociopolitical organization (Kelly et al. 1966; King 2001, 2003). Subsequently, the Bell Field (9Mu101) site (Kelly 1972) is argued to have been the center of a chiefdom which occupied the river valley just north of the Etowah River valley (King 2003). Interestingly, both the substructure mound architecture and the ceramic assemblage associated with the Bell Field site suggest strong relationships with eastern Tennessee communities further north. These relationships remain conjecture, but will be formally evaluated in later chapters.

While a single center emerged in northern Georgia, political and economic centralization in eastern Tennessee followed a substantially different developmental trajectory. By AD 1150-1200, large, aggregate settlements rapidly emerged across eastern Tennessee. These major changes are represented in the extant chronology as the transition between the Martin Farm and Hiwassee Island periods. The Hiwassee Island phase settlement pattern consisted of a wide range of settlement types and sizes including both aggregate settlements, some as large as four or five hectares, and household farmsteads (Schroedl 1998; Schroedl et al. 1990; Sullivan 2016). While the Hiwassee Island phase is coeval with the emergence of political complexity at Etowah differences in social and political organization were substantial. At over thirty hectares, the multi-mound complex at Etowah represented the single largest politico-ritual center across northern Georgia and Southern Appalachia. In eastern Tennessee

however, Hiwassee Island phase sites remained small and compact, often surrounded by a palisade and including smaller mound and plaza complexes (Schroedl 1998). Moreover, these types of aggregate settlements in eastern Tennessee, many of which produced the same elaborate ceremonial accoutrements found at Etowah (King 2007; King and Sawyer 2017), were more common across the landscape, as not a single settlement emerged as an imposing regional center. The settlement patterns and political institutions that emerged during the period at ca. AD 1150 across eastern Tennessee were very much a continuation of the developments observed in the preceding Martin Farm phase (Schroedl et al. 1990).

Indeed, as Sullivan (2016) points out, many of the early Hiwassee Island platform mounds, including those at Davis (40Ha2) (Sullivan et al. 1995), Sale Creek (40Ha10) (Lewis et al. 1995), and Hiwassee Island (Lewis and Kneberg 1946), do not seem to be associated with any residential population. As such, Sullivan (2016:146) suggests that the early Hiwassee Island phase may have continued to be defined by dispersed populations. It is important to note that the communal Hamilton burial mounds, located away from residential occupations, continued to be used throughout this time (Sullivan 2016:184). Additionally, large, round structures similar to those identified at Late Woodland sites across eastern Tennessee, seem to have been continued to be used into the early Hiwassee Island period and ceased to be used around the same time as the Hamilton burial mounds at ca. AD 1200-1250 (Sullivan 2016; Sullivan and Koerner 2010). By AD 1200-1250, just as many of the Late Woodland traditions were beginning

to fall out of popularity, many of the early Hiwassee Island sites were abandoned, while the Hiwassee Island site itself remained in use intermittently (Sullivan 2009, 2016). Concomitantly, the Hixon site (40Ha3) in the Chickamauga Basin became the dominant site across eastern Tennessee (Sullivan 2007, 2009, 2016). The Hixon site is notable for its large burial mound akin to the burial mound, Mound C, at the Etowah site. The Hixon burial mound contained over 100 interments and a plethora of religious paraphernalia similar to that found at Etowah, and in the classic Hightower style of the Southern Appalachian region (King 2007; Sullivan 2016). Despite its prominence on the landscape as a place of major sociopolitical gravity, there is little evidence for any residential population at Hixon, suggesting that populations continued to inhabit small farmsteads or dispersed villages (Sullivan 2016). This pattern is distinct from the pattern observed in northern Georgia where it is assumed that all populations had moved to palisaded mound centers. Another site, Citico (40Ha63), situated near modern day Chattanooga and which was contemporary with both Hixon and Etowah, has also yielded an array of ritual paraphernalia consistent with assemblages at both Hixon and Etowah (Brain and Phillips 1996:246; Evans and Smith 1988; Hatch 1976; Lewis 1958).

Fueling discussions of the connections between northern Georgia and eastern Tennessee, and indeed populations across eastern Tennessee alone, have been a handful of studies focused on discerned biological affinity. Both Harle (2010) and McCarthy (2011) have undertaken such studies. Harle's (2010) study suggest little genetic exchange between populations in eastern Tennessee

and northern Georgia, with one site near the Nickajack Reservoir near the Georgia border showing stronger similarities to eastern Tennessee sites than to northern Georgia sites. McCarthy's (2011) research investigated four sites, Hixon, Dallas, Rymer, and DeArmond. She found that while the populations interred at the Dallas and DeArmond sites were biologically similar, the two geographically closest sites, Dallas and Hixon, had markedly different biological communities, thus posing questions about the possible connections between the Hixon and Etowah communities (McCarthy 2011; Sullivan 2016).

Societal Restructuring, AD 1350-1600

By AD 1350, and no later than AD 1375, Etowah as a sociopolitical center was in a steep decline and was eventually abandoned amid violent and hostile circumstances (Cobb and King 2005; King 2003). By AD 1400, Etowah was once again reoccupied as one of multiple moderately sized socio-political centers located throughout northwestern Georgia. Notably, the Little Egypt site (9Mu102) in the Carter's Dam area seems to have emerged as a major regional center and is argued to have been the eventual capital of the Coosa chiefdom (Gougeon 2002; Hudson et al. 1985; Smith 2000). What also emerged after Etowah's dissolution was a settlement landscape dotted with both sociopolitical centers like Etowah and Little Egypt as well as a number of small, Lamar farmsteads as well as moderately sized (~4 ha), compact and palisaded villages such as the King site (9FI5) (Hally 2008; Hally and Kelly 1998).

At ca. AD 1350-1375, when Etowah seems to have been violently abandoned, the political situation in eastern Tennessee also underwent a transformation, albeit much different than that at Etowah and across northern Georgia. By AD 1350 settlements across eastern Tennessee became even more compact yet remained small in size. These Dallas phase sites were palisaded and each had public structures built on top of platform mounds with an associated plaza space. These settlements, like the preceding Hiwassee Island settlements were planned, built rapidly, and located in places that were previously unsettled or emerged contiguously from Hiwassee Island settlements. A major indicator of social and political transformation at these sites is the inclusion of burials within the village, whereas up until AD 1200-1250 communal burial mounds located away from villages were utilized (Polhemus 1990; Schroedl 1998; Sullivan 1998).

Throughout the fifteenth-century across the Chickamauga and Nickajack basins, there seems to have been a general population decline at the same time that the Dallas site (40Ha1) seems to have been burnt and abandoned (Council and Honerkamp 1990; Griffin 1963; McCollough and Bass 1983; Sullivan 2007, 2009, 2016). Continuing through to Spanish contact, a number of contemporary Mouse Creek phase settlements seem to have co-occurred across the region with Dallas phase settlements although may have been primarily centered north of the main concentrations of Dallas sites. These large towns, including the Ledford Island, Rymer, Mouse Creek, Sale Creek, Ocoee, and Upper Hampton sites are all similar to many of the Dallas phase settlements but lack platform

mounds (Sullivan 2016:157) and exhibit extended rather than flexed burial traditions (Sullivan 1995). As indicated by radiocarbon dates and a lack of European materials, both Dallas and Mouse Creek traditions seem to have dissolved by the time of Spanish contact in the mid-sixteenth century (Sullivan 2016:157).

Similar to the King site in northwestern Georgia, a number of small, compact villages emerged just south of the Nickajack Reservoir and just north of the Alabama border around the mid-sixteenth century (Sullivan 2016:159). All of these villages were likely organized around central plazas with burials interred not in mounds, but near or around domestic structures (Sullivan 2016:159).

Based primarily on ethnohistoric accounts, it has been argued that at the time of Spanish contact in the mid-sixteenth century, the Coosa chiefdom spanned from southeastern Tennessee, through northwestern Georgia, and into northeastern Alabama (Hudson et al. 1985; Smith 2000). As described above, results from a number of biocultural studies have suggested the contrary to these interpretations, arguing for a lack of any substantive biosocial interactions between groups across eastern Tennessee and northern Georgia (Harle 2010; McCarthy 2011). This lack of evidence for biosocial interactions does not however definitively negate arguments that Coosa may have been a paramount chiefdom characterized by alliances between biologically, socially, and culturally distinct populations. Archaeological evidence bearing on these regional relationships remains sparse. Despite the differences between the two regions discussed above, similar changes to settlement patterns, community

organization, and household architecture (Steere 2017) points to a period of widespread, shared cultural traditions and shared social, political, and economic experiences, across the entirety of the Southern Appalachian region after AD 1350.

Summary and New Perspectives

Despite substantive local differences, at a broad sociospatial and temporal scale, the histories of both eastern Tennessee and northern Georgia are punctuated by markedly similar patterns of social, political, and economic change. The populations of these two localities thus were either subject to the same external influences originating from outside the Southern Appalachian region or likely maintained substantive relationships that resulted in similar patterns of internal cultural development. Interpretations that combine these two scenarios are likely appropriate. What remains clear is that throughout the course of the millennium in question there were marked changes to the materiality of social, political, and economic life for Southern Appalachian populations. The most profound set of changes began to unfold at the turn of the first millennium AD, not only across Southern Appalachia but across the Southeastern and Midwestern regions more broadly. As summarized above, these material changes, including the emergence of aggregate villages, the construction of platform mound architecture, the use and exchange of elaborate ritual exotica, and the intensification of maize agriculture, have all been conceptualized as

benchmark attributes for the wider process of ‘Mississippianization.’ Traditionally, these material markers have been linked conceptually to the emergence of centralized leadership, the development of political economies underwritten by intensified agricultural production, the institutionalization of socioeconomic inequalities and sociopolitical hierarchies, and the adoption of shared politico-religious practices across broad spatial extents. In considering ethnohistoric accounts, employing ethnographic analogies, and working from neoevolutionary perspectives on societal development, these traits have often been judiciously, and convincingly, used to categorize chiefdom political formations as a significant characteristic of “Mississippianized” societies.

While the use of neoevolutionary schemes to study sociopolitical development has been criticized both in the context of Southeastern archaeology (e.g. Pauketat 2007) and across the discipline more broadly (see Chapman 2003), the current study does not seek to explicitly challenge or negate previous assertions about the structure of political forms across the Southern Appalachian region. While the use of neoevolutionary categories imposes from the top-down an idealized understanding of social, political, and economic relationships, the current study seeks to move from the bottom-up. That is, in the following case study I investigate the form, structure, and content of the relationships that actually underwrote sociopolitical forms and economic interactions in order to understand how major institutional changes actually articulated with the relationships that formed the foundations of Southern Appalachian societies. In the next chapter I present a conceptual framework that makes an analytical and

interpretive distinction between sociopolitical institutions and underlying relational foundations. I conceptualize sociopolitical development as a collective exercise in mediating social uncertainty arising from institutional change. By taking such a perspective, I evaluate 1) whether or not the material changes (often interpreted as “Mississippianization”) identified in the archaeological record indeed represent changes to underlying social and political relationships and 2) how the relational structures of Southern Appalachia conditioned sociopolitical development across the region. As such, the case study presented here does not stand to impede those studies that wish to use this same data to understand the formation and character of chiefdom political formations. In fact, the analyses presented in the following chapters contribute to these studies by providing an understanding of the variable relational structures that constitute chiefdom formations. Nevertheless, I choose to sidestep the use of classificatory schemes in favor of relationally-oriented ontologies of archaeological inquiry.

CHAPTER 3: COLLECTIVE ACTION AND SOCIOPOLITICAL UNCERTAINTY

In this study I consider sociopolitical histories from the bottom-up, as histories of social networks. Of particular interest here is how histories of social networks articulate with histories of sociopolitical and institutional change. In referencing institutional change, I am referencing changes to proscriptive behaviors, or the rules and norms of interaction among members of society, changes to which have the potential to generate significant amounts of social, political, and economic uncertainty. As such, I seek to explore how social uncertainty, introduced at historical junctures characterized by the reorganization of political landscapes, was actively and collectively managed by Southern Appalachian societies. In particular, I argue that it was through the durable structures of social networks that these uncertainties associated with institutional change were buffered against and mediated.

I regard there to be heightened levels of social uncertainty when the likelihood of future events is indefinite and incalculable (Alaszewski 2015; Beckert 1996; Boholm 2003; Knight 1921). In this way, and discussed in more detail below, significant moments of institutional change, including historical junctures characterized by sociopolitical transformation, will introduce heightened levels of social uncertainty in that the relationships, rules, norms, modes of trust, and patterns of reciprocity are called into question (North 1990). The management of these uncertainties is what I consider to be active processes of collective action. The ability to access such collective resources is conditioned by

the social networks, and the social institutions shaping those networks, that constitute society.

In order to explore these processes, it becomes necessary to move beyond the classificatory schemes and analytical black boxes. Such classifications have historically shaped the study of social change and transformation across the southeastern United States. To this end, I employ a framework that focuses on the very relationships that have given form to, and indeed inspired, these organizational classifications. That is, I present a framework that places the primacy of investigations on particular patterns of relationships between actors, and in particular on the ways that these different structures of relationships articulated with one another through time. By doing so, I work from the bottom up, parsing out particular relational structures and evaluating them against one another within an explicitly multiscale framework, both temporally and sociospatially speaking. To achieve such a perspective, I invoke analytical and conceptual scaffolding derived from an interdisciplinary body of social science research pertaining to processes of collective action, the role of social capital in collective action, and the articulation of social networks with these bodies of thought. The framework I build stands in contrast to traditionally top-down approaches in that I intend to measure, and indirectly observe, the relationships that shaped Southern Appalachian societies rather than impose a model of organizational structure as an explanation. I begin by providing a brief overview of traditional approaches to sociopolitical development in archaeological research and present a summary of the more recent

approaches upon which approaches rooted in collective action and social networks have been built. I then outline an analytical framework that articulates theories of collective action with social networks.

Comparative Sociopolitics in Archaeology

Here I provide a brief review of the deep conceptual roots of archaeological perspectives on sociopolitical development and evolution, most of which has also been tied to concepts and investigations related to the emergence of social, political, and economic complexity. While issues of complexity do not form the core of the current study, they remain intimately tied to archaeological theory concerning social change and history and, as such, are discussed in brief here. The following sections are used to review the history of perspectives rooted in social evolutionism, and to situate the theoretical history to which the conceptual framework employed in this study has emerged as a response. While covering key works, this review is far from exhaustive (see Chapman 2003, Harris 2001, and Trigger 1989).

Traditional Approaches

As Chapman (2003:4) outlines in his review of archaeological approaches to complexity, the “[d]evelopment of complexity in human societies has been tied into the concept of evolution during modern times, given the concern of evolution

with 'understanding directionality as a major characteristic of human history' (Trigger 1998:10)." This underlying evolutionism, which continues to pervade archaeological thought, is rooted in the enlightenment belief in progress (Chapman 2003:5) and has become built into archaeological and anthropological perspectives on social change in the form of assumptions of "an overall tendency towards larger, more internally differentiated, and more complexly articulated structures..." (Trigger 199a:10). The springboard for what is now understood as the neoevolutionary paradigm was the mid-twentieth century work by both Julian Steward (1949, 1950, 1951, 1953; see Clemmer 1999 for thorough review) and Leslie White (1949, 1959; see Moore 1997; Peace 2004 for thorough reviews).

While White constructed a theory of "universal evolution" of society, influenced heavily by Lewis Henry Morgan (1877) and Thomsen's (1848) earlier work on progress and civilization, Steward's "multilineal" framework considered in more detail cultural and environmental contexts while still developing a more general, and nomothetic, anthropology of societal evolution. While both Steward and White laid the tangible foundations for a neoevolutionary framework, their students, Elman Service, Marshall Sahlins, and Morton Fried really established the founding principles, especially in the form of Sahlins and Service's (1960) *Evolution and Culture*. Service (1962) used the ethnographic record to define four types of societies (bands, tribes, chiefdoms (original termed by Oberg 1955), and states) while Sahlins continued to illuminate the qualities of tribes and chiefdoms and to identify evidence that supported the evolution from the former to the latter (Sahlins 1958, 1968). Fried, building on this classification system, but

focusing more on political qualities, introduced the egalitarian, ranked, stratified, and state societies (Fried 1967). From here on, as Chapman (2003:39) outlines, social evolutionism situated archaeological agendas towards 1) the identification and study of social organization and types known from the ethnographic record and 2) the development of theory to understand the process of social evolution (e.g. Binford 1972; Binford and Binford 1968; Saxe 1970).

Since these developments, the concepts, analytical frameworks, and abstractions of sociopolitical realities set forth by mid-twentieth century researchers have been adopted almost as archaeological canon. Of particular interest to the current study, and building from these foundational studies, is the development and evolution of the chiefdom concept denoting a sociopolitical organization intermediary between tribes and states whose relational structure remained predicated on kinship but was characterized by a permanent, hierarchical political structure of social ranking (Service 1962). Stemming primarily from ethnographic analogy (Chapman 2003:39), it wasn't long before archaeologists began to search for material correlates of such organizational structures in the archaeological record. What resulted from these efforts were societal trait lists of dozens of material indicators of social phenomena (e.g. Creamer and Haas 1985; Peebles and Kus 1977; Renfrew 1972, 1974). When variation in the combination of these traits became too significant to ignore and too enigmatic to fit into the essentialized chiefdom form, typological subdivisions were drawn, splitting the chiefdom concept into a hoard of over dozens of new sociopolitical forms (e.g. Carneiro 1998; Cherry 1978; Cordy 1974; Nelson 1995;

Renfrew 1974; Wright 1984). The archaeological record of the southeastern United States has not been spared from these efforts at typology building, indeed researchers from the U.S. Southeast have contributed significantly to advancing the use of such concepts and frameworks (e.g. Anderson 1994; Beck 2003; Blitz 1999; Hally 1993, 1996). Admittedly, the ethnohistoric record for the southeastern United States is, in many ways, consistent with many of the defined chiefdom characteristics including hereditary leadership positions and institutionalized socioeconomic inequalities.. Nevertheless, these concepts have been deployed, in many cases, quite uncritically to the archaeological record and extended back in time by up to six centuries, far beyond their utility as absolute, justified sources of analogy.

Criticisms and reviews of these approaches are far from recent phenomena. Indeed, almost as soon as neoevolutionary concepts were applied to archaeological work, they were subject to intense scrutiny. While not completely reacting against a neoevolutionary framework, many archaeologists attempted to connect these organizational schemes to political and economic processes, especially those related to the emergence of chiefdom level societies (e.g. Flannery 1972; Johnson 1978, 1982; Peebles and Kus 1972; Reynolds 1984; Steponaitis 1978; Wright and Johnson 1975; Wright 1977, 1986). Along with these studies that sought to establish a more process-based understanding of organizational forms, an even more critical body of work developed that focused on identifying and highlighting social, political, and economic variation that could not be accounted for under a uniform neoevolutionary framework.

Indeed these studies sought to liberate classificatory socio-evolutionary types from their proverbial black boxes through intense, cross-cultural comparative exercises (e.g. Arnold 1985; Earle 1991; Feinman 1991; Feinman and Neitzel 1984; Gregg 1991; Steponaitis 1991; Upham 1987, 1990; Zeidler 1987). Despite these efforts, a common vocabulary for the description, identification, and comparison of sociopolitical forms failed to emerge as neoevolutionary frameworks continued to structure archaeological research, even research that explicitly attempted to critique its guiding concepts and principles. Furthermore, while many of these studies attempted to address issues of organizational change and transformation, most took as their referent the development and emergence of complexity as a reified social characteristic.

Archaeologists have generally been unable to disassociate a theoretical understanding of the development of inequality, identity, hegemony, and government from metaphors of social evolution (Pauketat 2007:4). In regards to the deductive approaches to archaeological investigation that have emerged from these neoevolutionary frameworks, Pauketat (2007:43) has argued that “any meager, coarse-grained data can fit into the latest political economic model...which translates into self-fulfilling research designs.” As an example, he references research on Mississippian societies in which variation becomes hidden by concepts that artificially synchronize chronologies and that collapse organizational variability into a unified “Mississippian Chiefdom” (Pauketat 2007:43). With the use of overly-generalized societal building blocks (e.g. Mississippian household, Mississippian community, Mississippian chiefdom),

neither scale nor history retain any importance as organizational variability, arguably a function of both scale and history, is noted and then ignored (Pauketat 2007:48). In this way, types are attempts to represent reality, rather than reality itself (Yengoyan 1991) as our concepts continue to stand as obstacles to understanding what really happened in the ancient world (Moore 1994; Pauketat 2007:2). The types, concepts, and attributes that have been proposed over the last century to organize research on organizational structures and social change are all inherently abstractions of relationships and relational organizations. What is called for, yet remains elusive, are frameworks and perspectives that move beyond concepts and towards more relational, inductive understandings of organizational structures and their role in affecting social change and driving sociopolitical development.

This Study

This study employs a conceptual framework that attempts to highlight and evaluate the underlying structures that connect members of a society. When terms such as tribe or chiefdom are employed, they bring from the top-down a number of assumptions about the relational structure of society, that is, the organization and quality of the relationships that constitute the organizational structure in question. To achieve a framework that can bypass these abstractions and bear directly on the relationships themselves, I have turned to a perspective rooted in collective action and social networks. First, I briefly outline two

alternative frameworks that adopt relationships as their primary referent for investigation, namely Marxist approaches and those rooted in theories of practice and structuration. While the conceptual framework I choose to adopt here articulates well with these other relationally-situated bodies of work, it offers a number of analytical advantages over them.

Marxist perspectives on change in archaeology focus explicitly on the role of social relations in guiding change (e.g. Bender 1978, 1985; Friedman and Rowlands 1977; Kristiansen 1982; McGuire 1992, 1993; Trigger 1993). Related frameworks explicitly consider relations of power (e.g. Arnold 1995; Miller and Tilly 1984; Paynter and McGuire 1991). The best example of such an approach is presented in Eric Wolf's (1984) *Europe and the People without History*. In this volume, Wolf poses that we must understand societies and cultures as "bundles of relationships" (1984:3). Indeed the impetus for Wolf's work was his recognition that anthropologists had the tendency to conceive of cultures, societies, and even nations as bounded and integrated systems standing in contrast and apart from other bounded systems (1984:4). Regarding change, Wolf made his position clear using the United States as an example, posing that the "U.S. was never a thing propelled towards its unfolding goal by some immanent driving spring, but rather a temporally and spatially changeable set of relationships, or relationships among sets of relationships" (1984:6). Similar to Pauktetat and Robb's (2013) recent position that history is indeed the history of relationships, between individuals, groups, and materials, Marx too seemed to have been a "historian of configurations...of material relationships (not a historian of events or

a universal historian)” (Wolf 1984:21). From this perspective, “society takes its departure from real or imputed interactions among people” (Wolf 1984:76). As such, it is not a stretch to regard such an approach as being explicitly relational, and in many ways as succeeding in bypassing the tyranny of typological frameworks. Tangential to, yet easily articulated with, such Marxist approaches are those rooted in theories of practice and structuration.

Dropping the explicit concern with labor, tension, and production, structuration and practice theories offer a more generalized relational perspective, one that considers change as an inherent characteristic of society, focusing on the ways that actions and relationships between individuals and society are negotiated, maintained, and transformed (e.g. Bourdieu 1972; Giddens 1984). Indeed it would seem that these theories actually provide a more thorough definition for Marx’s “relations,” as he never explicitly defined them. In these cases, structure “is the complex of rules and resources that shape (but do not determine) social action; agents review rules and resources as objective conditions; they use them creatively to perform activities and achieve ends” (Roscoe 1993:113). These ideas about the navigation, negotiation, and production of structure, especially in relation to ‘events,’ have continued to be built upon and evaluated within historically-minded frameworks by both sociologists and archaeologists (e.g. Beck et al. 2007; Bolender 2010; Gilmore and O’Donoughue 2015; Harding 2005; Lucas 2008; Ortner 1984; Pauketat 2001; Sewell 1992, 1996a, 1996b, 2005). While social agents undoubtedly “review rules and resources” and “use them creatively to perform activities and

achieve ends,” much of the classic structuration theories remain unconcerned with the social, or relational, fields within which agents perform these activities. At the other end of this spectrum, many of the postprocessual approaches pose explicitly relational perspectives on society, even posing that “histories are not the histories of individuals, groups, or institutions, but rather the histories of relationships between individuals, groups and materials” (Robb and Pauketat 2013; Terrell 2013). Histories and organizational structures are thus inherently rooted in the formation, maintenance, and redefinition of relationships; they are the products and expressions of historical genealogies of practices (Brumfiel 2006; Robb and Pauketat 2013).

While Marxist, structuration/practice, and postprocessual frameworks all begin to approach society from a relational perspective, Nicholas and Feinman (2016:276) have recently argued that they continue to lack in 1) their scope of agency, 2) constrained scalar foci, and 3) rigidity in boundedness. Table 3.1, adapted from Feinman and Nicholas (2016:276), outlines each of the frameworks thus far discussed in terms of these characteristics. Also included in Table 3.1 is the framework built on social network perspectives and collective action that will be outlined below. In their recent book chapter, Feinman and Nicholas (2016:272) point to the recent dearth of strong theoretical explanations for the development of cultural complexity (Sabloff 2012). They propose that what are needed are comparative approaches that can accommodate and explain elements of diversity in the evolution of human institutions (Feinman and Nicholas 2016:275; e.g. Blanton et al. 1996; Blanton and Fargher 2007; Brumfiel

Table 3.1. Common frameworks used to organize studies of social and cultural development and the emergence of social complexity. Table is adapted from Feinman and Nichols (2016:276) but includes the addition of the social network/collective action framework proposed here.

Framework	Agency	Scalar focus	Boundedness
Culture History	Elite?	Culture	Closed
Cultural evolutionary systems	Elite	Society	Closed
Marxism/Marx-influenced	Elite	Society, Class (rarely)	Potentially open
Sociology (narrow Darwinian)	All	Individual, Kin	Not adequately considered
Postprocessual	Elite (situational for commoners)	Society	Mostly closed
Social Networks and Collective Action	All	Society, Community, Household, Individual	Open

1992; Chapman 2003; Earle 1997; Feinman 2012). They go on to pose that productive frameworks will, at their heart, address the following four behavioral tenants (Feinman and Nicholas 2016:276):

- 1) “The evolutionary legacy of our species has tendencies towards both dominance hierarchies and high degrees of sociality with great potentials to cooperate (e.g. Boehm 1993; Dubreuil 2010)
- 2) Agency is universal but also constrained by structure and resources (e.g. Schelling 2006; Sewell 2005)
- 3) Human groupings may be open and permeable to varying degrees, but they rarely are entirely closed for lengthy periods (Wolf 1982)

- 4) Multiscalar perspectives are essential for understanding human groups, as humans generally participate simultaneously in networks of varying scales (e.g. Parkinson and Galaty 2009; Turchin 2003)."

The first three frameworks listed in Table 3.1 "give inadequate consideration to the whys and hows of human groups, often simply presuming their existence, continuity, and closure" and afford little agency to the non-elite, or most people (Feinman and Nicholas 2016:280). More recent postprocessual approaches are mostly circumstantial or situational in their considerations of agency. As a result, the opportunity to understand shifts in, or diversity of, the rules and practices of cooperation and collective action are lost (Feinman and Nicholas 2016:280). The following approach attempts to remedy the shortcomings of these extant approaches by serving as a framework that "not only takes account of the multiple, scalable, and interlinked networks in which humans participate, but also recognizes that human groups and networks rarely have been entirely isolated or closed (e.g. Adams and Kasakoff 1976)" (Feinman and Nicholas 2016:280).

In this way, a social network perspective "advocates explanations that highlight both the structural factors that govern change and the multiple pathways that change can take" (Little 2000:89). This approach advocated by Little (2000) "offers a means to account for outcomes on the basis of both social context and individual actions so that they are inherently multiscalar" (Hechter and Kanazawa 1997:208; Feinman and Nicholas 2016:281). As Feinman and Nicholas (2016:281) argue, and as I argue below, approaches rooted in collective action and social networks can provide the foundations for constructing new frames that

are specifically structured to evaluate the diversity of complex societies while also remaining guided by the four behavioral tenets outlined above. The following framework attempts to bypass completely, without ignoring historical context, the research programs that have thus been described, especially those rooted in culture histories and social evolutionism. As Drennan (1987:320) has claimed, “advances have come less by resolving major questions than by superseding them with better questions.” In this way, I do not attempt to address questions rooted in extant perspectives, to evaluate the organization of chiefdoms, to track their development, or even to negate their existence. Rather, I provide a new framework within which new questions are posed, questions concerned with the underlying organization of societies, how those relationships are reorganized in the face of institutional transformation, and how deep historical structures shape processes of social change.

Uncertainty in the Social Sciences

In this study, I use the concept of uncertainty to articulate social networks within a collective action framework. As other researchers of Southern Appalachian prehistory have demonstrated (e.g. Cobb and King 2005; King 2003; Sullivan 2016, 2007), and as I will contribute to in Chapters 4-6, two major social transitions took place between AD 600 and 1600. The first, at roughly AD 1150 was characterized by the emergence of chiefdom-like characteristics including the centralization of political leadership, the development of important

central places, the institutionalization of socioeconomic inequalities, and the adoption of widespread religious practices. The second critical transition at ca. AD 1325/1350 was characterized by the partial collapse of these practices, and especially the collapse/abandonment of Etowah as a major central place. Here I argue that these two instances of social, political, and economic transition would have generated significant amounts of social uncertainty. As used here, uncertainty “implies a recognition of change and awareness that states of affairs are not static; they can alter drastically, for better or for worse” (Boholm 2003:167).

All societies have to cope with uncertainty, or the essential unpredictability of the future, especially in regard to situations within which unique possibilities arise or irregular occurrences are presented (Alaszewski 2015; Boholm 2003:167). Uncertainty has been argued across the social sciences to be linked to the appearance of new risks in society (e.g. Beck 1992; Giddens 2000), associated with the impossibility of calculating risks (e.g. Knight 1921; Lakoff 2008), and to be potentially governable even when the future cannot be reduced to calculable forms (Samimian-Darash 2012). From an economic perspective, uncertainty is entangled with notions of incomplete knowledge and is used to define the character of situations in which people cannot anticipate the outcome of a decision and cannot assign probabilities to outcomes (Beckert 1996). Herein lays the fundamental difference between notions of risk and uncertainty: the calculability of the future (Figure 3.1). Risk emerges in situations where both the stakes of potential decisions and the potential outcomes of the decisions are

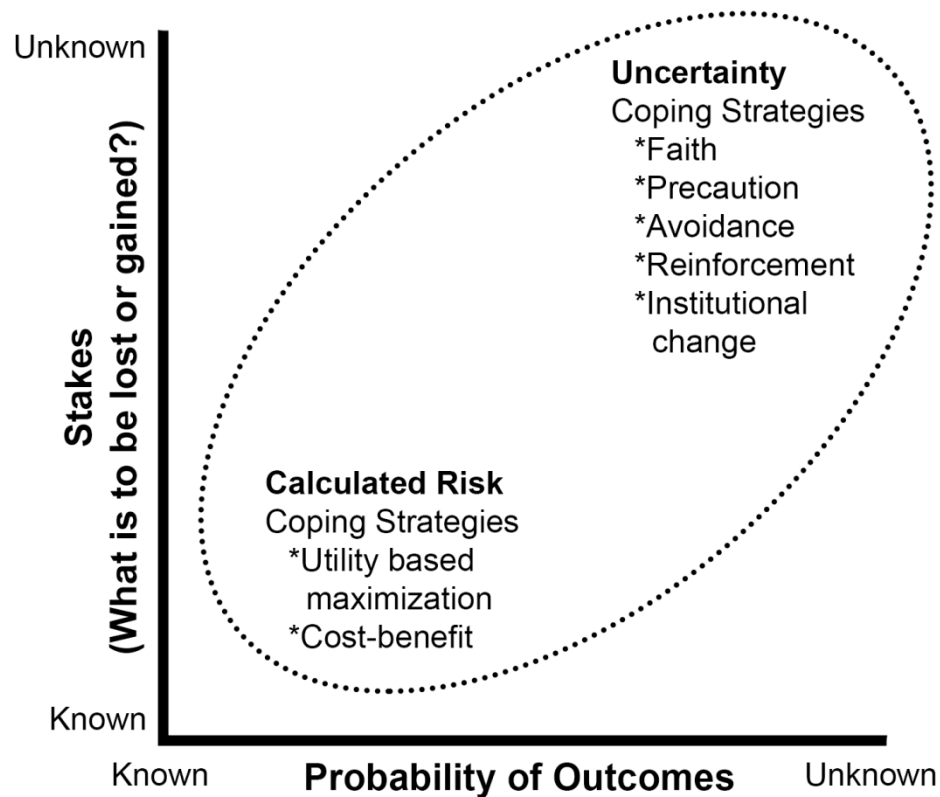


Figure 3.1. Schematic plot showing the differences between calculated risk and uncertainty (adapted from Boholm 2003).

known (Boholm 2003). In contrast, Uncertainty arises when both stakes and outcomes are not known. As such, the coping mechanisms implemented to deal with either risk or uncertainty may be fundamentally different (Boholm 2003).

While coping mechanisms associated with mediating risk will be characterized by cost-benefit analyses and utility maximization (Boholm 2003), such structured approaches cannot be applied in situations of uncertainty. Indeed, researchers have defined environmental uncertainty as situations within which actors are uncertain about the very character of a dilemma, the details surrounding the dilemma, the number of people that may be involved, the stakes held by those involved, varying interests, etc. (e.g. Messick et al. 1998; van Dijk

et al. 2004). In these cases, calculated responses cannot be generated. Instead, mechanisms deployed to cope with uncertainty will include such strategies as institutional formation or change (e.g. North 1990), precaution (e.g. Ewald 2002), prudence (e.g. Diprose et al. 2008), reliance on faith (Alaszewski 2015; Boholm 2003), or on strengthening/relying on existing structures (e.g., Gargiulo and Benassi 2000). As Beckert (1996:830) posits, an approach that moves away from rational behavioral economics will not emphasize the influence of uncertainty on decision-making, but will instead focus on the conditions/structures that people may rely on when making decisions or coping with uncertainty. Following this line of reasoning, the current study investigates the durability of social networks, and the institutions on which those networks are built, as modes by which heightened social uncertainty can be managed and mediated.

Collective Action and Social Capital

Issues of collective behaviors, especially in regards to processes of cooperation, have a long history in anthropology (e.g. Mead 1937; Radcliffe-Brown 1952) and within genealogies of social thought more broadly (e.g. Hobbes 1958 [1651]; Rousseau 1984 [1755]). By the latter half of the twentieth century, collective action as a body of inquiry had been established and built on early work dedicated to constructing rational choice models to explain cooperative behaviors (e.g. Hardin 1968; Olson 1965). The majority of work on collective action cited by anthropologists adopts evolutionary and classical economic

perspectives that attempt to understand how these behaviors emerge in the context of cooperation (e.g. Boyd and Richerson 2009; Henrich and Henrich 2006; Henrich et al. 2004). While I do not adopt such an evolutionary framework here, the modern body of work on collective action provides a number of useful concepts, assumptions, and frames of reference with which to successfully implement a relational understanding of societies, especially in the context of critical periods of transformation.

In the context of contemporary economic development, early studies on collective action (e.g. Hardin 1968; Olson 1965) concluded that the only way individuals could solve collective action problems, e.g. overcoming the tensions between individual and group interests, was by regulation by some external authority, the implementation of selective incentive programs, or privatization (Ahn and Ostrom 2002:9). More recent approaches, presented primarily within the last two decades, have begun to understand collective action in a much broader sense, including the role of collective behaviors in social change and social movements (e.g. Adger 2003; Diani and McAdam 2003) and the social relationships and organizations that underlie collective actions (e.g. Ahn and Ostrom 2002; Crowe 2007; Fukuyama 2001; Ostrom and Kahn 2007; Rudd 2000; Scholz et al. 2008; Woollock and Narayn 2000). Indeed this recognition “that social context matters for collective action (e.g. Coase 1960; March and Olsen 1984; Nee and Ingram 1998; North 1990; Ostrom 1990; Portes 1998; Sandler 2002; Smelser and Swedberg 1994; Williamson 1985) has led to the viewpoint that social relationships themselves can constitute resources that

individuals can appropriate to assist them in increasing their well-being” (Rudd 2000:132). Beyond a concern with self-interest, placing the focus instead on the practice of collective behaviors, Barnes (2001:32-33) eloquently locates the investigation of collective actions at the lived-experiences of participants:

“[Collective actions] indeed are not stable essences, but neither are they clusters of habitual individual actions. Shared practices are the accomplishments of competent members of collectives. They are accomplishments readily achieved by, and routinely to be expected of members acting together, but they nonetheless have to be generated on every occasion, by agents concerned all the time to retain coordination and alignment with each other in order to bring them about.”

The idea of collective actions as shared practices, in need of continual maintenance and generation, inherently subject to transformation, failure, or durability, should be generally palatable to the contemporary archaeologist as we are seasoned in the investigation of shared practices, including how they vary across both time and space, through the materiality of the archaeological record. From this perspective, we can understand the maintenance of traditions, the rejection or adoption of new practices, and indeed the transformation of organizational structures and sociopolitical institutions as issues of collective action. As Adger (2003:388) makes clear, the capacity to adapt is bound up in a society’s ability to act collectively. The key here is that the very capacity of social groups to act in their collective interests depends on the quality of the formal institutions under which they reside (Adger 2003; Evans 1996; Ostrom 1996; Woollock and Narayan 2000:234). “Collective action requires networks and flows of information between individuals and groups to oil the wheels of decision making. These networks [and institutions that facilitate such action] are usefully

described as an asset of an individual or a society and are increasingly termed social capital” (Adger 2003:389).

Social Capital, Institutions, and Trust

As Rudd (2000:132) cites, “there is substantial empirical evidence to support the hypothesis that norms of reciprocity, trust, and institutions matter in the production of quasi-public and pure public goods (Flora et al. 1997; Narayan and Pritchett 1997; Putnam 1993; Temple and Johnson 1998).” Indeed, collective action is undoubtedly achieved through the setting aside of immediate self-interested behaviors through a self-generating and reinforcing cycle of trust and reciprocity (Rudd 2000:133). These cycles of trust and reciprocity come into play and affect the generation and maintenance of shared practices at both the individual and aggregate scales of society. For instance, at the individual level, rules and norms resulting in trust and reciprocity lead to the formation of reputations, important resources that can lead to the reduction in transaction costs associated with the exchange and sharing in situations of information asymmetry (Ostrom 1998; Rudd 2000). At the group level, increased returns to participation in shared practices are achieved through an increase in the level of generalized social trust (Fukuyama 1995; Putnam 1993) and through the institutionalization of mechanisms of trust, reputation, and reciprocity (North 1990). A major component in the construction of such cycles of trust and reciprocity, especially in the reduction of transactions costs associated with the

sharing of information and exchange of resources, is the development of institutions that actually provide incentives for lasting coordination (Coleman 2000; North 1990; Ostrom 1999; Rudd 2000; Woollock 1998). The concept of trust however does not refer to a particular action or process (Hardin 2002:58-60). Rather, action results from trust (Ahn and Ostrom 2002:11). Cooperation represents the standard term often used to characterize the actions resulting from trust in the context of collective action situations, in which a “conditionally cooperative individual acts on a belief that others would also cooperate” (Ahn and Ostrom 2002:11). In the context of the study presented here, we might conceptualize this product of trust more generally and from a materially-based perspective, whereby shared practices emerge from cycles of trust and reciprocity enacted through social networks and institutions which we may term, as others have done, social capital. When any of these are altered, trust becomes weakened, as uncertainty about new relationships and the future of social, political, and economic life becomes ambiguous.

At its foundations, social capital describes 1) relations of trust, reciprocity, and exchange, 2) the norms and networks that enable people to act collectively, 3) and institutions that generate and sustain these norms and networks (Adger 2003:389; Woollock and Narayan 2000:391). In general terms, theories concerning social capital provide explanations for how individuals and groups employ their relationships to others for their own, and the collective, good. As used here, the collective good, including shared practices and effective mechanisms of coping with uncertainty in the face of societal transformation, has

both material elements and “wider spiritual and social dimensions. Hence social capital captures the nature of social relations and uses it to explain outcomes in society” (Adger 2003:389-390). As such, social capital as an organizing concept becomes particularly useful when deployed in an explicitly historical framework, concerned with how the deep historical roots of relational structures shape organizational outcomes and institutional change.

This focus on change and persistence through time becomes especially clear in the context of social capital definitions more commonly offered by economists and political scientists. For instance, Ahn and Ostrom (2002:4) define social capital as “a set of values and relationships created by individuals in the past that can be drawn on in the present or future to facilitate overcoming social dilemmas. As the basic forms of social capital, trustworthiness, networks, and institutions serve as independent inputs to economic and political processes and outcomes.” In this same vein, van Staveren and Knorringa (2007:112) define social capital as “the set of social relations that enable actors to gain, maintain, or expand access to economic resources that may lead to the reinforcement of the productivity of these economic resources.”

In contrast, Fukuyama (2001:7) poses that social capital is instantiated in actual human relationships, activated only through cooperation between two or more individuals. As such, he argues that trust, networks, and institutions do not in fact represent forms of, or constitute, social capital, but instead arise as a result of social capital (Fukuyama 2001:7). He goes on to conclude that a society can be thought of as a series of “overlapping and concentric radii of trust, from

friends to cliques to organizations to religious groups” (Fukuyama 2001:8) each with associated norms, networks, and institutions resulting from, articulating with, and reinforcing forms of social capital that facilitate collective action, shared practices, and the mechanisms through which social change and transformation can be mediated collectively. While Ostrom and Kahn (2007:8) concede that trust itself cannot be conceived of as social capital, but rather as an outcome of social capital, they argue that trust represents the “core link between social capital and collective action” and that “trust is enhanced when individuals are trustworthy, are networked with one another, and are within institutions that reward honest behavior.” Approaches referencing social capital thus shift the focus of analysis from the behavior of individuals towards patterns of relationships between individuals, groups, social units, and institutions (van Staveren and Knorringa 2007:113).

Given this understanding of social capital, what remains to be outlined is what is meant by social networks, relationships, or relational organizations/structures. Before doing so however, it’s also important that we unpack the term institution. To summarize the above, social capital can be understood as a generalized trust formed largely as a byproduct of the activities of individuals interacting with each other within voluntary or informal associations (Fukuyama 1995; Inglehart 1997; Putnam 1993; Rudd 2000). As such, it consists of both the norms and networks that facilitate collective action for collective benefit (Burt 2000; Coleman 1987; Granovetter 1985; Nee and Ingram 1998; Ostrom 1999; Portes and Sensenbrenner 1993) and the institutional

infrastructure that facilitates the development of trust, cooperation, and trade between individuals who would otherwise remain socially isolated (North 1990, 1998; Rudd 2000; Williamson 1994). Indeed while norms, rules, institutions, and networks are seen here as facilitating collective actions, they also act as inputs to collective behaviors by constraining certain opportunities and thus increasing the probability of collective action to deal with change (Rudd 2000:135). I follow Rudd (2000:133-134) and others in understanding institutions as

“human artifacts, crafted and revised over generations (Ostrom 1997). They help humans cope with environmental complexity by providing the infrastructure that allows humans to develop and propagate formal and informal norms and rules across generations. Institutions allow people to interact with reasonable confidence in the predictability of their actions. When institutions contribute to successful achievements of aspirations, a feedback mechanism reinforces the norms and rules within the institution. Institutions thus evolve over time as humans modify the rules of the game in response to changing physical conditions, technology, and shifting value (North 1990; Hodgson 1993; Ostrom 1997)”

Given this perspective on institutions, I work under the impression that societies which “develop successful institutions, solve social dilemmas, and produce increased levels of public goods do indeed gain tangible benefits that can provide them a competitive advantage and lead to increased levels of social, economic, and political success” (Rudd 2000:134). Indeed, this seems to be especially true when the benefits of establishing strong institutions include prosperity, enhanced political stability, and increased societal knowledge about the world and processes of social transformation (Rudd 2000:134). As such, an investigation of the scale, structure, and history of social networks, and thus the institutions on which those networks are driven, should allow a perspective on

social change and sociopolitical transformation that emphasizes the role of relationships in shaping these processes and determining organizational outcomes.

Social Networks

In this section I articulate the literature on collective action and social capital in the context of a social network perspective. The network perspective I present represents neither a set of middle range theories on social phenomena nor a grand theory from which the world can be explained. Rather, the perspective outlined here represents a type of analytical ontology within which the onus of explanation, interpretation, and investigation rests primarily on the study of relationships between peoples, groups, entities, etc... No matter the particular components, studies adopting such a framework focus on the characteristics of the relationships and connections between components rather than on the surficial attributes of the components themselves. After a brief overview of this approach, and the difference between such an approach and more traditional categorical approaches, I present an integrated framework for understanding the relationships between social networks, collective action, social capital, and social change.

A Social Network Approach

An engagement with social networks in social science research is inherently a practice in both method and theory simultaneously. As Wasserman and Faust (1994:3) point out, social network methodologies have developed over the last seven decades as an integral part of advances in social theory while many of the key structural measures and concepts of social network analysis are founded in the research of those attempting to describe empirical phenomena motivated by central components of social theory. An explicitly social network perspective thus encompasses theories, models, and applications expressed in terms of relational concepts or processes which recognize relations, defined by linkages among entities, as fundamental components of network theories (Wasserman and Faust 1994:4). Wasserman and Faust (1994:4) outline the following principles that distinguish social network analysis and a network perspective from other approaches:

- 1) Actors and their actions are viewed as interdependent rather than independent, autonomous units
- 2) Relational ties (linkages) between actors are channels for transfer or “flow” of resources (either material or nonmaterial)
- 3) Network models focusing on individuals view the network structural environment as providing opportunities for or constraints on individual action

- 4) Network models conceptualize structure (social, economic, political, and so forth) as lasting patterns of relations among actors

Thus the main difference between social network approaches and non-network frameworks is the inclusion of concepts and information on relationships among units within a study (Wasserman and Faust 1994:6). Whether a study seeks to understand the actions of individuals in the context of structured relationships, or attempts to study these structures directly, network analyses operationalize structures in terms of networks of linkages among units (Wasserman and Faust 1994:6). Thus regularities or patterns in interactions give rise to structures (Wasserman and Faust 1994:6). Already, we can draw parallels between a social network perspective and the relational perspectives offered by the structuration/practice theorists discussed above, especially in terms of the historical contexts of relationships and the structures they continually generate (e.g. Bourdieu 1972; Brumfiel 2006; Giddens 1984; Pauketat 2004, 2013; Robb and Pauketat 2013; Sewell 2005). Unlike these approaches however, a social network perspective provides the appropriate methodologies to operationalize these relational concepts and frameworks.

Scott (2013:2-3) defined two broad categories of data in the social sciences: attribute data and relational data. Attribute data refers to the properties, qualities, and characteristics that belong to entities while relational data refers to the ties, contacts, and connections which relate one entity to another and so cannot be reduced to the properties of the individual entities themselves. These relations are not properties of the entities themselves, but of systems of entities;

they connect pairs of entities into larger relational structures (Scott 2013:3). As such, relational data is most appropriate for facilitating network analyses and perspectives. What becomes clear is that cultural evolutionists, and their enduring legacy, have attempted to collect relational data as attribute data in order to generate static, essentialist understandings of societies that should be more appropriately represented as dynamic relational structures. These archaeological traditions have sought to measure particular attributes of societies in order to generalize and essentialize their true relationally constituted organizational structures. In contrast to these perspectives that focus solely on the categorical attributes of individual and collective actors, network perspectives offer a powerful way of describing organizational structures (Emirbayer and Goodwin 1994:1413).

Social network research is not, however, a unitary theory or set of methods; it remains “a constellation of diverse methodological strategies” while as a paradigm it remains a “loose confederation of approaches” (Burt 1980; Emirbayer and Goodwin 1994:1414). Where all of these diverse approaches converge is on their implicit assumptions about the relationships between individuals and society, between micro and macro processes, and the structuring of social action by objective supra-individual patterns of social relationships (Emirbayer and Goodwin 1994:1414). Thus the major difference between classic approaches and network approaches is the network perspective’s “anticategorical imperative” which “rejects attempts to explain human behavior or social processes solely in terms of the categorical attributes of actors” (Emirbayer

and Goodwin 1994:1414) and thus rejects explanations of social behavior “as the result of individuals’ common possession of attributes and norms rather than as the result of their involvement in structured social relations” (Wellman 1983:165). In essence, a network perspective shields against an appeal to categories to explain why people behave the way they do (Emirbayer and Goodwin 1994:1415). In this way, structures need not be treated as “black boxes” (e.g. tribe, chiefdom); they can be parsed into their constituent elements of entities and relations (Emirbayer and Goodwin 1994:1418).

Both the structure of relationships and the location of actors in a network have fundamental consequences for both the individual units and for the system as a whole (Knoke and Kukinski 1982:13). Because of these structural properties, appeals to specific features of the interconnectedness of elements can be leveraged to offer explanations of the behaviors of network elements (Lauman 1979:349). Thus, network and relational approaches build explanations “from patterns of social relations; they capture causal factors in the social structural bedrock of society, bypassing the spuriously significant attributes of [entities] temporarily occupying particular positions in their [relational] structure” (Burt 1986:106). Put another way, while behavior and process must be explained with reference to networks of social relations, explanations themselves are generated by the description and evaluation of relational properties as these properties themselves structure observed behaviors and processes. Relational approaches focus on connections among actors and thus explain behaviors and processes through the fact of social connectivity itself—including through

evaluations of density of connections, strength of ties, symmetry and size of organizational structure, the positions of particular entities within these structures, etc. (Emirbayer and Goodwin 1994:1419). The results of network analyses are not guided by the preexisting properties and attributes of its component entities. For example, if an actor occupies a central location in his/her network, it does not follow that that actor occupies this role because s/he is a central actor. Rather, a relational explanation posits that the actor is central *because* of his/her location in the network. This perspective upends explanatory frameworks that move from interpreting importance as centrality towards a framework that interprets centrality as importance. Thus, to utilize an archaeological example, a large community of demonstrated sociopolitical importance is not necessarily a central actor because of some *a priori* sociopolitical importance. This explanation is circular. Rather, its centrality in regard to its network, its quality and number of relations, can be used to describe and evaluate its emergence as an important sociopolitical entity.

Social Networks, Social Capital, and Collective Action

A collection of themes that archaeologists have just begun to explore using social network perspectives includes cooperation, collective action, and social movements (e.g. Borck 2016; Feinman and Nicholas 2016; Peeples 2011). Archaeological research engaging with collective action has grown rapidly in the

last decade (e.g. Blanton and Fargher 2007, 2009, 2012, 2016; Carballo 2012, 2013; Carballo and Feinman 2016; Carballo et al. 2014; Fargher 2016; Feinman 2017, 2012; Roscoe 2009; Stanish and Levine 2011). While there now exists a well-developed body of archaeological work on collective action, this work remains bound to issues of cooperation within the context of rational choice theories and evolutionary perspectives on human groups (e.g. Boyd and Richerson 2009; Henrich and Henrich 2006; Henrich et al. 2004; Olson 1965; Ostrom 1990, 2000, 2007, 2010). As Peeples (2011:24-25) highlights however, among relational sociologists, collective action has most frequently been considered within the realm of research on political mobilization and social movements (see Polleta and Jasper 2001). From this perspective, the primary question shifts from why collective action occurs to how dispersed populations are able to coordinate action across time and space to successfully negotiate fundamental changes within a particular social setting (e.g. Diani 1992; McAdam et al. 2001; Tarrow 1998; Tilly 1979). Peeples (2011) uses social network perspectives and analyses to evaluate the collective production of identity in the context of social transformations that he characterizes as social movements. Borck (2016:14) defined social movements as a specific type of contentious politics that are often investigated with a focus on why and how groups mobilize to enact religious, ideological, and political change. Borck's study thus utilizes a relational framework, within an historical perspective, to evaluate how political and ideological structures were maintained and transformed.

In the introduction to an edited volume on the relationships between social movements and networks (Diani and McAdam 2003), Diani (2003:1) defines social movements as resembling “strings of more or less connected events, scattered across time and space” and posits that entities supporting these movements do so not as atomized or isolated actors, but as actors linked through complex webs of direct or mediated interactions. Thus processes of collective action, or the coordinated mediation of social changes, are structured by social networks (Booth and Babchuk 1969; Obershcall 1973; Pickvance 1975; Pinard 1968; Snow et al. 1980; Tilly 1979) as a variety of network characteristics, including the qualities and organizations of both relationships and nodes, play fundamental roles in shaping and defining engagement (Centola and Macy 2007; Diani and McAdam 2003; Gonzalez-Bailon 2013; Gould 1991, 1993; Granovetter 1973, 1978, 1982; Macy 1991a, 1991b; Marwell et al. 1988; Oliver 1984; Oliver and Marwell 1988; Oliver and Pahl 1988; Oliver et al. 1985; Opp 1989). Thus networks invariably affect the levels of collective performance that different social units can achieve (Diani 2003:11), including the structuring of opportunities for communication which bear directly on the evaluation of collective processes (Hedstrom 1994; Hedstrom et al. 2000). While current archaeologies of collective action, rooted in evolutionary frameworks and rational economic contexts, attempt to address the “whys” and “whats” of collective action in the past, a consideration of collective action in the context of social networks and relational organizations can move us towards the “hows.”

One way of moving towards the ‘hows’ of collective action is to investigate the kinds of social capital available to members of society, the scale at which this capital is produced and leveraged, and its relationship to social, economic, and political institutions in the context of major social transformations. This is exactly the type of investigation offered here using the Southern Appalachian case study. To do so, I call upon a social network perspective, and the accompanying analytical and methodological strength of such an approach, to address these issues.

In the context of contemporary economic development studies, Scholz et al. (2008:405) do well to point out that:

“The currently dominant paradigms in political science focus primarily on characteristics of individuals or formal institutions that contribute to the solution of collective action problems. Network approaches take us another step toward a comprehensive understanding of these dilemmas, providing precise tools for analyzing the role of informal relationships and self-organizing networks in mediating between individuals and institutions.”

This understanding becomes especially important when we accept that social capital is a “necessary glue” for maintaining adaptive capacity, especially in the context of unforeseen and transformative events and that the prevalence of different types of social capital may be important at different times to different social groups situated at different sociospatial scales (Adger 2003:392; Burton et al. 1993). For this study, I draw on an extensive body of literature (outlined in Chapter 7) that has come to identify different types of social capital and that has articulated the relationships producing each type of capital with the structures of

social networks (e.g. Coleman 1987; Crowe 2007; Putnam 2000; Woollock and Narayan 2000).

The last point to be made is on the role of history in understanding social capital and on influencing the relational structure of social change. In Gargiulo and Benassi's (2000) study of managerial organizations, they found that relationships cemented through years of common organizational history may outlive the specific contexts in which they arose (and may in fact become a liability for leaders and for the organization). Indeed, if changes to institutional contexts are not drastic enough, old relationships may remain strong (Gargiulo and Benassi 2000:18). Similar to van Staveren and Knorringa (2007), Gargiulo and Benassi (2000:19) point out that the environments created by overly cohesive networks may have detrimental effects on cooperation as it may hinder opportunities to develop social ties necessary to initiate and sustain cooperation beyond the bounds of the existing network. Thus, the tradeoff is between networks that guarantee the 'safety' of cooperation, and those that secure the 'flexibility' to adapt the composition of the network as necessary to coordinate new interdependencies (Gargiulo and Benassi 2000:20). Given these features, managers and leaders tend to seek the safety of cohesive networks in situations of uncertainty when, at the same time, flexibility remains crucial to enacted organizational change and taking advantage of opportunities (Gargiulo and Benassi 2000:20). Coming back to the main point of this discussion, the histories of these networks and relationships, e.g. previous socialization in a different organizational culture, will have a big impact on how organizations are able to

change, transform, and adapt to uncertainty. Indeed, mechanisms of informal control, rooted in deep organizational histories, coupled with the tendency towards wanting 'safe' cooperation in the context of change and uncertainty, may cement interpersonal bonds and curtail an organization's ability to effect change (Gargiulo and Benassi 2000:20). As such, being able to track relational structures, forms of social capital, and institutions through time is necessary for understanding how sociopolitical organizations develop, evolve, and are maintained.

Key Points

From the above discussion, a number of key points are summarized that guide the remainder of this work:

- 1) Through a collective action perspective, we can move towards more bottom-up approaches that emphasize not only the relations that underlie social and political organizations but those relations constituted by diverse members of society, not just those established between elites or a ruling class.
- 2) Access to social capital, including cycles of trust, reciprocity, and exchange, remains the cornerstone of collective action processes. In the context of shifting political landscapes, access to diversified pools of social

capital could be used to effectively manage social change and mediate the uncertainty generated by institutional turnover.

- 3) Social networks themselves, relations among actors and entities, constitute forms of social capital. The durability or flexibility of social networks can directly affect the forms of social capital available to actors in contexts of critical historical junctures.
- 4) In adopting a social network perspective to social and political organization, we adopt an anti-categorical imperative. Such an approach moves us beyond black box approaches to structures (e.g. social, political, or economic systems) and towards an approach that emphasizes the underlying relationships that actually produce institutional forms.
- 5) Moving beyond essentialized archaeological periodization and towards more real or experienced models of time and temporality is crucial for understanding processes of social change and collective action as particular actions, strategies, and events may unfold differentially across communities and regions and across decades, generations, or millennia.
- 6) Finally, when placed in a deep historical context, a collective action perspective rooted in a network approach illuminates the ways by which organizations and patterns of relationships condition change, affect sociopolitical outcomes, and buffer against uncertainty.

CHAPTER 4: CONSTRUCTING REGIONAL CERAMIC SERIATIONS

This chapter employs multiple methods of ceramic seriation, including correspondence analyses and frequency seriation, to revise the regional ceramic sequences for Southern Appalachia. In Chapter 5, the revised sequences presented here will be situated in absolute time using high-precision Bayesian chronological modeling. In this chapter and the next, I present new regional ceramic chronologies for both eastern Tennessee and northern Georgia that include formal, attribute-based seriations interpreted within a Bayesian chronological framework. As new data and new analyses will undoubtedly continue to contribute to reevaluations of any ceramic chronology, the analytical framework and models outlined here offer an avenue for future ceramic and radiocarbon datasets to be formally integrated with extant datasets to quantitatively reevaluate these sequences. Because changes to ceramic attributes, especially surface decorations and tempering agents, have remained intimately tied to culture-historic frameworks that highlight and define critical societal transformations, the resulting chronologies also provide the opportunity to re-evaluate the timing and tempo of particular social, political, and economic changes. The following study differs significantly from previous seriation efforts in 1) its combination of multiple formal seriation methods; 2) its consideration of technological and stylistic attributes in place of types; and 3) its use of ceramic assemblages from geographic scales magnitudes larger than previously considered.

Southern Appalachian Ceramic Sequences

Below are descriptions of the ceramic sequences for northwestern Georgia and eastern Tennessee. These include 1) short histories of ceramic studies in each region and 2) descriptions of traditional ceramic types and their temporal ranges. The histories of investigations related to the construction of ceramic sequences in each region vary substantially and are important to understand for their respective impacts on the resulting chronologies. The first major difference between these histories is the contrast in the centralization of ceramic studies. The Tennessee Valley Authority was established in 1933 and all of the reservoir projects that eventually formed the basis for the eastern Tennessee ceramic sequence were managed and directed primarily by William Webb, Thomas Lewis, and Madeleine Kneberg working together as a single team. Because of this, the organization and interpretation of ceramic data in Tennessee was standardized early on. These standardized practices have continued to this day. In northern Georgia however, chronology-building efforts were not as centralized, as no single institution or individual was tasked with organizing and managing archaeological projects across the region. While Robert Wauchop completed a survey of the entirety of northern Georgia, individual reservoir and site-based projects by Joseph Caldwell, William Sears, and Arthur Kelly resulted in a number of discrete datasets that were evaluated against one another primarily through personal correspondences between researchers. Additionally, the northern Georgia sequence remains inherently

more ambiguous due to its position within its cultural landscape, situated between a number of culture-historic frontiers including the Upper Savannah River valley, the Appalachian Summit and North Carolina Piedmont, southeastern Tennessee, and its connections to regions in Alabama, middle and southern Georgia, and even the Gulf of Mexico via the Chattahoochee River.

The last notable difference between the ceramic sequences of northern Georgia and eastern Tennessee is the use of typologies versus attributes. The history of ceramic investigations in eastern Tennessee has generally remained concerned with assemblage-level frequencies of particular surface decorations and tempers. In northern Georgia, the use of particular ceramic types often overshadows a critical understanding of the distribution and frequency of particular surface treatments and tempering practices. Each of these differences has implications for understanding the basis of each region's ceramic sequence and for interpreting results of subsequent re-analyses. As this study incorporates archaeological work conducted in separate states and by separate institutions, many different terms and names have been used to describe ceramic artifacts across modern political boundaries. Table 4.1 summarizes the most common ceramic types found across Southern Appalachia and includes traditional type names, the temper and surface treatment used to define these types, and where the name is usually employed (in eastern Tennessee or northern Georgia). While the following discussion is extensive, it represents the most thorough and up-to-date synthesis of ceramic studies across the Southern Appalachian region, incorporating over seven decades of archaeological work across northern

Table 4.1. Common ceramic types found across Southern Appalachia dating to between ca. AD 600 and 1600.

Type Name	Temper	Surface
Candy Creek Cordmarked	Limestone	Cordmarked
Hamilton Cordmarked		
Candy Creek Fabric Marked	Limestone	Fabric Impressed
Hamilton Plain	Limestone	Plain
Cartersville Check Stamped	Sand/Grit	Check Stamped
Connestee Check Stamped		
Woodstock Check Stamped		
Cartersville Simple Stamped	Sand/Grit	Simple Stamped
Connestee Simple Stamped		
Vining Simple Stamped		
Connestee Brushed	Sand/Grit	Brushed
Etowah Brushed		
Connestee Cordmarked	Sand/Grit	Cordmarked
Etowah Cordmarked		
Watts Bar Cordmarked		
Connestee Fabric Impressed	Sand/Grit	Fabric Impressed
Connestee Plain	Sand/Grit	Plain
Etowah Burnished Plain		
Etowah Plain		
Etowah Plain Smoothed		
Lamar Plain		
Swift Creek Plain		
Watts Bar Plain		
Wilbanks Plain		
Woodstock Plain		
Lamar Plain		

Table 4.1. (cont.)

Etowah Complicated Stamped		
Lamar Complicated Stamped		
Napier Complicated Stamped		
Swift Creek Complicated Stamped		
Swift Creek B-Complex Stamped		
Wilbanks Complicated Stamped		
Woodstock Complicated Stamped	Sand/Grit	Simple Stamped
Etowah Corncob Marked	Sand/Grit	Corncob Marked
Etowah Incised		
Lamar Bold Incised		
Lamar Incised		
Rudder Comb Incised		
Woodstock Incised	Sand/Grit	Incised
Etowah Net Impressed	Sand/Grit	Net Impressed
Etowah Painted	Sand/Grit	Painted
Etowah Polished Black	Sand/Grit	Polished Black
Etowah Red Filmed		
Wilbanks Orange Filmed		
Wilbanks Red Filmed	Sand/Grit	Slipped
Dallas Incised		
DeArmond Incised		
McKee Island Incised	Shell	Incised
Dallas Negative Painted	Shell	Negative Painted
Dallas Plain		
McKee Island Plain		
Sixes Plain	Shell	Plain

Table 4.1. (cont.)

Dallas Punctated		
McKee Island Punctated	Shell	Punctated
Hiwassee Island Complicated Stamped	Shell	Complicated Stamped
Hiwassee Island Red Filmed	Shell	Slipped
Hiwassee Island Red on Buff	Shell	Painted
McKee Island Brushed	Shell	Brushed

Georgia and eastern Tennessee. While many of the debates, issues, and frameworks discussed below are presented in more detail elsewhere, the following discussion synthesizes and interrogates ceramic sequences from much broader spatial extents and much longer temporal spans than extant reviews.

Northwestern Georgia

The majority of the northwestern Georgia ceramic sequence is based on changes in the execution, style, and quality of complicated stamping (Figure 4.1). The ceramic sequence for the time period considered here, between ca. AD 600 and 1600, usually begins with the Late Woodland Napier type, although a brief discussion of its relation to the preceding Middle Woodland Swift Creek-type ceramics is warranted. Of particular interest here is the Swift Creek B-Complex variant, understood to be a terminal manifestation of the classic Swift Creek type (Kelly 1938; Rudolph 1991:3). A complete overview of the classic Swift Creek

ceramic complex is beyond the scope of this discussion as in depth considerations can be found elsewhere (e.g. Wallis 2011; Williams and Elliott 1998). Rudolph (1991:1) and others (e.g. Wauchope 1966:58) have noted the complexity and ambiguity of the ceramic sequence in regard to the transition between Swift Creek complicated stamped types, Napier complicated stamping, and the succeeding Woodstock complicated stamping tradition. Swift Creek B-Complex stamping is characterized by teardrop and snowshoe motifs (similar to Woodstock motifs) that are executed with fine, narrow lands and grooves (Figure 4.2). Kelly (1938) originally identified this variant as a late manifestation of classic Swift Creek stamping at the Swift Creek site (9Bi3) in the uppermost levels of Mound A. While absent from the mound, Kelly (1938) also found Napier stamped ceramics at the site in the uppermost strata of the village excavations. Napier ceramics, originally defined by Jennings and Fairbanks (1940) are characterized by a fine sandy paste and fine-lined rectilinear motifs including zigzag and herringbone designs (Markin 2007) (Figure 4.2). Swift Creek B-Complex ceramics are concentrated primarily in northeastern Georgia, near the upper Savannah River valley (Rudolph 1991:21). While Napier ceramics are also found in this area, few single-component Napier sites have been identified, with the majority concentrated in Bibb and surrounding counties in central Georgia, where Swift Creek B-Complex ceramics are rare (Rudolph 1991:35) (Figure 4.3). As the Swift Creek B-Complex ceramics seem to combine elements from both classic Swift Creek and Napier ceramics (Rudolph 1991:21), it is interesting that the gradation of Napier ceramics from central Georgia northeast towards a



Figure 4.1. Examples of complicated stamped ceramic from northern Georgia. a) Napier; b) Napier; c) Woodstock; d) Etowah; e) Etowah; f) Wilbanks; g) Wilbanks; h) Lamar.

concentration of Swift Creek B-Complex ceramics also follows the general distribution of simple stamped ceramics across the region (see Birch et al. 2016; Williams 1994).

Absolute dates for Late Swift Creek assemblages have been determined from 9Ck7, Russell Cave in Alabama, and Simpson's Field in South Carolina (Bowen 1982; Dickens 1975; Griffin 1974). Dates for Napier are also known from only a handful of sites across the northern Piedmont and southern Ridge and

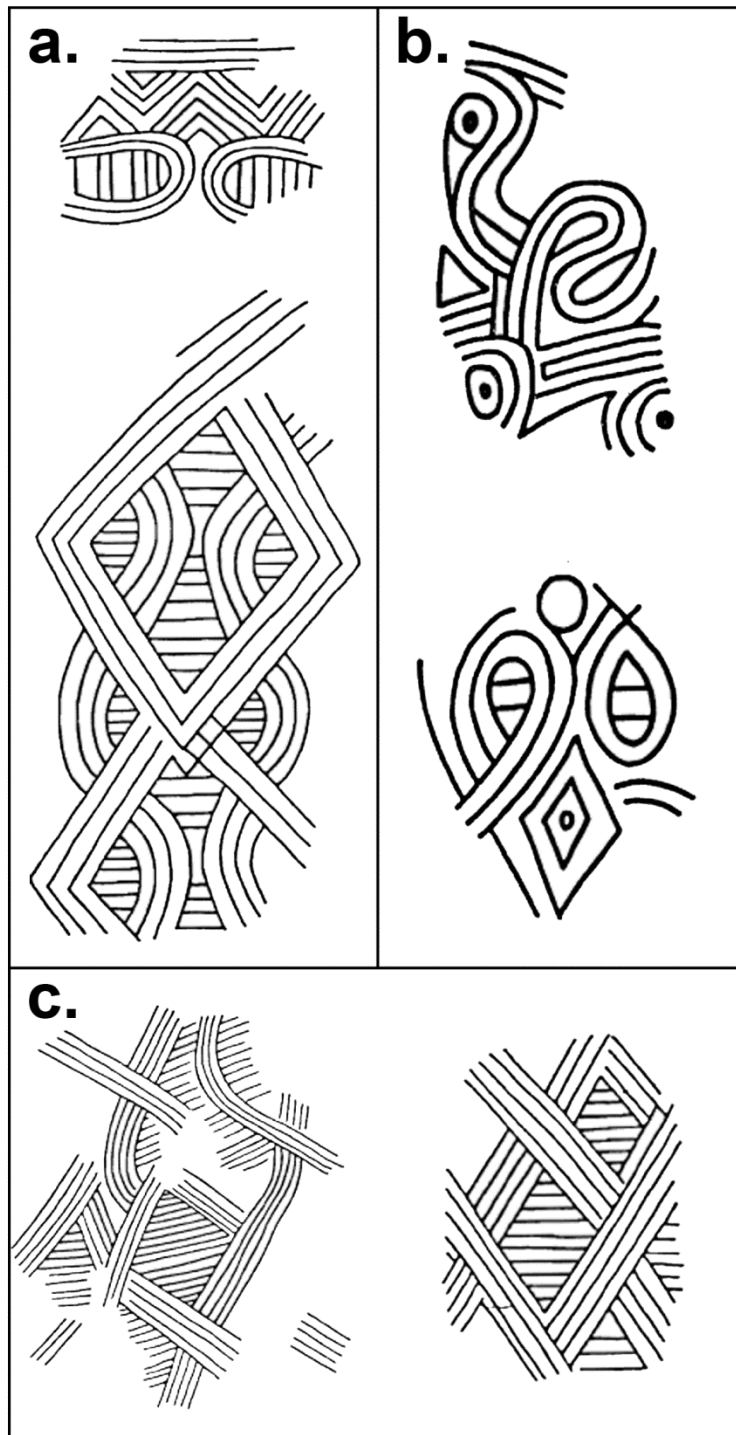


Figure 4.2. Examples of Late Swift Creek (a), Classic Swift Creek (b), and Napier (c) complicated stamped designs. Adapted from Wauchope (1966).

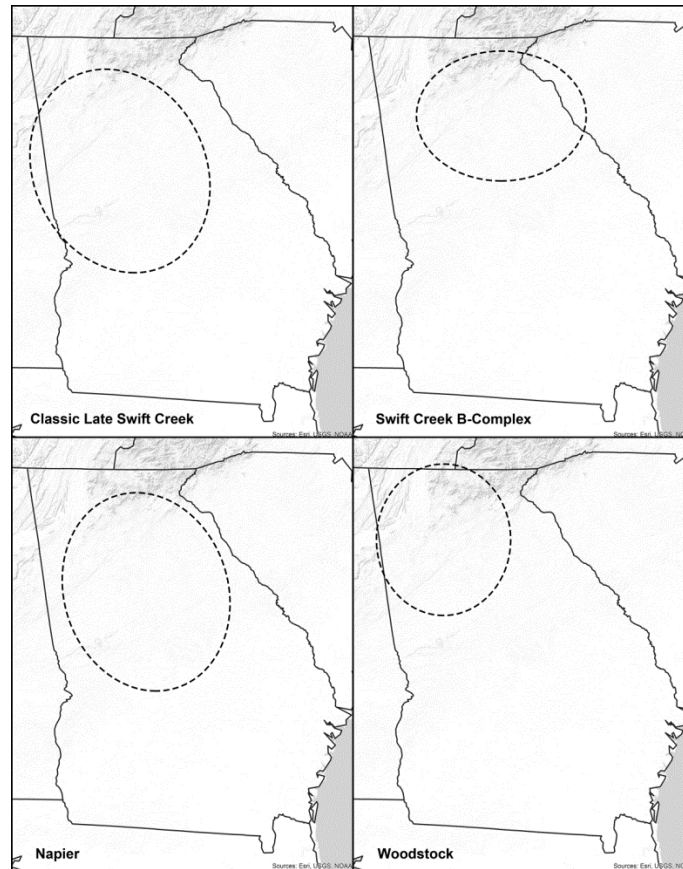


Figure 4.3. General geographic distribution of Classic Late Swift Creek, Swift Creek B-Complex, Napier, and Woodstock ceramic traditions (Rudolph 1991; Williams 2005).

Valley province including Anneewakee Creek (9Do2), Russell Cave in Alabama, and the Patrick site (9Mr40) in eastern Tennessee (Dickens 1975; Griffin 1974; Kelly and Smith 1975; Schroedl 1978b). Based on uncorrected and uncalibrated radiocarbon determinations (Rudolph 1991:19, Figure 4), the use of Late Swift Creek ceramics has been designated to have occurred between ca. AD 600 and 750 while the use of Napier ceramics has generally been understood to begin sometime ca. AD 700. As Rudolph (1991:24-38) argues in her stylistic elements analysis of classic Swift Creek, Swift Creek B-Complex, and Napier ceramic motifs, Swift Creek B-Complex stamps are generally similar to both classic Swift

Creek and Napier style stamping while classic late Swift Creek styles are similar only to earlier Swift Creek styles. Napier styles are similar only to Swift Creek B-Complex styles. While the current chronological sequence (Figure 2.3) cleanly orders Swift Creek, Napier, and Woodstock ceramics respectively, extant analyses contribute to a number of scenarios for the evolution of complicated stamping across northern Georgia: 1) a gradual transition between classic Swift Creek styles and later Woodstock styles, skipping over Napier and Swift Creek B-Complex ceramics; 2) the transition from classic Swift Creek to Swift Creek B-Complex to Napier to Etowah, bypassing Woodstock styles completely (discussed below); 3) a transition from classic Swift Creek to both Swift Creek B-Complex ceramics and Napier ceramics contemporaneously, defined in part by geographic differences; or 4) from classic Swift Creek straight to Napier styles without the transitional B-Complex styles (see Rudolph 1991 for more detailed discussion).

It has been argued that Napier stamping traditions may have evolved directly into Etowah traditions, completely bypassing Woodstock stamping traditions in some parts of the region (Birch et al. 2016; Wauchope 1966:58). While this leaves open the possibility that Napier and Woodstock ceramics may be contemporaneous, they continue to be treated as successive styles, with Woodstock ceramics transitioning from Napier ceramics. Situated between Late Woodland types (Swift Creek/Napier) (Garrow 1975; Kelly and Smith 1975) and the mature Mississippian Etowah type (Markin 2007:94), Woodstock ceramics have been referred to as both a Terminal Late Woodland type and an Emergent

Mississippian type. Despite its unique position as a marker for the period just preceding a period of major societal transformations the Woodstock period has garnered surprisingly little attention by archaeologists (but see Birch et al. 2016; Cobb and Garrow 1996; Little 1999; Markin 2007, 2015). Woodstock complicated stamped ceramics are characterized by stamps of concentric shapes (mostly diamonds) filled with horizontal parallel lines (Markin 2007:97; Wauchope 1948, 1966), micaceous pastes, and a similar inventory of vessel forms compared to preceding Late Woodland inventories including deep beakers with straight or flaring sides, globular jars, and bowls (Markin 2007:95; Wauchope 1966:60). In addition to new complicated stamped motifs and styles (wider lands and grooves and less precise execution), the Woodstock period of the ceramic sequence is also defined by the reappearance of check stamped ceramics (Caldwell 1957, 1971) as well as the use of incising and punctations (Wauchope 1966).

Early on, Caldwell (1953) proposed a temporal split between Early and Late Woodstock assemblages. Early Woodstock assemblages were defined by the inclusion of Swift Creek, Napier, and Woodstock ceramics while Late Woodstock assemblages were defined by the inclusion of both Woodstock and Etowah ceramics. Markin's (2007, 2015) recent reanalysis of assemblages from northern Georgia has proposed a similar split, but based on a motif-centric analysis and a number of radiocarbon determinations. Like Caldwell (1953), Markin (2007) poses that Early Woodstock assemblages contain more Napier and Swift Creek B-Complex sherds while Late Woodstock assemblages will contain more Etowah sherds. In addition, she argues for a general trend from the

dominance of diamond motifs in Early Woodstock assemblages towards an increase in line-block motifs in Late Woodstock assemblages (Markin 2007:94-114). Questions remain however, concerning the role of geography, society, and interaction in the distribution of Woodstock stamped motifs, as many of the assemblages identified by Markin as Early Woodstock tend to cluster around the Allatoona Reservoir. While this may simply be the result of availability and sampling of archaeological data, it is important to recognize here that both Caldwell (1953) and Markin (2007) note the regular co-occurrence of ceramic types, especially the co-occurrence of Woodstock with earlier types and Woodstock with the later Etowah type.

The next three ceramic phases, Etowah, Wilbanks, and Lamar, are known primarily from work in the Etowah River valley (Hally and Langford 1986; King 2003, 2001, 1996; Sears 1958a, 1958b; Wauchope 1966, 1948) which established detailed ceramic sequences for Etowah and a number of smaller mound and village sites and provided a strong base for understanding the broader regional sequence beyond the Etowah River valley. While many of the sites considered in this dissertation are indeed located in the Etowah River valley, sites outside of this area are also included to expand the geographic scale of analysis and to capture the relationships and connections between disparate groups across all of northern Georgia. As such, I readjust the extant chronology for northern Georgia to account for temporal variation across a larger geographic area.

The Etowah River valley chronology was first established by researchers working primarily at the Etowah site (e.g. Kelly and Larson 1957; Sears 1958a) and around the Allatoona and Buford reservoirs (e.g. Caldwell 1957, 2011; Sears 1958a, 1958b; Wauchope 1948, 1950, 1966) (Figure 4.4). Based on this work, the Etowah phase was initially partitioned into four distinct periods, I-IV, based on temper, the relative frequency of minority types, and complicated stamped motifs (King 2001:7). Etowah I assemblages (Caldwell 1953) were defined by the presence of Etowah complicated stamped and plain sherds with only ladder-based diamonds and line-block motifs represented. Etowah II assemblages (Sears 1958b), known primarily from the Wilbanks site (9Ck5), are characterized by an increase in two-bar diamond motifs along with burnished, polished, and red-filmed ceramics. These changes to surface treatments were accompanied by an increase in shell tempering (e.g. Hiwassee Complicated Stamped and Sixes Plain ceramics) (King 2001:9). Etowah III assemblages (Sears 1958b) are characterized by the dominance of two-bar diamond motifs and a decline in ladder-based diamonds. Line-block, filfot crosses, and cross-bar diamonds are also used to define the Etowah III period along with shell tempered painted ceramics, incised designs, and an increase of limestone tempering over shell tempering, although still occurring less frequently than sand tempering (Caldwell 1957:335; King 2001:9; Sears 1958b:158). Finally, the Etowah IV period (Caldwell 1957:341-342), described only from assemblages from a single site in the Allatoona Reservoir, Woodstock Fort (9Ck85) (Caldwell 2011), was characterized by two and three-bar diamonds, the dominance of filfot crosses,

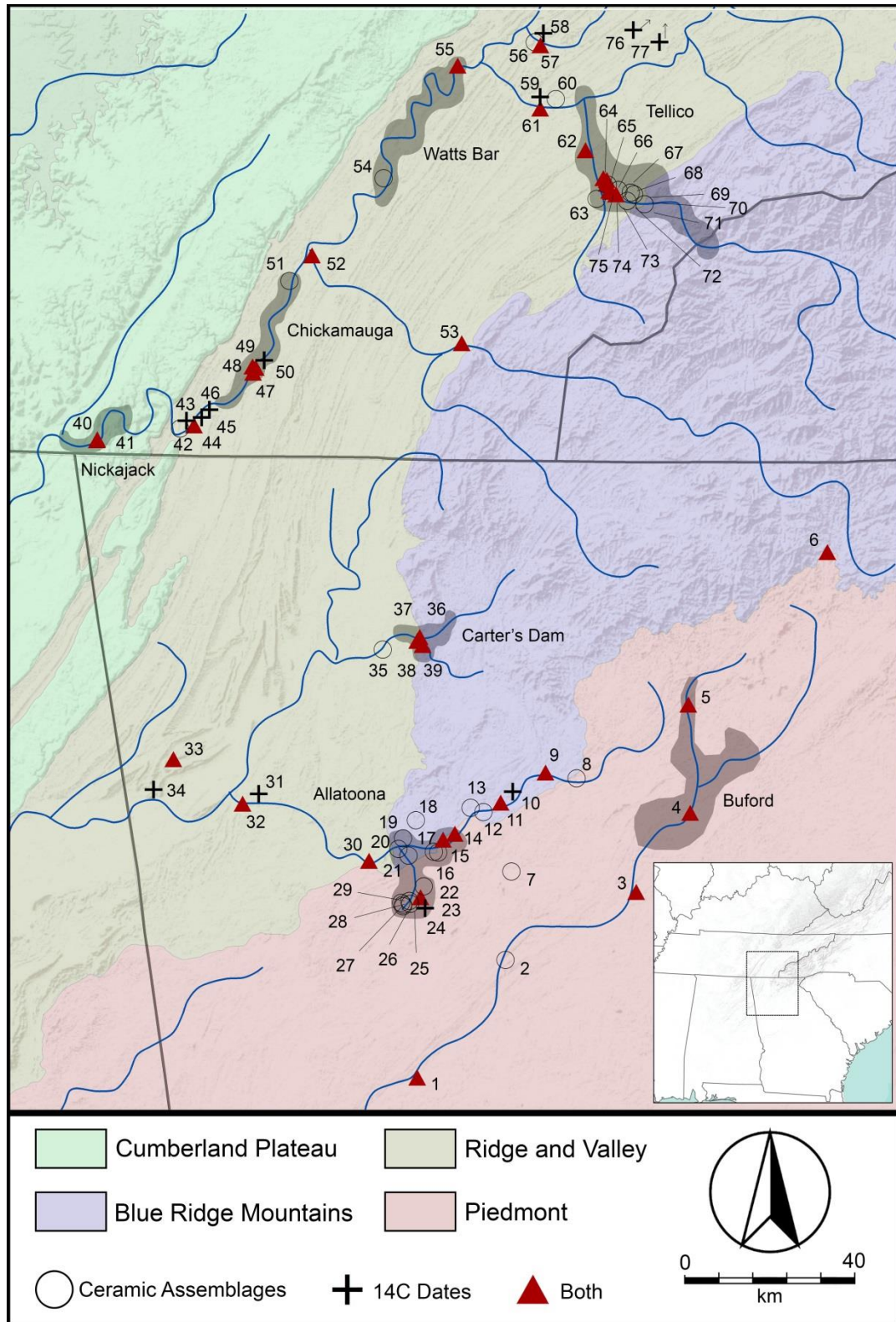


Figure 4.4. Map showing sites used in this study and depicting from which sites ceramic and radiocarbon data were available. Site names and numbers are listed in Table 2.1.

the appearance of figure-9s and 8s, the disappearance of shell tempering, and a decrease in limestone tempering (King 2001:10).

Re-analyses of the ceramic sequence, notably by Hally and Langford (1988), Hally and Rudolph (1986), and King (1996, 2001), have substantially altered the characterization and periodization of the Etowah period and form the basis of the currently accepted chronology. Hally and Langford (1988:44) were the first to propose a simplified sequence including Early and Late Etowah ceramic phases. The Early Etowah phase remains akin to Sears's (1958b) Etowah II period characterized primarily by the domination of ladder-based diamond motifs. Hally and Langford (1988) also note that to the north, in the Ridge and Valley province, this period is also characterized by shell and limestone tempering. Hally and Langford's (1988) Late Etowah phase is similar to Caldwell's (1957) Etowah III phase and is defined by a decrease in shell tempering, an increased frequency of two-bar diamond motifs, and the appearance of filfot cross motifs and incising (King 2001:11). Using assemblages from stratified deposits adjacent to Mound B at the Etowah site excavated by Arthur Kelly, King (2001) refined the occupational chronology for the Etowah site using Hally and Langford's (1988) simplified ceramic chronology. Combining stratified assemblages with averaged radiocarbon dates, King (2001:69-74) proposed a temporal range of AD 1000-1100 for the Early Etowah period ceramics and a range of AD 1100-1200 for the Late Etowah period ceramics. While King's temporal ranges now form the basis for the extant ceramic chronology, he points out that the contexts from which assemblages and dates

were analyzed actually contained Early Etowah, Late Etowah, and Early Wilbanks ceramics. These co-occurrences however were deemed the product of unintentional mixing of contexts (King 2001:69). He does however go on to suggest the possibility that the range for the Early Etowah phase may need to be revised to AD 1000-1175/1200 while the Late Etowah phase may actually date to AD 1100-1225, but these remain suggestions (King 2001:69-74).

Following the use of Etowah ceramics, are Savannah, or Wilbanks, phase ceramics. Caldwell defined the Savannah phase ceramics for the Etowah River valley as being dominated by figure 8, figure 9, and concentric circle motifs (Caldwell 2011). Sears characterized what he thought was a separate ceramic complex, the Wilbanks phase, by the co-occurrence of Wilbanks complicated stamped, plain, and shell tempered plain sherds (Sears 1958a). According to Sears, Wilbanks complicated stamped motifs consisted of bullseyes, quatrefoils, elongated Us, and scrolls (Sears 1958a). Caldwell's Savannah ceramics and Sears's Wilbanks ceramics have since been collapsed into a single phase (Ledbetter et al. 1987), and Wilbanks is often used to refer to the Savannah manifestation in the Etowah River valley specifically (e.g., King 2003). Unlike the preceding Etowah, Woodstock, and Napier complicated stamping, Wilbanks stamps are large, bold, curvilinear designs that were often heavily over stamped (King 2001:10). Additionally, Wilbanks ceramics are thicker with much coarser grit temper than preceding types. In fact, the differences between Wilbanks and Etowah ceramic seem so great (Hally and Rudolph 1986:53-57; Hally and Langford 1988:56-61; Rudolph and Hally 1985:451), that some have suggested

an intrusion of foreign populations into the region (Fairbanks 1950). The current understanding of the transition from Etowah to Wilbanks ceramics is that it happened in situ, from one to the other, outside of the Etowah River valley (Hally and Rudolph 1986:53-57; King 2001:11 Rudolph and Hally 1985:462). These interpretations were originally based on eastern Savannah period phases, specifically the Beaverdam phase, of the upper Savannah River, as well as the Stillhouse phase of the Oconee River (Hally and Rudolph 1986:53-57; King 2001:11 Rudolph and Hally 1985:462; Stephenson et al. 1996). Each of these phases is argued to exhibit ceramics that have been interpreted as transitional between the Etowah and Savannah phases. The absences of these transitional types in the Etowah River valley have since been used to argue for a period of abandonment between the Etowah and Wilbanks phases at ca. AD 1200 and 1250 (Hally and Langford 1988; King 1996, 2001, 2003).

At the Etowah site, King (2001:66) identified sherds similar in paste to Wilbanks sherds, but stamped with Etowah two-bar diamonds. He also observed diamond motifs that were more rounded, which he argues indicates a trend towards the dominance of curvilinear and circular designs in the Wilbanks phase. Given these two anomalies, King (2001:66) argues that some of the assemblages at Etowah represent the very end of rectilinear Etowah stamping. He also noted that Etowah phase ceramics have been identified in all Wilbanks contexts sampled (King 2001:50). These inclusions include sand and shell tempered red filmed, sand and shell tempered painted, and polished black, all of which have been found in Early Wilbanks contexts across the site (King

2001:50). Despite the ubiquitous co-occurrence of Etowah and Wilbanks phase types, King (2001:50) attributes this pattern to unintentional mixing of discrete contexts. Beyond changes to complicated stamping techniques and differences in paste, a number of ceramic types appear in substantial numbers during the Wilbanks phase. Cordmarked ceramics in particular occur in all Wilbanks contexts. King (2001:51) points out that these may be akin to what are referred to as McKee Island Cordmarked ceramics in eastern Tennessee and northern Alabama. Notably, the majority of ceramics at the Bell Field site (9Mu101), north of the Etowah River valley, are shell and grit tempered cordmarked (Kelly et al. 1966). Also appearing during the Wilbanks phase are multiple styles of check stamping, corncob impressed sherds, shell and grit tempered brushed sherds, and Rudder Comb Incised ceramics (Webb and Wilder 1951:255-267). Overall, the complicated stamped motifs between the Early (AD 1250-1325) and Late (AD 1325-1375) Wilbanks phases change very little (King 2001:46). Differences are mainly observed as changes to the frequency of minority types and vessel shapes (King 2001:46). For instance, Rudder Comb Incised, Lake Jackson style sherds, Pisgah style rims, Pisgah complicated stamping, peaked and noded rims, punctated nodes, lugs, and pinched rims all occur above King's "Orange Layer" at Etowah, but not at all below. It is important to note that the distinction between Early and Late Etowah as well as Early and Late Wilbanks are based only on data from the Etowah site itself.

Lamar phase ceramics are similar to the preceding Wilbanks phase ceramics. Two distinct Lamar phases were originally defined: the Stamp Creek

phase by Caldwell (1957:33-35) and the Brewster (Pumpkinvine) phase by Sears (1958b). Both are characterized by complicated stamped and plain sherds that are primarily coarse grit tempered (King 2001:11). Stamped designs are poorly executed, large motifs. Vessels are grit tempered and typically have flaring rims that have been thickened and pinched or peaked and noded (King 2001:11). A major distinguishing characteristic of Lamar phase assemblages is the appearance of Lamar Incised. Further, Lamar assemblages are characterized by a decrease in the minority types and attributes described above that increased during the Late Wilbanks phase (King 2001:59-60). At a few sites in extreme northwestern Georgia another Lamar phase, the Barnett phase, has also been defined (Hally 1970). This phase is characterized by a mixture of classic, sand tempered Lamar ceramics, and shell tempered plain ceramics similar to those of the Dallas phase in eastern Tennessee (discussed below). Starting at ca. AD 1375, the use of Lamar ceramics lasted throughout the 16th century and into the 17th century.

Eastern Tennessee

The basis for the currently accepted ceramic chronology for eastern Tennessee is rooted in data collected during the early years of TVA work across the region (Lewis 1959; Lewis and Kneberg 1946; Kneberg 1961). Since this time, more recent reservoir projects and large-scale surveys have served to refine, partition, and amend these efforts (e.g. Davis 1982; Kimball 1985; Salo

1969), but the general scheme has remained unchanged. Unlike the ceramic sequence for northern Georgia, eastern Tennessee assemblages contain little to no complicated stamped pottery. Instead, Tennessee assemblages, throughout the length of the series, are generally dominated by plain, cordmarked, fabric impressed, simple stamped, check stamped, and incised ceramics (as well as other minority types) (see for overviews Lewis and Kneberg 1946; Schroedl et al. 1990). For this reason, work on identifying temporal changes has focused less on changes to particular styles or executions of decorative motifs and more on alterations to the relative frequencies of attributes including temper and surface treatments. Indeed, the most updated sequence is currently based in part on statistical work by Kimball (1985). While originally designed for the analysis of surface collections in the Lower Tennessee River valley (Davis et al. 1982), their work represented the first real attempt to modify Lewis and Kneberg's (1946) original sequence. To do so, they characterized sherd assemblage profiles using statistical clustering methods based on surface treatment and temper (Kimball 1985; Schroedl et al. 1990:179). Using 38 assemblages from 8 sites for the Woodland period and 73 assemblages from 11 sites for the Mississippian period, Kimball (1985) combined results of cluster analyses with radiocarbon data to refine the chronological placement of particular ceramic attributes and, more specifically, the frequency of attributes.

The Middle Woodland Candy Creek phase (Lewis and Kneberg 1946; Lewis et al. 1995) and the Connestee phase of western North Carolina (Keel 2001) form a continuum with the Late Woodland phase in eastern Tennessee.

Known primarily from the Icehouse Bottom site (Chapman 1973; Cridlebaugh 1981), the Patrick site (Schroedl 1978b), the Higgs site (McCollough and Faulkner 1973), and the Garden Creek site in North Carolina (Keel 2001), the Middle Woodland-Late Woodland continuum is characterized by a majority of limestone tempered plain, fabric impressed, and cordmarked sherds. Occurring in substantial quantities, but less frequently, are limestone tempered check stamped, simple stamped, and complicated stamped, and a number of sand tempered wares including plain, fabric impressed, check stamped, simple stamped, and complicated stamped. The Late Woodland portion of this continuum is argued to have lasted between ca. AD 350 and 900, with the terminal end of the phase characterized by a decrease in sand tempering, wider and shallower cordmarking, an increase in limestone tempered plain ceramics, and the appearance of small quantities of shell tempering (Schroedl et al. 1990:180-181, 184). These changes, occurring primarily towards the end of the Late Woodland ceramic phase, have led some to pose a number of different distinctions between the earlier and later portions of the Late Woodland phase.

Working with data from the Chickamauga Basin, Kneberg (1961) proposed a separate Late Woodland Hamilton phase characterized by the dominance of limestone tempered plain, cordmarked, and brushed ceramics (Lewis and Kneberg 1946; Rowe 1952). Kneberg (1961) also proposed a variant concentrated in the Watts Bar area known as the Roane-Rhea complex that exhibited limestone tempered plain sherds, fewer limestone tempered cordmarked, no stamped vessels, and similar vessel morphology to

Mississippian assemblages (Kneberg 1961:8; Schroedl et al. 1990:181).

Similarly, Schroedl et al. (1990:184), drawing on assemblages from the Jones Ferry site (Schroedl et al. 1990, 1985), the Doughty site (McCollough and Faulkner 1973), and Tomotley (Baden 1983), proposed a distinct Woodland IV period, from between ca. AD 600 and 900, that emphasized the co-occurrence of limestone and shell tempered ceramics in the same contexts. The Late Woodland phase today (Lewis et al. 1995) is generally understood to correspond to Schroedl et al.'s (1990) Woodland IV period and lasts from between ca. AD 600 and 900.

Following the Late Woodland phase is the Martin Farm phase (Faulkner 1972; Salo 1969; Schroedl et al. 1985) often referred to as an Emergent Mississippian phase (Schroedl et al. 1990). The Martin Farm phase is then succeeded by the first Mississippian phase, Hiwassee Island. It's worth discussing the two together, as Schroedl et al. (1985, 1990:185) have pointed out that there are differences only in the composition of the assemblages, but not in the occurrence of types. The transition between Martin Farm type assemblages and Hiwassee Island type assemblages are known primarily from a single site, Martin Farm (40Mr20) in the Tellico Reservoir where Schroedl et al. (1985) uncovered both Martin Farm and Hiwassee Island components. Using data from these excavations, Schroedl et al. (1985) statistically analyzed (sensu Kimball (1985) 24,000 sherds across 31 assemblages at the site. The ceramic profiles they proposed are as follows. The Martin Farm assemblages are made up of limestone tempered plain (30-35%), cordmarked (20-25%), and shell tempered

plain (35-40%) (Schroedl et al. 1990:185). The Hiwassee Island assemblages are made up of shell tempered plain (65-85%), cordmarked (1-15%), fabric impressed (3-5%), and slipped or red filmed (1-3%) along with limestone tempered plain (5-11%) and cordmarked (3-6%) (Schroedl et al. 1990:185). Overall, the Hiwassee Island phase assemblages showed a marked increase in diversity when compared to the Martin Farm assemblages. It is important to note that it is during the Hiwassee Island phase that both Etowah and Wilbanks-like ceramics are found (in a minority) in eastern Tennessee, specifically at both the Hiwassee Island site (40Mg31) and the Hixon site (40Ha3). The Etowah stamped ceramics are shell tempered and referred to as Hiwassee Island Complicated stamped (the same type found at the Bell Field and Sixtoe Field sites in northern Georgia by Kelly (1966, 1967)). The Wilbanks-like stamped ceramics found at Hixon have not been formally described before. They exhibit broad, curvilinear stamps on thick-walled sherds tempered with either grit (as they are in Georgia) or shell (Figure 4.5). While Wilbanks ceramics are argued to have been in use up until AD 1375, the Hiwassee Island phase is argued to have ended roughly between AD 1300 and 1325/1350 (Lewis et al. 1995; Sullivan, personal communication).

Dallas-type ceramics begin to be produced between roughly AD 1300 and 1350. This phase is characterized by an increase in shell tempered cordmarked and an overwhelming dominance of shell tempered plain ceramics (Kimball 1985:144-145). These changes are accompanied by a decrease in fabric impressed, complicated stamped, and painted ceramics (Dickens 1979; Garrow

1975). Also appearing are a variety of new decorative modes including applique fillets, modeled effigies, notched and noded rims, and a substantial amount of incising (Kimball 1985:144-145). Ceramics identified with the Barnett phase, a mixture of both Dallas and Lamar attributes are also present in eastern Tennessee. This attribute mixing is normally just encompassed by the characterization of the Dallas phase generally, but has also been referred to as “Dallamar” in the literature (Kelly et al. 1966). In general, the changes between assemblages dating to before and after ca. AD 1300-1350 are distinct and substantial. While distinguishing between assemblages of the two phases is easy, it seems that temporally the two assemblages abut each other with no gap in time. This becomes especially clear when examining the distribution of Hiwassee Island and Dallas assemblages throughout platform mound construction stages in which no temporal gaps seem to exist between stages dominated by Hiwassee Island phase assemblages and those dominated by Dallas phase assemblages. The Dallas phase is argued to span from the early to mid-14th century through the early 1600s up to the introduction of Cherokee pottery.

Data

The seriations presented below are produced using published ceramic assemblages, the sources for which are listed in Table A.1 and A.2. For this study, assemblages are defined as collections of ceramic materials recovered from discrete archaeological contexts. In this case, these contexts include house

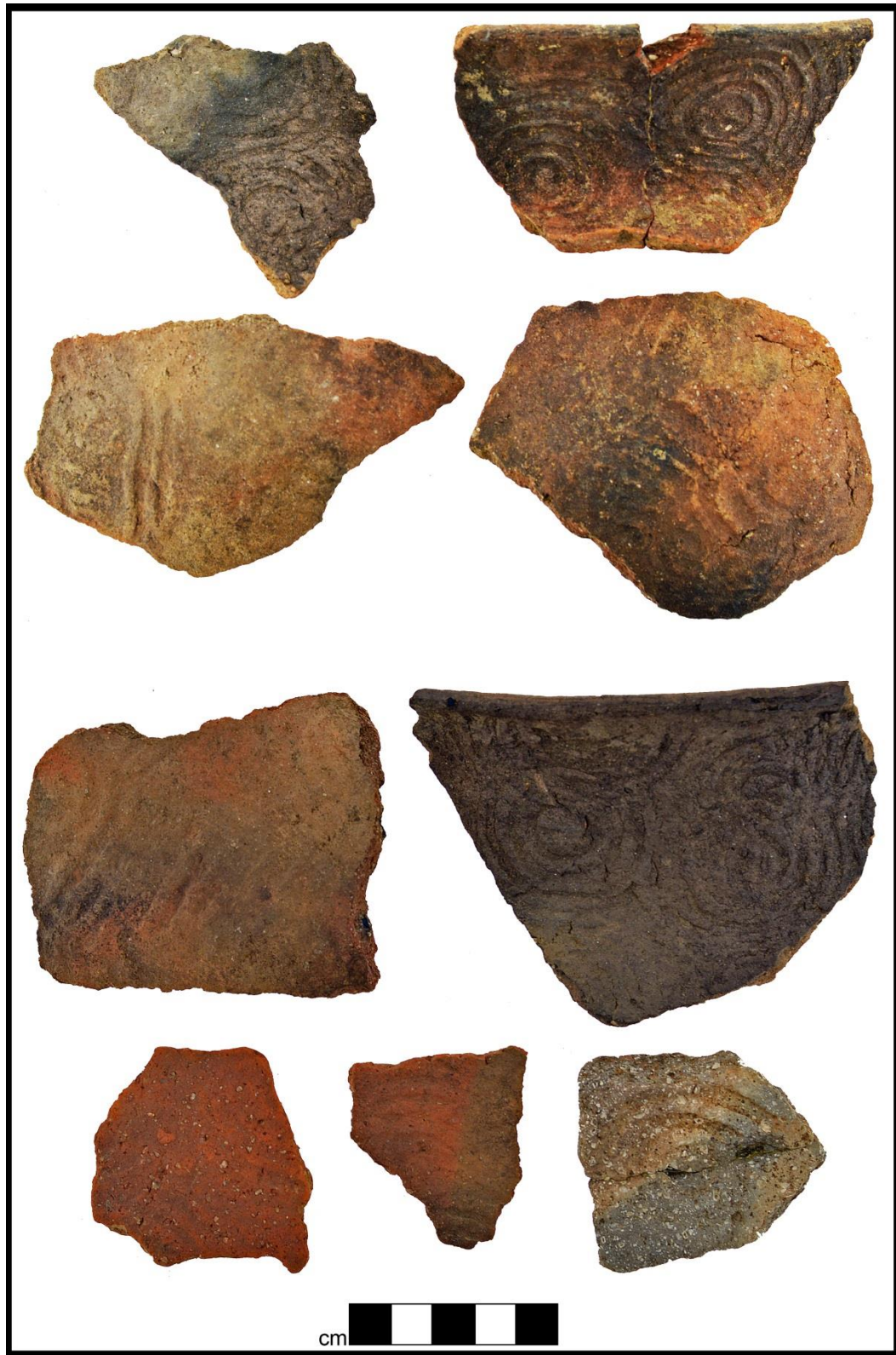


Figure 4.5. Wilbanks-like stamping on sherds from the Hixon site (40Ha3) in eastern Tennessee.

floors, mound construction stages, intact midden layers, pit features, and discrete strata encountered and recorded through unit excavations. By using discrete, sub-site assemblages for this analysis, assemblages from different components at the same site are treated independently within the seriation (Figure 4.6). Due to differences in excavation techniques, recording, and reporting over the last century however, the organization and quality of published assemblage data is highly variable. As such, an assemblage is defined here as a temporally discrete collection of ceramic materials from contexts below the scale of the archaeological site. That is, a ceramic assemblage may be a collection of sherds excavated from a single archaeological feature such as a house floor, pit, general midden context, or mound construction layer for example.

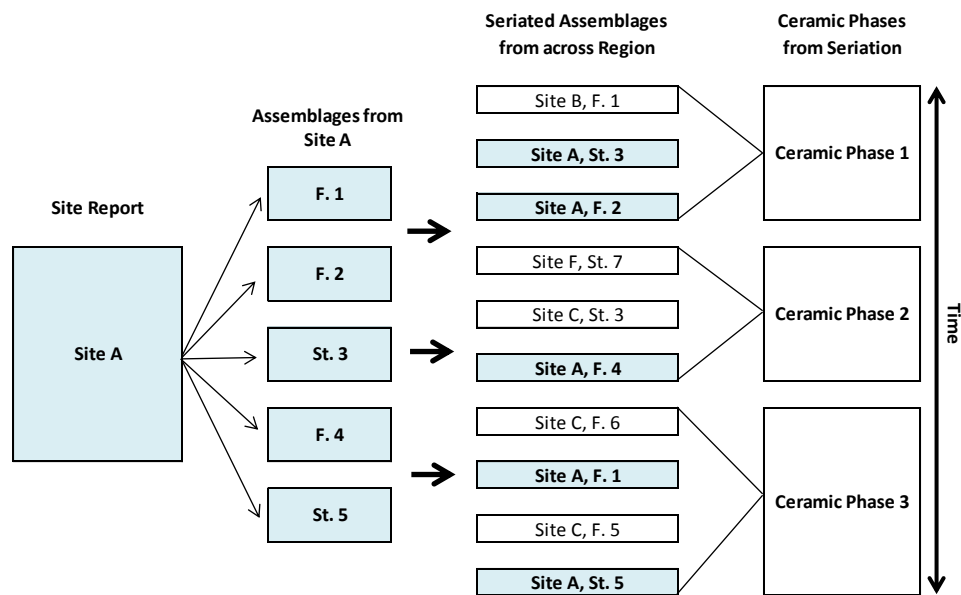


Figure 4.6. Schematic of seriation procedures.

In sum, for northwestern Georgia, 124 assemblages from 25 sites (41 components) totaling 87,704 sherds were used. For eastern Tennessee, 164 assemblages from 32 sites (43 components) totaling 276,715 sherds were used (Figure 4.4; Table 2.1). These assemblages, including proveniences, associated radiocarbon dates, ceramic counts, and results derived from the correspondence analyses described below are presented in Appendix A (Table A.1 and Table A.2). For the purpose of mitigating inter-researcher biases concerning the assignment of sherds to a particular type, ceramic types were not used to organize the following seriation. Established types were aggregated by temper and surface treatment qualities (e.g. limestone tempered plain, shell tempered incised, sand tempered complicated stamped) (Figure 4.7).

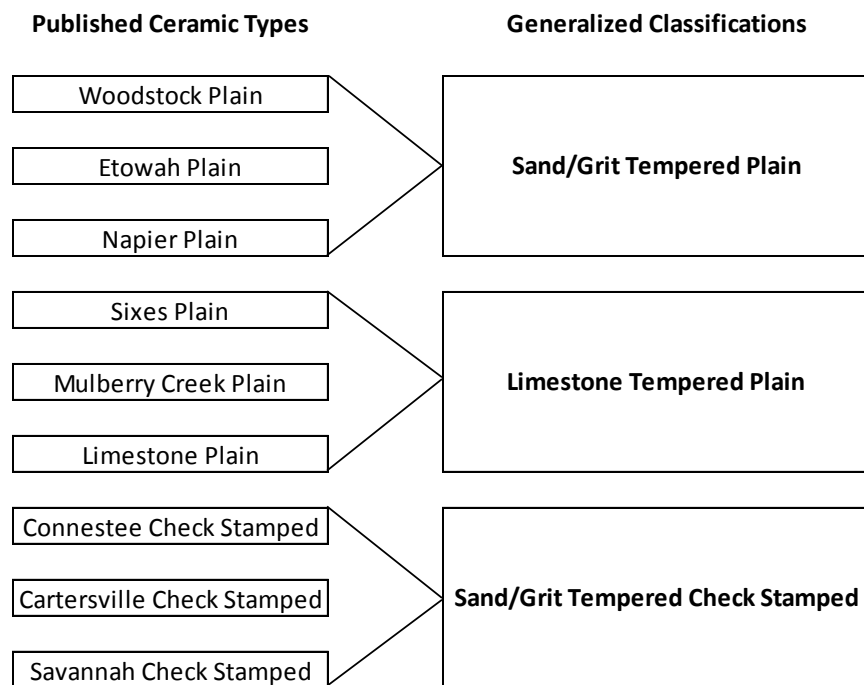


Figure 4.7. Example showing how ceramic types were collapsed by surface decoration and temper.

Seriation Techniques

In this section I present the methods used to order ceramic assemblages from across the Southern Appalachian region by time. A combination of traditional frequency seriation and correspondence analysis is employed. The benefits of combining the two procedures for ordering archaeological assemblages has been recognized and highlighted by others working with ceramic data (e.g. Peeples and Schachner 2012; Smith and Neimann 2007). The procedures outlined below are presented in a simplified schematic in Figure 4.6. Essentially, I use correspondence analysis, a statistical mode of assessing and representing variability among samples or assemblages, to assign scores to assemblages that can then be used to order them along a gradient representing time. Once assemblages are ordered, I use traditional frequency seriations to verify that assemblages were successfully ordered by time as evidenced by the presence of “battleship” curves of ceramic frequencies. The mathematical and theoretical justification for the use of these methods is described in more detail below.

Frequency Seriation

“Seriation is a descriptive technique, the purpose of which is to arrange comparable units in a single dimension (that is, along a line) such that the position of each unit reflects its similarity to other units” (Marquardt 1978:258).

Willey (1973) referred to the process as interdigitation, describing it as the “fitting together of stratified sequences using similarities in relative frequencies of pottery types” (Smith and Neiman 2007:48). Seriation is one of the few uniquely archaeological methodologies and stems from the need to effectively order artifact assemblages by changes in assemblage composition over time (e.g. Kroeber 1916; Lyman et al. 1997:57-59; Spier 1917). Like many regions across North America, seriation techniques were quick to be applied in the U.S. Southeast (e.g. Ford 1952, 1962; Ford and Willey 1941; Willey and Woodbury 1942) but saw a rapid decline with the introduction and spread of radiocarbon dating techniques (Gibson 1993:32; Ford 1952:319; Lyman et al. 1997:185; O’Brien and Lyman 1999:225-226; Smith and Neiman 2007:48). The most commonly known method of seriation is frequency seriation. Frequency seriation “uses the relative frequencies of artifact types within an assemblage to derive an order or sequence among many assemblages (Dunnell 1970:121-125; Lyman et al. 1997:57)” (Smith and Neiman 2007:48). Working from a frequency table where assemblages are represented as rows and artifact types are represented as columns, frequency seriation “attempts to fit *within-assemblage* (row) percentages to a model that specifies how *within-type* (column) fluctuations should behave over time” (Smith and Neiman 2007:49). The model for the standard or expected distribution or frequency of artifact types over time is the commonly referred to “battleship curve” which exhibits monotonic increase, a climax, and a monotonic decrease (Smith and Neiman 2007:49). As attributes or artifact types are assumed to increase in abundance, peak, and then decline

through time, the measure of success for a frequency seriation is its wellness of fit to a battleship curve (Peeples and Schachner 2012).

Correspondence Analysis

Correspondence analysis (CA) is a complementary technique to traditional applications of frequency seriation (e.g. Brainerd 1951; Kroeber 1916; Marquardt 1978; Robinson 1951; Spier 1917). Originally used in seriation attempts by European archaeologists, it was later adopted for similar purposes by American archaeologists (e.g. Alberti 2015; Baxter 1994, 2003; Bølviken et al. 1982; Djindijan 1985; Duff 1996; Kintigh et al. 2004; Madsen 1988; Neiman and Alcock 1995; Peeples and Schachner 2012; Robertson 1999; Smith and Neiman 2007). CA is “a statistical technique for displaying the relationships among the rows and columns of a two-way frequency table of non-negative numbers in two dimensional space” (Peeples and Schachner 2012:2820; for detailed overviews see Greenacre 1984, 2007; Greenacre and Hastie 1987). Appearing in the 1930s (Hirschfeld 1935), many derivations and independent developments of CA have been introduced (Benzécri 1969; Greenacre and Hastie 1987; Hill 1973, 1974; Nishisato 1980), although each remains underlain by the same general mathematical procedures (Smith and Neiman 2007:55). In brief, CA “operates through the decomposition of the X^2 statistic for a contingency table to produce a set of orthogonal axes, numbering one less than the total number of rows or columns (whichever is less), which account for the total variation in a frequency

table” (Peeples and Schachner 2012:2820). As an ordination technique, CA allows for the visualization, using a limited number of dimensions, of the distances between a set of assemblages whose complete description requires many more dimensions (Smith and Neiman 2007:55). The X^2 distance used in CA is defined as follows:

$$d_{x^2 1,2} = \sqrt{\left[\sum_{f=1}^c \frac{\left(\frac{P_{1j}}{P_{1+}} - \frac{P_{2j}}{P_{2+}} \right)^2}{\frac{P_{+j}}{P_{++}}} \right]}$$

“where p_{ij} is the frequency of the j ’th type in the i ’th assemblage, expressed as a proportion of the total number of artifacts in all assemblages. This says that to compute the chi-squared distance between two assemblages, we compute the differences between the relative frequencies for each type, square them, divide each squared difference by the relative frequency of its type in the entire dataset, add up the results, and take the square root” (Smith and Neiman 2007:55).

A completely accurate depiction of the chi-squared distance among assemblages (or the total inertia in the data set, or the weighted sum of the X^2 distances of each point to the centroid (Peeples and Schachner 2012:2820)) would require one less dimensions than the number of types or assemblages (whichever is less) (Smith and Neiman 2007:56). The reason the data can be projected in such low-dimensional space, with the majority of inertia (or roughly variation) accounted for by the first two or three axes, is that CA uses inertia-maximization. That is, it places points (in this case each point represents an assemblage) along a new set of dimensions so that the first dimension, for instance, is placed so that the scores of the assemblages along it account for the

most inertia possible, and so on and so forth throughout subsequent axes or dimensions (Smith and Neiman 2007:57). As such, the first two or three dimensions should account for the majority of inertia in the dataset. The contribution of each axis to the total inertia can be described and easily interpreted as percentages (Peeples and Schachner 2012:2820) related to the amount of variation captured by each axis. This method is similar to principle components analysis, but is designed for categorical data (such as frequencies and presence/absence data) rather than for continuous variables (Peeples and Schachner 2012:2820) and leads to the maximization of inertia rather than variance (Smith and Neiman 2007:57). The same analyses used to assign scores to assemblages can also be applied to the types. As such, assemblages and types can be displayed in the same graphical space which allows easy visual assessment of the relationships between particular assemblages and artifact types (Baxter 1991, 1994:110-123; Clausen 1998; Legendre and Legendre 1998:451-461; Ringrose 1992; Smith and Neiman 2007:57).

The above description of CA as an ordination technique allows for the visualization of distances among a set of assemblages along a few dimensions (Smith and Neiman 2007:55) and thus is useful for defining and ordering observations along a gradient of variation (Peeples and Schachner 2012:2820). For these methods to articulate with frequency seriation methods, CA must be understood as a technique to facilitate gradient analysis (see Smith and Neiman 2007). CA as a tool for gradient analysis was first established by vegetation ecologists (Hill 1973, 1974). It relies on the assumption that the frequency of

occurrence of a species in samples taken along some environmental or ecological gradient will follow a normal distribution when plotted against the gradient itself. That is, species will be most frequent or most abundant at some point along the gradient, the species optimum, and will decline in abundance as gradient values depart from the optimum point (Smith and Neiman 2007:57). Hill (1973, 1974) realized that the species and sample location scores were analogous to the scores related to the first axis of a correspondence analysis derived from the ordination methods outlined above. If species are replaced with ceramic types, and the environmental gradient is replaced with a temporal gradient, it becomes easy to see how the locations in time of both assemblages (vegetation samples) and types (species) can be evaluated using these methods.

As such, CA provides a method of formally assigning numerical, successive scores to ceramic assemblages that can be used to place them in a sequence which can inform, and be evaluated by, traditional frequency seriation. As Smith and Neiman (2007:58) point out, the results of any CA are only reliable to the extent that they meet the following four conditions (from ter Braak 1985): 1) variances of type responses along each gradient are equal or uniformly distributed; 2) type maxima are independent of optima along each gradient; 3) type optima are equally spaced or uniformly distributed along each gradient; and 4) assemblage locations are equally spaced along each gradient. If these conditions are met, sorting assemblages by score will produce the expected battleship curves. As demonstrated in the next chapter, Bayesian analyses of associated radiocarbon data can also be used to independently assess the

success of the seriation in ordering artifacts along a temporal gradient. It is important to note that one of the strengths of CA is that it captures variation produced by a number of forces including time, space, and any social process that may be influencing relative frequencies of artifacts. In this way, while time may be captured and represented by one of the first dimensions, so too might other processes driving any observed variation.

Procedures and Results

The procedures for conducting correspondence analyses and subsequent frequency seriations for northwestern Georgia and eastern Tennessee vary slightly per the unique ceramic traditions in each region. For northwestern Georgia, what is clear from the extant sequence is that particular styles of complicated stamping are undoubtedly sensitive to time. For this reason, the complicated stamped category was divided into Swift Creek, Napier, Woodstock, Etowah, Wilbanks/Savannah, and Lamar stamped categories based on original excavator classifications. Besides these named types, no other type classifications were used in lieu of generic temper-surface treatment classifications.

Temper was not included in the northwestern Georgia seriation. Given the majority through time (~70%) of sand/grit tempering, temper was not included in the analysis. During the earliest periods, 99% of sherds are made with sand/grit tempering across northern Georgia. Later, while at a macro scale shell and

limestone tempering increases to roughly 30% of the regional sample, 94% of shell tempering and 90% of limestone tempering is found at just two sites during the second temporal period (discussed below): Etowah (9Br1) and Sixtoe Field (9Mu100). For the latest period, while up to 49% of sherds are tempered with shell, 99% of these shell-tempered sherds are found at 4 sites located within 2km of each other: Thompson (9Go4), Bell Field (9Mu101), Little Egypt (9Mu102), and Potts Tract (9Mu103). As such, while the use of temper as a temporal marker may be useful in unravelling individual settlement histories, the distribution of temper types is too heterogeneous to use in a regional seriation.

Plain sherds and fabric impressed sherds were also excluded. Plain sherds were excluded because variation in plain sherd characteristics is not uniformly reported. Some variation is apparent in terms of vessel thickness and coarseness of sand/grit tempering, but there exists no standard way of reporting this variation for the region. Also, similar to patterns identified in temper distribution, the regional variation in the use of plain sherds is uneven. In the first and second temporal periods (described below) plain sherds make up roughly 47% during each period and up to 84% during the third and final period studied here. While this increase in the final period is certainly a factor related to time, this influx happens once again at the four, closely spaced settlements mentioned above and not across the entire northern Georgia region where styles of complicated stamping and proportions of incised sherds remain more sensitive to time. This is consistent with other seriation efforts in the region (e.g. Smith and

Neiman 2007) as plain-pottery types are “less sensitive instruments for measuring...change with the passage of time” (Phillips et al. 2003:220).

Fabric impressed sherds were excluded because they likely represent the contamination of assemblages with much earlier fabric impressed types (e.g. Dunlap Fabric Marked and Kellogg Fabric Impressed) from previous components at sites. The raw scores for dimensions one and two for each assemblage included in the CA for northwestern Georgia are included in Table A.1. The plot of assemblages and types are presented in Figure 4.8. The eigenvector scores for each dimension are presented in Table A.3.

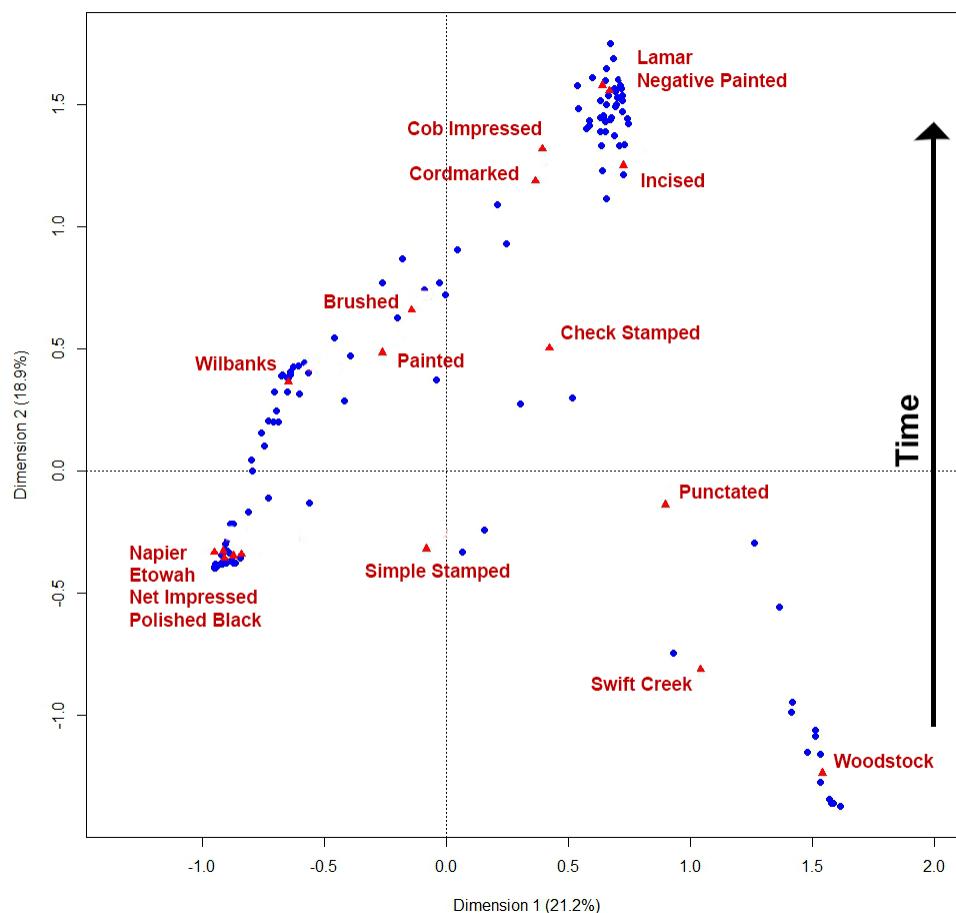


Figure 4.8. Plot of CA for northern Georgia assemblages.

In Figure 4.8 time is represented along dimension two from the earliest assemblages and types at the bottom towards the latest assemblages and types at the top. It is important to point out that seriation will get you in the neighborhood, but won't give you the exact address (Steponaitis 1983:89-90). That said there are a few comments to be made concerning Figure 4.8. According to the extant chronology, Napier and Swift Creek types should precede Woodstock complicated stamping traditions. While the inversion of Swift Creek and Woodstock types in the plot is not extreme and likely a product of the available sample of assemblages, the Napier type is represented just next to the Etowah type in the plot, significantly higher than the Woodstock and Swift Creek types (although raw distance in this plot is not directly related to distance in time, only the ordering of types/assemblages is relevant). This result contributes to debates concerning the chronological placement of the Napier complicated stamped tradition (e.g. Rudolph 1991; Wauchope 1966). According to the results of the analysis, assemblages with Napier complicated stamping are much more similar to assemblages with Etowah stamping than to assemblages with Woodstock or Swift Creek stamped sherds. This seems to support Wauchope's (1966) hypothesis that in some places Woodstock may have been bypassed altogether. Thus while the inclusion of Napier may introduce some non-temporal variation, its inclusion among the other types has little to no effect on the results of the CA. Two separate CAs, using only frequencies of complicated stamping were conducted: one that included and one that excluded Napier frequencies. These are presented in Figures 4.9 and 4.10. The exclusion of the Napier

frequencies has very little effect on the inertia for dimensions one and two (Tables A.4 and A.5). It is important to remember that the results of the CA are the product of frequencies of complicated stamped types along with the frequencies of many other types of ceramics.

Using the dimension two scores for each assemblage associated with the analysis presented in Figure 4.8 a frequency seriation was conducted. The complete results are presented in Figure A.1 of Appendix A. An appended version of this seriation

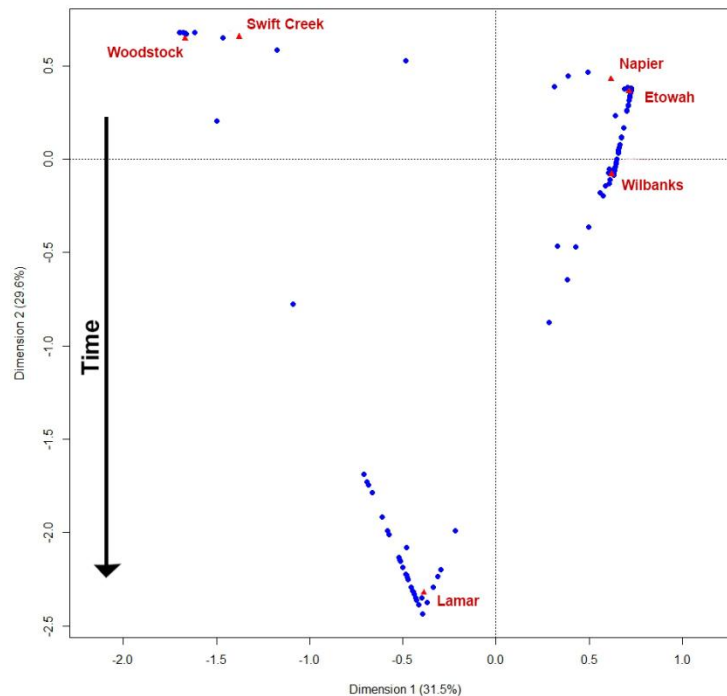


Figure 4.9. Plot for CA of complicated stamped traditions from northern Georgia.

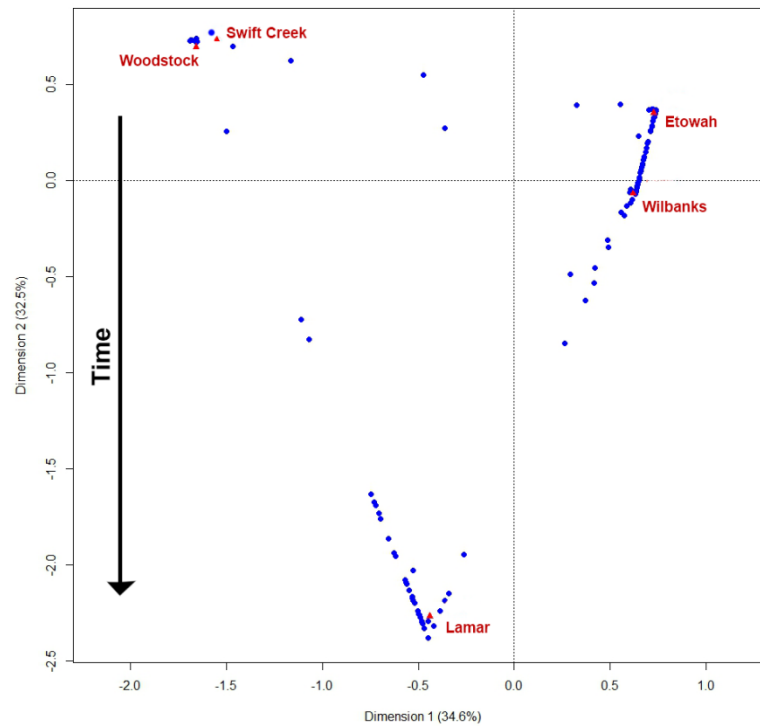


Figure 4.10. Plot for CA of complicated stamped traditions from northern Georgia excluding Napier.

is presented in Figure 4.11 that includes only types that make up at least 1% of the total assemblage used in the study. Figure 4.11 does not present each individual assemblage (this can be found in Figure A.1). Rather, adjacent assemblages (every successive group of ten assemblages) were aggregated to distill noise and make the plot easily interpretable. The clear battleship curves indicate successful seriation along a given gradient (presumably time). A second seriation graph is presented in Figure 4.12 that includes the results of the CA based on complicated stamped types only.

As a final check, another CA was conducted that included only complicated stamped motifs. Motifs included are diamonds filled with parallel horizontal lines, line blocking, concentric diamonds (all variations), fillet crosses,

scrolls, squares/rectangles (all variations), and ovals/circles (all variations). Elongated Us, figure 9s, figure 8s and quatrefoils were excluded as they introduced substantial variation into the analysis indicating that these motifs may not be sensitive to time alone. The results of this analysis are presented in Figure 4.13 and Table A.6. Results of the same analysis that includes elongated Us, figure 9s, figure 8s, and quatrefoils are also presented in Figure 4.14 and Table A.7. Figure 4.15 displays the correlation between the CA scores assigned to the same assemblages in the total seriation versus the seriation of just motifs, showing that each seriation ordered the assemblages in a similar manner. All raw data used in these motif analyses are presented in Appendix A (Table A.8).

For eastern Tennessee, all classifications were included. Classifications represented combinations of surface treatments and temper, as both temper and decoration are sensitive to time. Because of the temporally sensitive nature of the use of particular temper types, plain sherds were included in the eastern Tennessee analyses. The assemblages used, their resulting scores along dimension one, and their subsequent ordering are presented in Table A.2 of Appendix A. The CA biplot of assemblage and type scores are presented in Figure 4.16 while appended frequency seriations are presented in Figures 4.17 and 4.18 (one that includes types making up at least 1% of the total ceramic assemblage and one including only types that make up at least 5% of the total assemblage). Eigenvector scores for each dimension are listed in Table A.9. A raw frequency seriation graph including all types and unaggregated assemblages is presented in Figure A.2 of Appendix A.

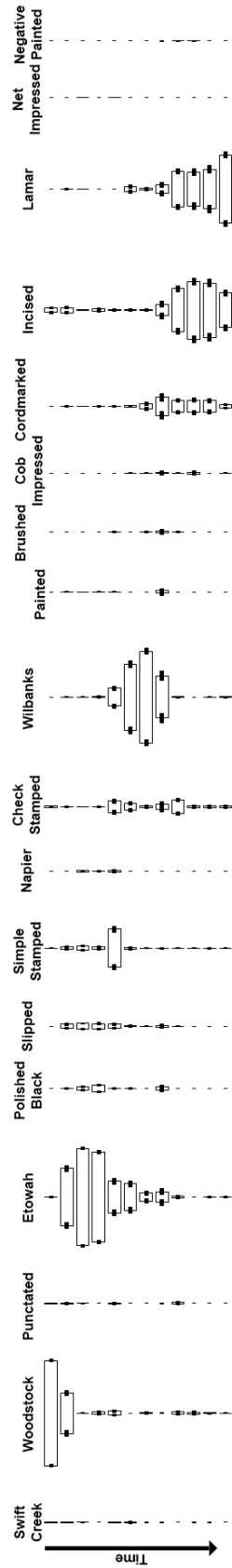


Figure 4.11. Appended seriation plot for northern Georgia. Individual assemblages were aggregated by groups of ten adjacent assemblages. Only ceramic categories making up at least 1% of the total sample are included here. A total seriation plot included all individual assemblages and all ceramic categories can be found in Appendix A, Figure A.1.

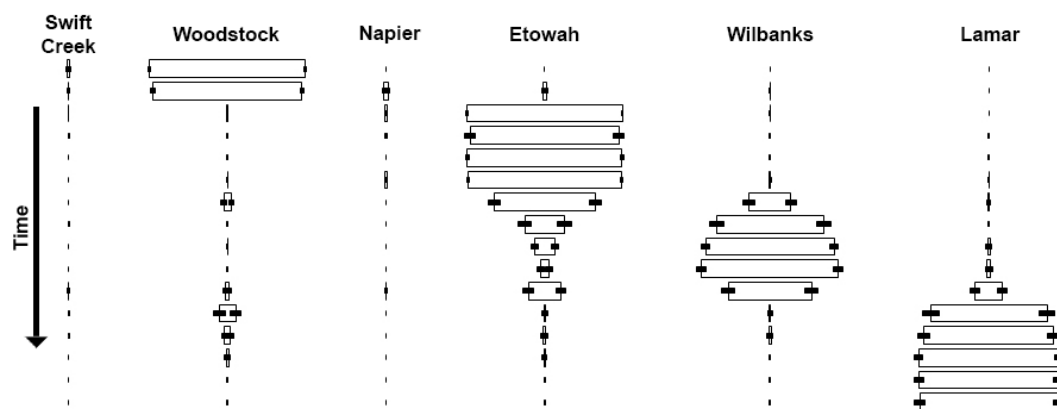


Figure 4.12. Appended seriation plot for complicated stamped traditions from northern Georgia. Individual assemblages were aggregated by groups of ten adjacent assemblages.

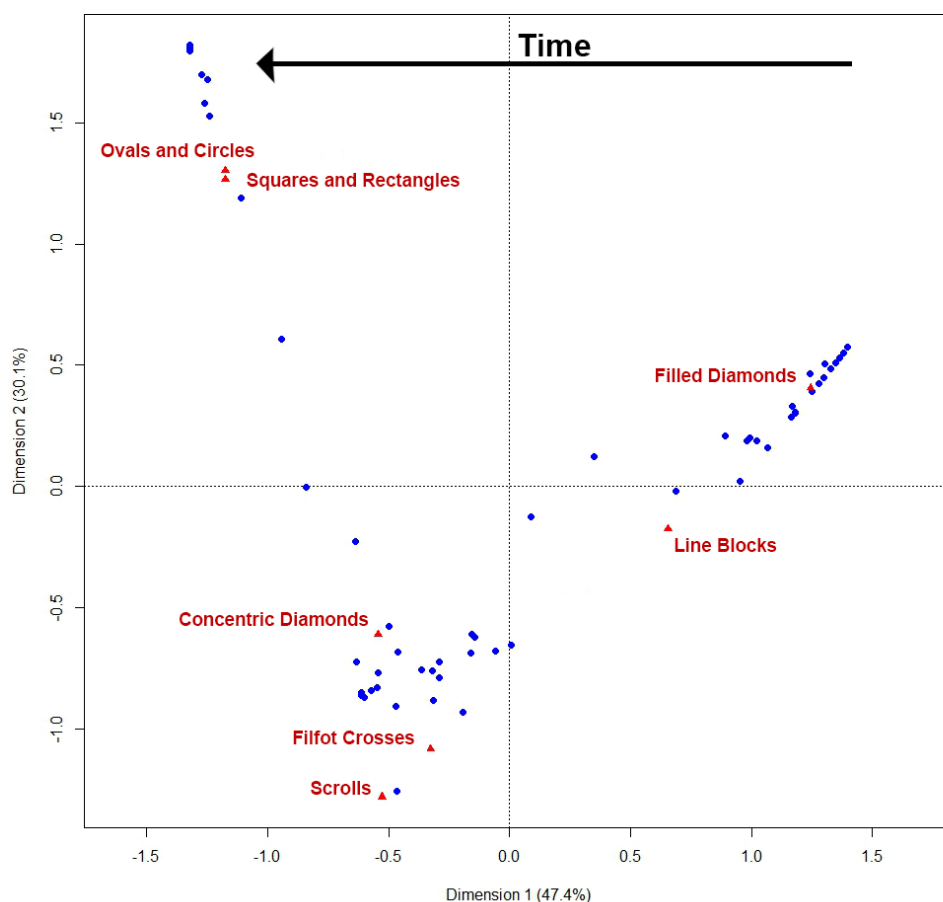


Figure 4.13. Plot of CA for northern Georgia complicated stamped motifs, excluding elongated Us, figure-8s, and figure 9s.

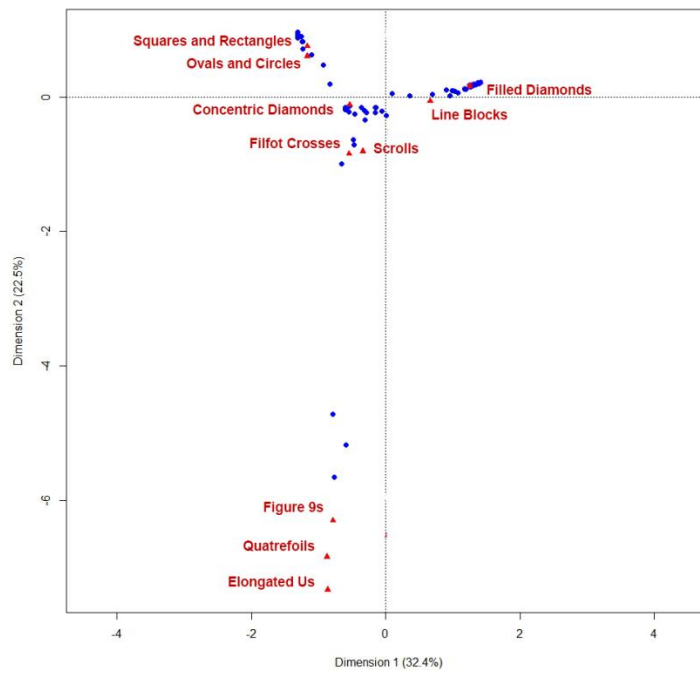


Figure 4.14. Plot of CA for northern Georgia complicated stamped motifs, includes all motifs.

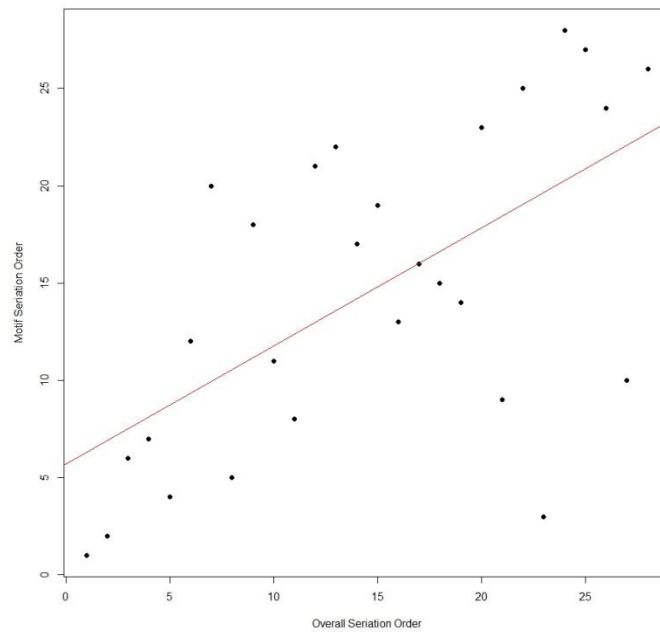


Figure 4.15. Biplot depicted correlation between the order of assemblages as determined by the total seriation and the order determined by the motif seriation.

Revised Ceramic Chronologies

The seriation results for each region provide more refined understandings of the Southern Appalachian ceramic sequences that move beyond some of the essentializing principles employed in previous studies. What the seriations clearly show are the substantial overlaps between ceramic styles, traditions, and technologies through time, indicating the complexity of stylistic and technological change in the context of shifting patterns of social, political, and economic interactions. Using the seriation graphs, four temporal subdivisions can be drawn for each region (Figures 4.19 and 4.20; Table 4.2). While these subdivisions represent seemingly sequential phases in the directional seriation presented here, as I demonstrate in Chapter 5, these subdivisions actually

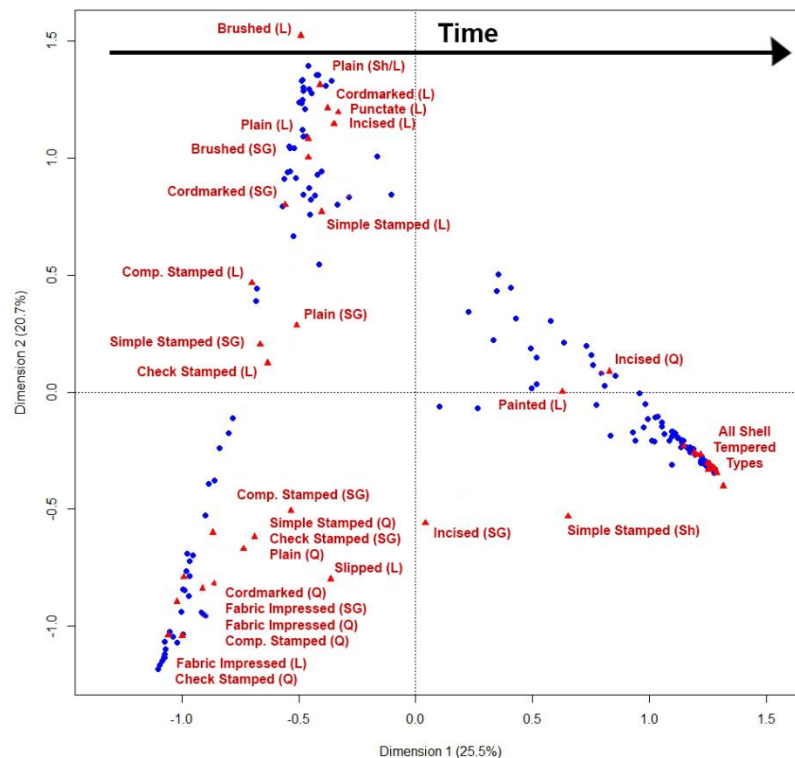


Figure 4.16. Plot for CA of eastern Tennessee assemblages.

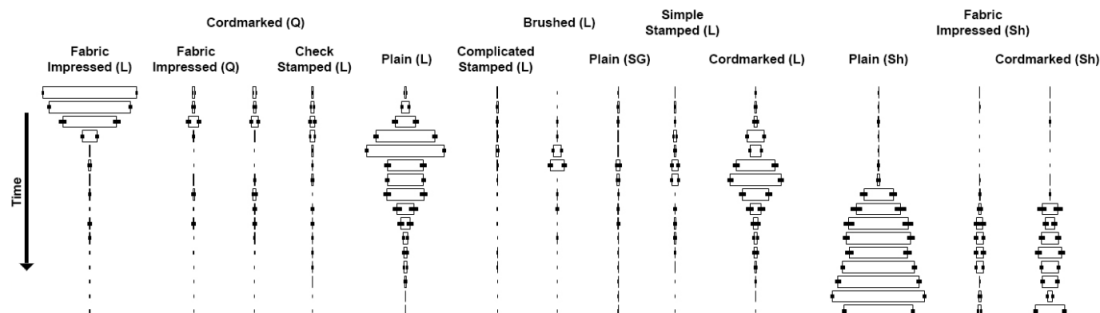


Figure 4.17. Appended seriation plot for eastern Tennessee. Individual assemblages were aggregated by groups of ten adjacent assemblages. Only ceramic categories comprising at least 1% of the total sample were included here. The full seriation plot including all assemblages and ceramic categories can be found in Appendix A, Figure A.2.

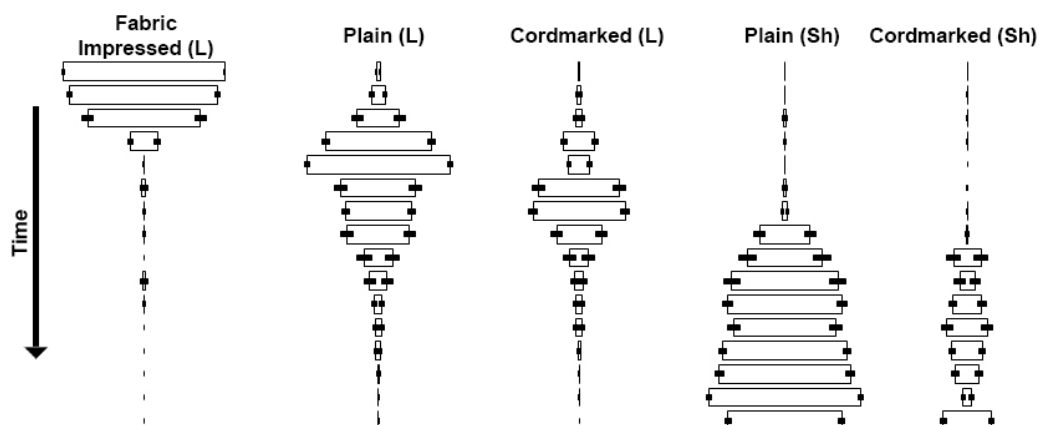


Figure 4.18. Appended seriation plot for eastern Tennessee. Individual assemblages were aggregated by groups of ten adjacent assemblages. Only ceramic categories comprising at least 5% of the total sample were included here. The full seriation plot including all assemblages and ceramic categories can be found in Appendix A, Figure A.2.

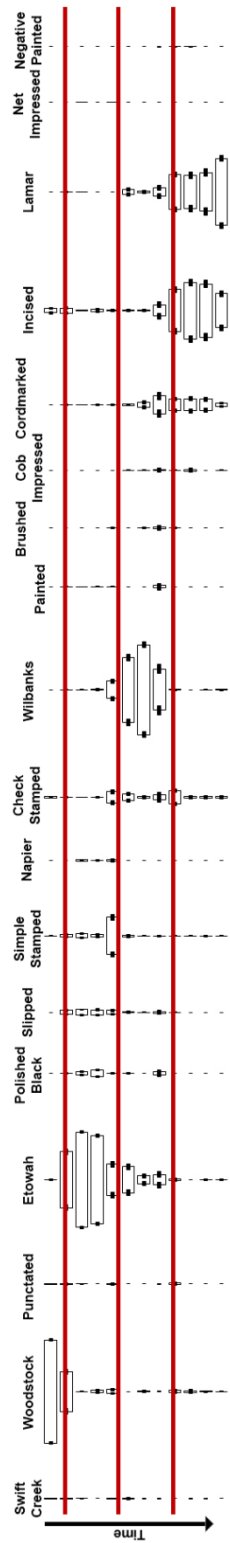


Figure 4.19. Appended seriation plot for northern Georgia showing decided subdivisions

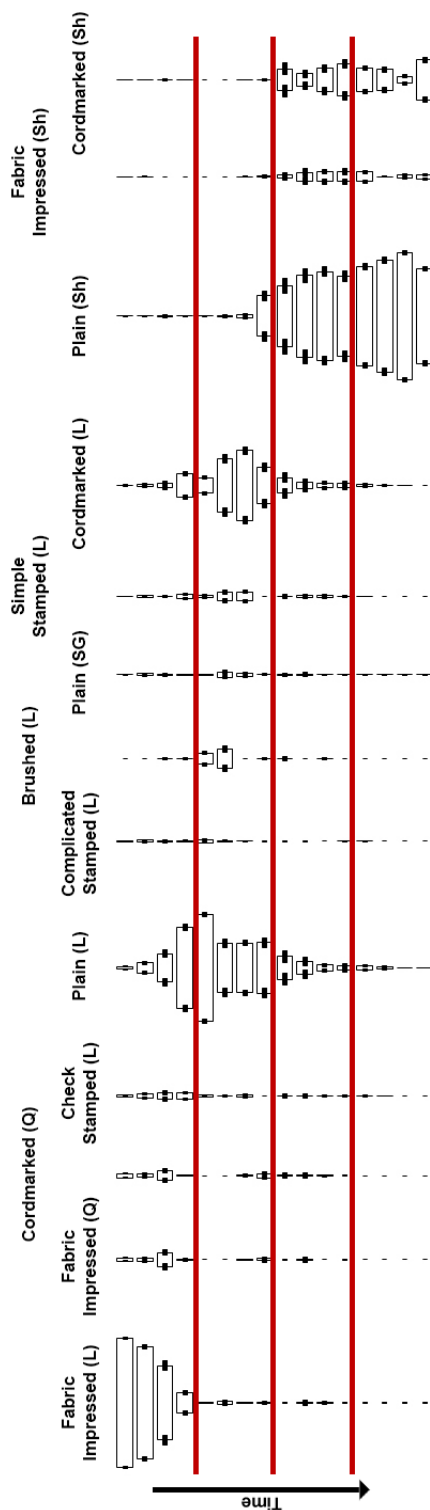


Figure 4.20. Appended seriation plot for eastern Tennessee showing decided subdivisions.

Table 4.2. Descriptions of subdivisions for the northern Georgia and eastern Tennessee seriations.

Subdivision	General Characteristics
GA-1	Woodstock complicated stamping associated with Late Swift Creek stamping and Napier stamping; moderate amounts of punctated and incised ceramics
GA-2	Increase in Etowah complicated stamping; increase in polished black and slipped pottery
GA-3	Transition to Wilbanks stamping from Etowah stamping; increase in check stamping; increase in painted, brushed, and cob impressed ceramics
GA-4	Absence of Etowah and Wilbanks stamping; increase in cordmarked, incised, and Lamar stamped ceramics
TN-1	Abundance of limestone tempered fabric impressed pottery; quartz tempered fabric impressed and cordmarking; smaller amounts of limestone tempered
TN-2	Gradual increase in limestone tempered plain pottery; minority amounts of limestone tempered complicated stamping
TN-3	Balanced quantities of limestone plain and limestone cordmarked sherds; limestone tempered brushed and simple stamping
TN-4	Dominated by shell tempered plain pottery; shell tempered fabric impressed, cordmarking, and incising

exhibit varying degrees of overlap in terms of their absolute temporal ranges.

These subdivisions are generally subjective, based on two factors. The first factor in defining these subdivisions was a visual assessment of battleship curves, where breaks were placed at locations where peak abundances of ceramic frequencies shifted from one type to another. The second factor was a consideration of the scores provided by the CA analyses. Using these scores, major breaks were confirmed as significant breaks in the distribution of CA scores (e.g. a difference of 1.50 between assemblages rather than 0.10). As

there remains no standard, objective way of identifying temporal groups within frequency seriations, the subdivisions themselves remain admittedly subjective.

Briefly, the first subdivision for the northwestern Georgia seriation (GA-1) is defined by an abundance of Woodstock complicated stamped pottery along with Swift Creek stamped, punctated, and incised pottery. GA-2 is characterized by the increase of Etowah complicated stamped pottery as well as an increase in polished black and red slipped pottery. GA-3 is characterized by a transition, yet significant overlap between Etowah stamped and Wilbanks stamped pottery. With an increase in Wilbanks stamping is a concomitant increase in check stamping. Towards the bottom half of the GA-3 subdivision, painted, brushed, and cob impressed types also increase in abundance. The final GA-4 subdivision is characterized by the dramatic end to both the Etowah and Wilbanks complicated stamped curves and an increase in cordmarking (which begins in GA-3), incised, and Lamar stamped sherds.

The first Tennessee subdivision (TN-1) is characterized by an abundance of limestone tempered fabric impressed pottery accompanied by quartz tempered fabric impressed, quartz tempered cordmarking, and limestone tempered check stamping. TN-2 is represented by a gradual increase in limestone tempered plain pottery and minority amounts of limestone tempered complicated stamping. TN-3 is characterized by balanced quantities of limestone tempered plain and limestone cordmarked along with limestone tempered brushed and simple stamped sherds. Towards the end of the TN-3

subdivision is the introduction of shell tempered plain pottery. TN-4 is dominated by shell tempered plain pottery as well as shell tempered fabric impressed and cordmarked surface treatments. While ultimately subjective, these subdivisions capture peak abundances of particular ceramic traditions as breaks are placed where abundances of one type significantly decrease as the abundance of a succeeding type, or types, begin to increase. These subdivisions, and their associated radiometric data, are used as the basis for the Bayesian models presented in Chapter 5 and are used to contextualize these seriation results in absolute time. By doing so, the timing and temporality of ceramic change across the region, and its implications for refining the extant chronology, are discussed.

CHAPTER 5: REGIONAL BAYESIAN RADIOCARBON CHRONOLOGIES

In this chapter, I evaluate 233 radiocarbon determinations within a Bayesian interpretive framework to situate the ceramic seriations presented in Chapter 4 in absolute time. While the seriation methods employed in the previous chapter do well to order information in a relative manner, the absolute timing and temporality of changes to ceramic styles, technologies, and traditions can only be elucidated through absolute dating techniques. Indeed, the results of seriation efforts are often presented alongside radiocarbon data to anchor archaeological sequences in time (e.g., Smith and Neiman 2007). In this chapter, I contribute to these efforts by presenting a case study within which radiocarbon data and information derived from archaeological seriations can be formally, quantitatively evaluated against one another using Bayesian modeling. The results of this study provide a high-resolution, absolute chronology for Southern Appalachian regional ceramic sequences. In turn, these sequences contribute to refining the timelines and temporalities of significant institutional change, explored in more detail in Chapter 6, and to temporally organizing the regional social network analyses presented in Chapter 7.

Bayesian Chronological Modeling

Bayesian statistics allow us to “analyze new data we have collected about a problem in the context of our existing experiences and knowledge about that

problem” (Bayliss 2007:75). By doing so, we can “arrive at a new understanding of the problem which incorporates existing understandings about the problem and our new data” (Bayliss 2007:75). To use the associated terminology, new data, or observations, can be referred to as ‘likelihoods.’ Existing experiences and knowledge are referred to as “prior beliefs’ or a *priori* information. The resulting understandings we achieve from incorporating our prior beliefs into the analysis of new data are understood to be ‘posterior beliefs.’ Bayesian statistics are uniquely situated for the analysis of radiocarbon data because of their focus on probabilities. Extensive overviews of Bayesian analysis of radiocarbon dates have been published by experts in the technique (e.g. Bayliss 2015, 2007; Bayliss et al. 2007b; Bronk Ramsey 2009a; Buck et al. 1996; Whittle et al. 2011), only a brief introduction is provided here. The results of “scientific dating are always interpreted contextually” and Bayesian statistics “provide an explicit, quantitative method which can combine raw dates with other prior information included in a model to produce formal statistical date estimates which combine both sets of evidence” (Bayliss 2007:76). In the following case, radiocarbon determinations represent likelihoods: the seriations described in Chapter 4 are used to define prior beliefs about the radiocarbon data, and the results of the Bayesian models (defined temporal ranges for ceramic seriation subdivisions) are the posterior beliefs.

Adopted by researchers for use in archaeological applications over two decades ago (e.g. Buck et al. 1991, 1992, 1994, 1996; Christen 1994; Christen

and Litton 1995; Christen et al. 1995), Bayes' theorem (Bayes 1763) can be expressed mathematically as follows:

$$p(t | y) \propto p(y | t)p(t)$$

Where t represents a set of parameters, y represents observations or measurements, $p(y|t)$ is the likelihood, and $p(t|y)$ is the posterior probability, or the probability of a given parameter set given the measurements and the priors (Bronk Ramsey 2009a:338). This is expressed in a simpler manner by Bayliss (2007:76) and reads as follows:

$$\frac{P(data | parameters)}{P(data)} \times P(parameters) = P(posterior | data)$$

Where the likelihood is determined by the probability of the data or observations given the set parameters and is proportional to the probability of the parameters themselves. The combination of these two, observations/measurements and prior information or beliefs is where the value of Bayesian statistical methods lie, especially in regards to interpreting radiocarbon data.

Because radiocarbon dates are actually measurements of isotopic ratios, in order to be read as proxies for calendrical dates they must be calibrated against an established calibration curve that reflects fluctuations in atmospheric carbon isotopes over time (see Scott and Reimer 2009 for a detailed overview; Reimer et al. 2013). The process of calibrating a radiocarbon determination thus results in a probability distribution along which the actual calendrical age of the sample likely lies. The incorporation of prior information about these observations allows for a formal assessment of observations as well as a formal evaluation of

the prior assumptions used to interpret the data. Thus, a formalized Bayesian model allows for the simultaneous, quantitative evaluation of both radiocarbon data and our assumptions about the archaeological record. Through these efforts, the probability distributions of radiocarbon determinations can be modeled using this prior information and may significantly enhance both the precision and accuracy of chronometric dating by producing modeled posterior probability distributions. Arguably the strongest prior information we have as archaeologists are the stratigraphic, depositional environments from which radiocarbon data are recovered (e.g. Aldana 2016; Bachand 2008; Bayliss et al. 2007a; Bronk Ramsey 2000, 2009a; Kennett et al. 2014; Krus 2016; Monaghan et al. 2013; Overholtzer 2015; Pluckhahn et al. 2015; Schilling 2012, 2013; Steier and Rom 2000; Thompson et al. 2016). More general priors including culture-historic frameworks, ceramic sequences, settlement patterns, and documentary evidence can also be employed as prior information (e.g. Alberti 2013; Boaretto et al. 2005; Buck et al. 1996; Greco and Otero 2015; Greco and Palamarczuk 2014; Manning et al. 2006; Mazar and Bronk Ramsey 2008; Needham et al. 1998; Raczky and Siklosi 2013; Regev et al. 2012; Turck and Thompson 2016). When using more generalized prior information, as I do below, the assumptions employed may serve as a working hypothesis on which the analysis is based (Bronk Ramsey 2009a:348). The author (Lulewicz 2018) recently evaluated the assumptions built into the extant culture-historic framework for northwestern Georgia by iteratively incorporating a number of alternative assumptions in the Bayesian interpretation of a legacy radiocarbon dataset. Building on this recent

work, I combine a suite of 68 new radiocarbon dates with this legacy dataset and employ the seriations described in Chapter 4 as working hypotheses about the ordering of ceramic assemblages and thus the contexts from which those assemblages were recovered. Interpreting these seriation results and radiocarbon within a Bayesian framework, I provide precise temporal ranges for the period of use for ceramic assemblages and a more accurate estimation of the timeframe for each ceramic sequence. Before describing these results, a few important concepts and procedures need to be defined. All concepts refer to commands available in OxCal v. 4.3 (Bronk Ramsey 2009a).

A more thorough discussion of the mathematical expressions underlying each of the parameters discussed below is presented by Bronk Ramsey (2009a:348). One of the simplest parameters to impose on a group of radiocarbon dates is their inclusion in a **Phase**. A phase is an unordered group of events. When dates are grouped in a phase, it is assumed that all dates within the group are equally likely to occur anywhere between the start and end boundaries of the phase. No information concerning order is assumed. For the grouping of dates into a phase to serve as an informative parameter (sensu Bayliss 2007), the phase must be given start and end **Boundaries**. The use of particular kinds of boundaries defines how events (dates) are distributed within the phase. The distributional parameters imposed by particular types of boundaries provide another set of informative parameters that will produce variation in model outputs. In this study, only **Sigma Boundaries** were applied. Whereas the use of the **Boundary** command assumes a uniform distribution of

observations within a phase, 'sigma boundaries' are used to define normally distributed events (Bronk Ramsey 2009a). Sigma boundaries issue the parameters that there are no definite start or end events (Figure 5.1) (Bronk Ramsey 2009a). Thus, sigma boundaries are appropriate for evaluating the temporal ranges for seriation data which also assumes a normal distribution of ceramic types through time. Additionally, sigma boundaries do not impose hard starts and ends to distributions but rather takes into account the waxing and waning of distributions of events. In this way, boundaries of different phases, especially when modeled as overlapping phases (defined below), are free to overlap with preceding and succeeding phases or events. Remember, the subdivisions of the seriations described in Chapter 4 are centered on peak abundances of particular types. As such, the beginnings of the subdivisions are characterized by an increase in a particular type while the ends of the subdivisions are characterized by a decrease in a particular type. Given the nature of these battleship curves, especially the overlap of

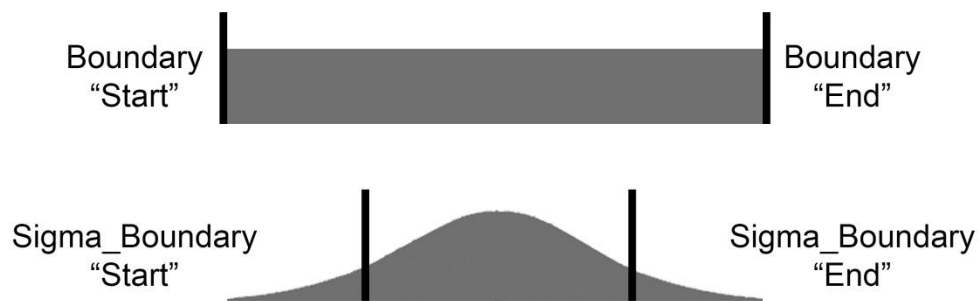


Figure 5.1. Examples of different kinds of boundaries used in Bayesian chronological modeling. Adapted from Bronk Ramsey (2009a).

these curves, it would be a false assumption to impose definite starts and ends on each temporal subdivision as the curves associated with the frequency of ceramic types grade into one another over time.

Models can also be built, as they are below, by including multiple phases within a model and defining the relationships between those phases. The primary models presented below incorporate the four subdivisions of each seriation as four phases within an ***overlapping model***. An overlapping model assumes no ordering of the phases included in the model and allows for start and end boundaries of each phase to overlap with temporally adjacent, or contemporaneous, phases (as defined by the radiocarbon determinations). The seriation presented in Chapter 4 has placed assemblages in a rough order, although the order of each individual assemblage in time will likely vary (Steponaitis1983:89-90). Because of this, an overlapping model is more appropriate than either a ***sequential model*** or a ***contiguous model***. A sequential model assumes that one phase follows the other, but does not assume the length of the gap between phases. In a sequential model, one phase must end before another starts. In a contiguous model, transitional boundaries are used between phases assuming that phases directly abut one another in time with no gap in between the phase endings and beginnings. While the primary models constructed below are overlapping, alternative models were built that use sequential, contiguous, and individual phase models to compare to the primary models. Alternative models are used to understand the effects of particular assumptions/priors on model outputs (Bronk Ramsey 2009a:347).

The last concepts relevant to the current study that need defining are ***outliers*** and ***outlier models***. A full review of the kinds of outliers and outlier models that may be applied in Bayesian analyses for archaeological applications can be found in Bronk Ramsey (2009b). The specific type of outliers considered here are charcoal outliers. Many extant radiocarbon determinations have been derived from wood and wood charcoal samples leading to the possibility of ‘old wood’ effects (Bronk Ramsey 2009b; Graf 2009; Schiffer 1986; Waterbolk 1983). That is, because trees are long-lived species, the determinations associated with large, unidentified charcoal samples may represent a portion in the lifespan of the tree that does not correspond to the felling of the tree itself. Samples of bark, outer rings, or small twigs are more likely to have formed close to the cutting date. To deal with this we can identify all dates on wood and wood charcoal as outliers and incorporate an outlier model into our Bayesian interpretive frameworks. When a date is identified as an outlier, and no outlier model is specified, it is completely removed from consideration. When an outlier model is specified, a model is defined for outliers that have a probability assigned to them. The procedures used here for charcoal outliers are outlined in full detail in Bronk Ramsey (2009b). In the case presented here, each charcoal measurement was given a 100% probability of being an outlier. With an outlier model applied, determinations characterized as outliers are down-weighted in the model in accordance with how consistent the determination is with all available information (including other radiocarbon dates and priori beliefs) (Bronk Ramsey 2009b:356). The model output is thus affected by the down-weighting of particular charcoal

determinations based on the modeled fit of each outlier. The primary models presented below all include charcoal outlier models. To assess the effects of these model parameters on outputs, the same model frameworks without the application of outlier models are presented as alternative models.

Radiocarbon Data

From across the study area, there are 233 radiocarbon determinations associated with, the ceramic seriations presented in Chapter 4, 68 of which are newly reported here. For eastern Tennessee, there are 122 determinations from 39 sites. For Georgia there are 110 determinations from 24 sites. All radiocarbon data available for the study area, including radiocarbon ages and associated isotopic determinations, material, provenience, and references are presented in Appendix B (Table B.1). Overall, 180 radiocarbon dates were used to date the ceramic seriations presented in the previous chapter. Ninety-six dates were used for the northwestern Georgia sequence while 84 were used for the eastern Tennessee sequence.

Because the seriation subdivisions made in Chapter 4 are generally subjective, some subjective decisions were made as to the inclusion of radiocarbon determinations within the Bayesian models. Two types of decisions were made. The first concerned the movement of radiocarbon dates and assemblages from one subdivision to another. In some cases, assemblages assigned to one subdivision may have been more appropriately placed in an adjacent subdivision based on subjective review of the ceramic assemblage itself

or knowledge about the archaeological context of the assemblage. For instance, if layers one and three of a mound were included in subdivision TN-2, but the assemblage associated with layer two of the mound was placed in TN-3, dates associated with layer two were included in the TN-2 phase in the Bayesian model along with the other mound layers. In all cases where assemblage dates were moved from one phase to another, they occurred near to, or right on, the boundaries of the subdivisions. That is, in all cases, the radiocarbon dates only needed to be moved by one assemblage into the more appropriate subdivision. These assignments are more likely than not the result of the subjective nature of the subdivisions, as the placement of the subdivision one assemblage higher or lower along the temporal gradient would have included the radiocarbon date in question.

The second decision made was the inclusion of radiocarbon determinations that are not directly associated with any assemblages used in the seriation. In some cases, raw ceramic data were not available. Either ceramic data had not been published or was reported in a way that was not compatible with other extant data for seriation. Dates not associated with ceramic assemblages included in the seriation were added based on the determinations made by myself. In most cases, these dates not associated with particular ceramic assemblages used in this analysis were recovered from single-component sites or features with ceramic descriptions matching the subdivisions described in Chapter 4. Assemblage associations and phase designations are presented with the radiocarbon data in Table B.1 in Appendix B.

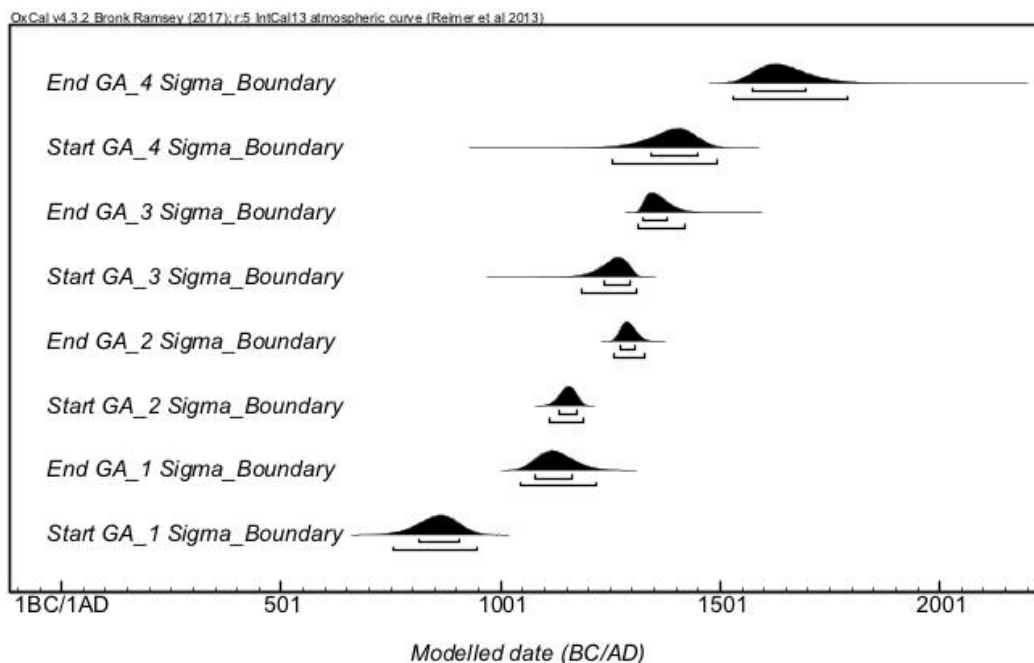


Figure 5.2. Modeled start and end boundaries for northern Georgia ceramic subdivision described in Chapter 4. Full model results that include all individually modeled dates can be found in Appendix B, Figure B.1.

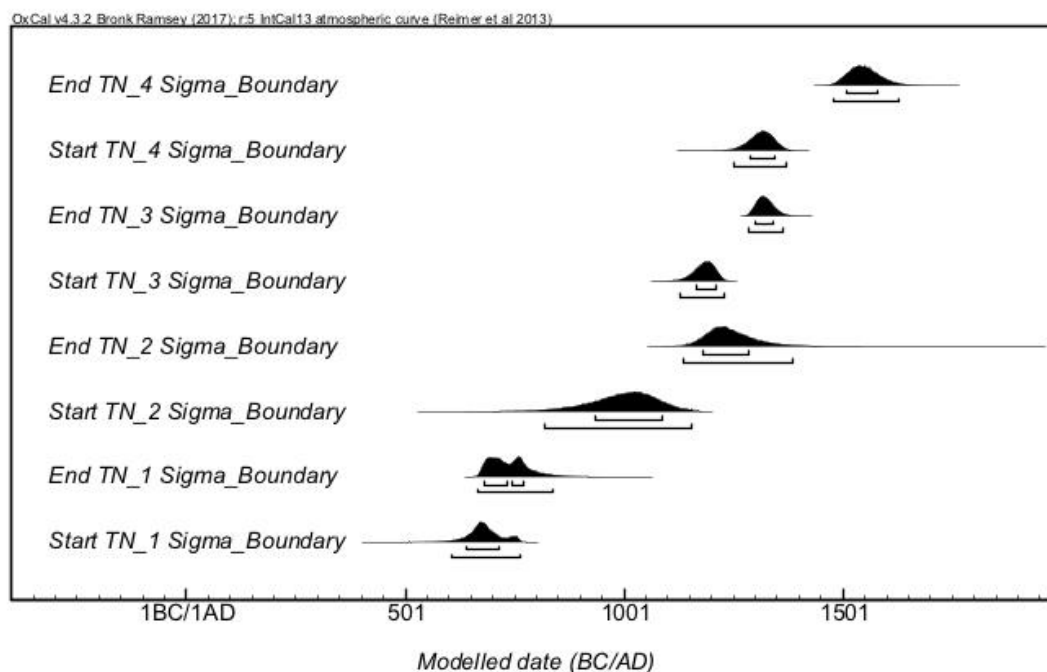


Figure 5.3. Modeled start and end boundaries for eastern Tennessee ceramic subdivision described in Chapter 4. Full model results that include all individually modeled dates can be found in Appendix B, Figure B.2.

Table 5.1. Modeled start and end boundaries for the northern Georgia ceramic subdivisions described in Chapter 4. Confidence intervals of 68% (top) and 95% (bottom) are presented.

Seriation Subdivision	Modeled Start Boundary (<i>cal. A.D.</i>)	Modeled End Boundary (<i>cal. A.D.</i>)	Modeled Span (<i>years</i>)
GA-1	815-910	1080-1165	430-570
GA-2	1135-1175	1275-1310	260-420
GA-3	1235-1295	1325-1380	85-215
GA-4	1345-1450	1575-1695	305-440

Seriation Subdivision	Modeled Start Boundary (<i>cal. A.D.</i>)	Modeled End Boundary (<i>cal. A.D.</i>)	Modeled Span (<i>years</i>)
GA-1	760-945	1045-1220	350-640
GA-2	1115-1190	1260-1330	195-450
GA-3	1190-1310	1315-1420	50-285
GA-4	1255-1495	1530-1790	240-575

Table 5.2. Modeled start and end boundaries for the eastern Tennessee ceramic subdivisions described in Chapter 4. Confidence intervals of 68% (top) and 95% (bottom) are presented.

Seriation Subdivision	Modeled Start Boundary (<i>cal. A.D.</i>)	Modeled End Boundary (<i>cal. A.D.</i>)	Modeled Span (<i>years</i>)
TN-1	640-715	680-770	0-100
TN-2	935-1090	1180-1285	220-425
TN-3	1165-1210	1300-1340	205-320
TN-4	1290-1345	1510-1580	390-510

Seriation Subdivision	Modeled Start Boundary (<i>cal. A.D.</i>)	Modeled End Boundary (<i>cal. A.D.</i>)	Modeled Span (<i>years</i>)
TN-1	605-765	665-840	0-235
TN-2	820-1160	1140-1385	125-565
TN-3	1130-1230	1285-1365	175-415
TN-4	1250-1370	1480-1630	345-625

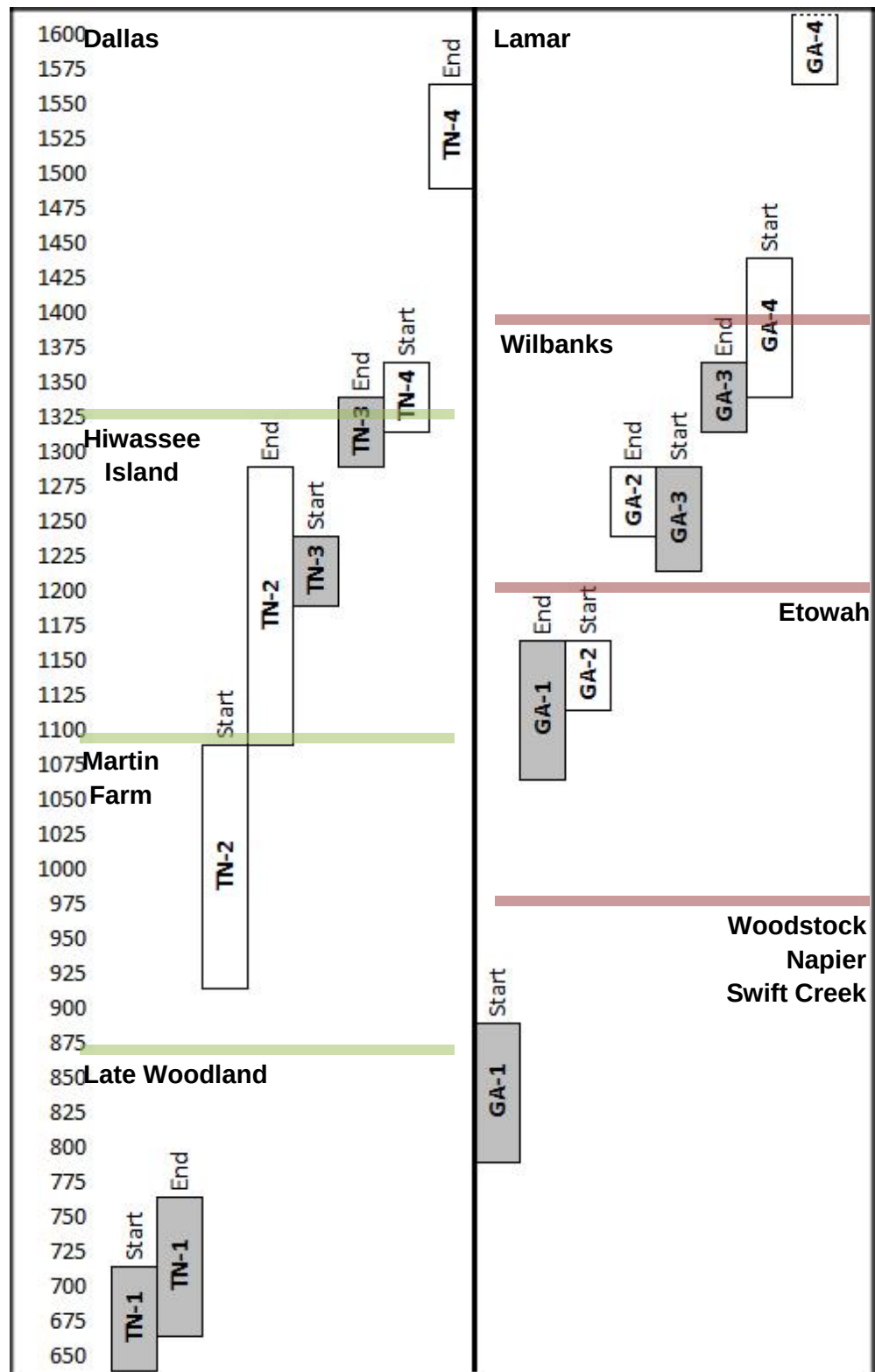


Figure 5.4. Schematic representation of modeled start and end boundaries for the ceramic subdivisions described in Chapter 4 compared to extant chronological breaks.

Materials and Methods

All models were built and run in OxCal v.4.3 (Bronk Ramsey 2009a) using the IntCal13 calibration curve (Reimer et al. 2013). Full plots for each primary model that include the results of each modeled radiocarbon determination are presented in Appendix B (Figures B.1 and B.2). The code for all primary and alternative models is presented in Appendix C. Appended results are presented here as Figures 5.2 and 5.3 and Table 5.1 and 5.2. These figures and tables present the modeled start and end boundaries for the temporal ranges associated with each subdivision of the seriation. These temporal sequences are presented schematically in Figure 5.4. All radiocarbon data used are presented in Table B.1 of Appendix B. Additionally, lab-IDs for each radiocarbon date associated with an assemblage used in the seriation are presented with the assemblage data in Table A.1 of Appendix A. Each of the primary models shows good overall model agreement. Model agreement is presented as an index to assess how well all measurements agree together within the applied parameters. An acceptable model should display an A_{model} value of no less than 60% (Bronk Ramsey 2009a). The primary northern Georgia model has an A_{model} of 85.2% while the eastern Tennessee model exhibits an A_{model} of 124.3%. Of all dates used across both models, only three dates show poor agreement within their given model. All three dates are from the eastern Tennessee model. Poor agreement of many more dates could have been expected, as agreement values for one in every 20 dates will likely fall below 60% (Bronk Ramsey 2009a:356).

Of the 26 alternative models, all exhibit A_{model} values that exceed 60%. None of the alternative models deviate significantly from the results presented by the primary models. Two minor differences are observed. Sequential multi-phase models push the temporal ranges for phases to be slightly later (ca. 20 years) than the primary model suggests. This is to be expected given the assumptions that one boundary must end before another starts in a sequential model. All individual phase models for each seriation subdivision that incorporated a charcoal outlier model align with the results of the primary models. Single phase models that did not incorporate a charcoal outlier model produced slightly earlier dates for phases, indicating possible effects of old wood and justifying the use of charcoal outlier models. All modeled ranges and determinations are rounded to the nearest 5 and presented in italics. Results are presented at the 68% confidence interval. Results at the 95% confidence interval can be obtained from the code provided in Appendix C.

Results

The seriations presented in Chapter 4 provided an alternative perspective to extant ceramic chronologies that have traditionally employed essentialized ceramic types to neatly order sociopolitical chronologies. By illustrating the inherent overlaps between different ceramic attributes through time, particularly surface decorations and tempering agents, the seriations used to direct the Bayesian models presented here have produced absolute temporal spans that in

some cases lend support to extant chronologies and in other instances deviate wildly from extant perspectives. The complexity of these seriations, combined with the very nature of Bayesian chronological modeling, whereby single-year start and end boundaries are deemed inappropriate interpretations, the results presented below provide a number of new insights into the ceramic chronologies of Southern Appalachia and raise a number of important questions concerning the timing and tempo of sociopolitical transitions.

For the northwestern Georgia seriation, subdivision GA-1 has a modeled start boundary of *AD 815-910* and a modeled end boundary of *AD 1080-1165*. The GA-2 subdivision begins somewhere in the range of *AD 1135-1175* and ends between *AD 1270 and 1310*. The model indicates that GA-3 begins sometime between *AD 1235 and 1295* and ends in the range of *AD 1325-1380*. Finally, the GA-4 subdivision has a modeled start boundary of *AD 1345-1450* and a modeled end boundary of *AD 1575-1695*. For eastern Tennessee, TN-1 is dated to begin in the range of *AD 640-715* and end between *AD 680 and 770*. The start boundary for TN-2 is *AD 935-1090* with a modeled end boundary of *AD 1180-1285*. TN-3 begins in the range of *AD 1235-1295* and ends somewhere in the range of *AD 1300-1340*. The last subdivision, TN-4, begins between *AD 1290 and 1345* and likely ends between *AD 1510 and 1580*.

For northwestern Georgia, GA-1 begins sometime ca. *AD 850*. Interestingly, this phase was modeled using dates associated with assemblages bearing Swift Creek, Napier, and Woodstock ceramics (as described in Chapter 4), supporting the contemporaneity of these stamping traditions. The Bayesian

chronology begins to deviate from the extant chronology as the GA-1 subdivision seems to last at least 100 years beyond AD 1000 suggesting significant overlap with assemblages bearing Etowah type ceramics and placing the beginning of GA-2 approximately 100-150 years later than expected compared to the AD 1000 proposed by the extant chronology, ca. *AD 1150*. While the extant framework outlines the Etowah phase, and the use of Etowah ceramics, as lasting for two-hundred years, between AD 1000 and 1200, the Bayesian model estimates a span of 260-420 years for GA-2, with an end date sometime ca. *AD 1270-1310*. The results of the Bayesian model suggest that the use of Wilbanks ceramics overlapped significantly with Etowah type ceramics. The modeled start date for GA-3 generally confirms the placement of Wilbanks ceramics in the extant chronology at ca. AD 1250. The modeled end date for GA-3 varies slightly with the extant chronology, suggesting an earlier termination of Wilbanks ceramics, ca. *AD 1350*. The timeline for GA-4, characterized primarily by Lamar type ceramics starts sometime ca. *AD 1400*, generally supporting the extant placement of Lamar traditions. The most significant aspect of the new Bayesian chronology is the substantial temporal overlap of the subdivisions characterized by Etowah and Wilbanks complicated stamping (GA-2 and GA-3 respectively). A review of the seriation graphs for northern Georgia show that Etowah and Wilbanks complicated stamping undoubtedly grade into one another. This corresponds with King's (2001) observation that Etowah ceramics are found in all Wilbanks contexts at the Etowah site. While King (2001) explained this pattern as

the result of unintentional mixing, the Bayesian model presented here suggests some level of contemporaneity between the two traditions.

For eastern Tennessee, Schroedl et al.'s (1990) proposition of a Terminal Late Woodland phase (Woodland IV), dating to between AD 600 and 900, seems to be justified by the Bayesian model as the temporal range for the GA-1 assemblages used here date to ca. *AD 650-750* with a substantial gap preceding the start of GA-2, Martin Farm-like assemblages, at ca. *AD 950*. While there is a 200 year gap, this is likely an issue of radiocarbon sample size and availability of excavated assemblages dating to this period. The range of GA-2 may also be skewed by a small sample size of radiocarbon dates and excavated assemblages. Nevertheless, its start date seems to correspond roughly with the extant chronology's placement of the Martin Farm phase, although its modeled end date, ca. *AD 1230*, is significantly later than the traditionally accepted date of ca. *AD 1100/1150* for these types of assemblages. Given this new range for Martin Farm-like assemblages, it is possible that Martin Farm assemblages are contemporaneous, to some extent, with Hiwassee Island-like assemblages, as GA-3 is modeled to begin ca. *AD 1185*. Considering the similarities between the ceramic assemblages of each subdivision, the contemporaneity of the two is not a stretch. Finally, the modeled start of GA-4, defined primarily by shell-tempered plain, cordmarked, and incised ceramics, corresponds roughly to the beginning of the Dallas phase in the extant chronology at ca. *AD 1325*.

Implications

The chronologies presented above, at their most basic level, are essentially chronologies of ceramic traditions. As such, the date ranges, boundaries, and spans outlined here using Bayesian chronological modeling first and foremost temporally characterize periods of production, use, and discard of particular ceramic materials. While these chronologies directly bear on understanding the timing and temporality of changes to ceramic traditions through time, they can also indirectly be used to understand broad changes to social, political, and economic practices across regions and within communities. This can be accomplished from two different perspectives. The first perspective approaches changes to ceramic traditions as changes to the social means of production and, by extent, changes to social, political, or economic organization. From this perspective, the timing and temporality of changes to ceramic technology, style, or distribution are used to infer, and to explore, concomitant changes in practice and the organization of relationships related to the production, consumption, and distribution of pottery. The second approach to inferring the timing and temporality of sociopolitical change from ceramic chronologies uses these chronologies primarily as temporal signposts to situate and contextualize other changes identified in the archaeological record that evince social change. This second approach is the one employed here and in Chapter 6, while Chapter 7 delves into the relationships between ceramic production, social signaling, and organizational structures. It is important to reiterate that the new chronological models presented above are based on a

limited number of radiocarbon dates and ceramic assemblages. As more radiocarbon data are accumulated or more ceramic data incorporated, these models have the potential to be altered in light of new information. The addition of more, and more precise, radiocarbon data associated with more assemblages could potentially lengthen or tighten temporal spans depending on how representative the samples used here are of the overall population of potential ceramic assemblages or sites. As archaeological datasets are rarely complete and are often characterized by missing data, the chronologies presented in this chapter are not definitive. Rather, they represent the most probable models built from available data.

Northern Georgia

For northern Georgia, the timing of the early transition towards increased agricultural production, increased sedentism, and centralized sociopolitical organization has traditionally been marked by the appearance of Woodstock stamped pottery at roughly AD 800 (e.g. Cobb and Garrow 1996; Little 1999; Markin 2015, 2007). Archaeologically, the appearance of Woodstock pottery, including distinct new motifs and stamping execution, is accompanied by the appearance of larger, palisaded villages (Cable and Raymer 2001; Caldwell 1950; Markin 2007), increased amounts of maize in archaeological contexts (Markin 2007), and settlement patterns that may indicate incipient clustering related to sociopolitical centralization (Markin 2015, 2007). While traditionally

argued to have evolved from the Napier tradition of complicated stamping, the seriations and models presented here suggest the possibility that Swift Creek B-Complex, Napier, and Woodstock ceramics may have been produced across northern Georgia contemporaneously. The GA-1 subdivision derived from the ceramic seriation in the previous chapter is characterized by the presence of all three stamping traditions. The models presented in this chapter suggest that the assemblages assigned to GA-1 date to anywhere between *cal. AD 815-1165*, with a modeled start date falling between *cal. AD 815-910* and a modeled end date lying somewhere between *cal. AD 1080-1165*. The previously proposed dates for the Woodstock phase were roughly AD 800-1000. Given the probable contemporaneity of a number of stamping traditions within this temporal subdivision, the model presented here suggests that while these major social transitions often linked to Woodstock pottery likely still begun ca. AD 800, the social landscape within which these changes were enacted may have been socially, politically, and historically more heterogeneous than previously considered.

The modeled end dates for the GA-1 subdivision presents more deviation from the extant chronological framework. Whereas the boundary between Woodstock and Etowah stamped ceramics is often cited as AD 1000 (e.g. King 2003, 2001; Markin 2007), the boundary between the GA-1 and GA-2 subdivisions, each characterized by Woodstock and Etowah maximal distributions respectively, is situated somewhere between ca. AD 1135 and 1175 with the ending of GA-1 modeled to *cal. AD 1080-1165* and the beginning of GA-

2 modeled to *cal. AD 1135-1175*. Even if the earliest possible date is used to locate the beginning of the use of Etowah ceramics, *ca. cal. AD 1135*, this is still 135 years later than proposed by the extant chronology. This date however could likely be extended back somewhat as Etowah complicated stamped ceramics do grade into the GA-1 subdivision in the ceramic seriation. Even so, the overlap between the two types of complicated stamping techniques, and the later transition between the two, is significant. This would indicate that when the community at Etowah was founded, a concomitant reorganization of society across the landscape may not have been as pronounced as previously hypothesized. In other words, while Etowah and a number of other small mound and village complexes across the region were facilitating and promoting, on a local scale, communal gatherings or corporate political strategies (*sensu* Blanton et al. 1996), many communities and populations may have remained unengaged in such activities, at least for one or two generations early on.

The extant date range for this early stage in Etowah's history is AD 1000-1200, coeval with the extant date range for the use of Etowah style complicated stamped ceramics. Barring subtle gradations into GA-1 and GA-3, the bulk of the use of Etowah complicated stamping occurs in GA-2 and is modeled here to span between *cal. AD 1135* at the earliest and *cal. AD 1310* at the latest. This stamping tradition could have fallen out of popularity by *cal. AD 1275* at the earliest, at least 75 years after what is suggested by the extant chronology. Given this expanded potential span for the maximal use of Etowah ceramics, between 260-420 years as opposed to 200, two sociopolitical scenarios for

Etowah and the region might be proposed. The first scenario generally matches the extant narrative (e.g. King 2003) whereby Etowah ceramics are produced as the sole ceramic tradition across the region and at the Etowah site until at least *cal. AD 1275* but as late as *cal. AD 1310*. During this time, corporate political strategies were employed as evidenced by mass feasting events and the initial stages of cooperative labor projects (King 2003). Centralized political authority had not been implemented, major work on mound construction projects had not been undertaken, and Mississippian ritual paraphernalia had not yet been incorporated intensively into the sociopolitical realm. After the production of Etowah ceramics ceased, Wilbanks type stamping, whose climax characterizes the GA-3 subdivision, began to be produced, but not before *cal. AD 1295*, at least 45 years later than proposed by the extant chronology. In this first scenario, associated with the identification of Wilbanks ceramics in the archaeological record, sociopolitical strategies shifted from corporate to network-based (sensu Blanton et al. 1996) as evidenced by the centralization of political authority, the adoption of a shared, Mississippian symbolic language through iconographic signaling, and an increase in socioeconomic inequality. While the extant chronology places this phase between AD 1250 and 1375, the models presented here suggest that while the use of Wilbanks ceramic likely did start around this time, ca. *cal. AD 1235-1295*, their use may have ceased as early as *cal. AD 1325*, but possibly as late as *cal. AD 1380*, similar to the extant narrative. The Etowah and Wilbanks phases in the extant chronology are roughly the same length, at 200 and 175 years respectively. If scenario one is accepted here, the

GA-2 phase, characterized by the climax of Etowah ceramics could range from 260-420 years while the range for GA-3, characterized by the climax of Wilbanks stamping, likely spanned between only 85-215 years, indicating that the more corporately oriented political strategies lasted much longer than strategies that employed more network-based approaches to political consolidation.

In the second scenario, the one favored here, the GA-2 and GA-3 subdivisions overlap significantly, indicating the likely concurrent production of Etowah and Wilbanks-like stamped vessels. This is in contrast to the extant narrative which cleanly orders the Etowah and Wilbanks phases and allows no overlap between the boundaries of the two phases or the production of each phase's eponymous ceramics. Indeed, the distinction between the two phases in the extant narrative, and the material disjuncture between the two ceramic traditions, has been explained as the result of abandonment, migration, and reoccupation episodes through which histories were remade and society was reoriented (Cobb and King 2005). The models presented here however indicate no period of abandonment across northern Georgia or the Etowah River valley. Even if we accept the two extreme ends of modeled boundaries, with GA-2 ending by *cal. AD 1275* and GA-3 not beginning until *cal. AD 1295*, this leaves only a 20 year gap, not even a generation, let alone the 50 year gap that has been proposed (Cobb and King 2005; King 2003, 2001). At the other extreme, the GA-2 subdivision may extend all the way up until *cal. AD 1310* while the GA-3 subdivision may begin as early as *cal. AD 1235*, which would produce an overlap between the two of 75 years. While this remains the extreme maximum

for the amount of temporal overlap between the two traditions, some overlap and contemporaneity is highly probable. As King (2001:50) acknowledges, Etowah Complicated Stamped ceramics were found in all Wilbanks contexts sampled at the Etowah site. Indeed, Mound C, the elaborate mortuary mound yielding some of the most profound ritual paraphernalia, exhibits ceramic distributions characterized by similar distributions of Etowah and Wilbanks sherds throughout most of the mound's construction stages (King 1996:284-287). While later stages generally had more Wilbanks-like sherds, Etowah sherds were never absent from Mound C construction stages (King 1996:284-287). At the Long Swamp site, a small mound and village complex in the Etowah River valley, no Wilbanks sherds were found and the Etowah stamped tradition was the only type of stamping present, yet dates derived from multiple materials across multiple contexts place the occupation of the site coeval with occupations at Etowah during which Wilbanks ceramics were produced. Given this kind of distributional and stratigraphic evidence combined with the seriations and radiocarbon analyses presented here it is highly likely that the two stamping traditions were employed at the same time, at least to an extent, across the region. While I argue here that the two were used contemporaneously, what remains clear is that the use of Wilbanks ceramics definitely dates to the latter half of the period within which Etowah ceramics were used. That is, while GA-2 and GA-3 definitely overlap in time, it is not a complete overlap, as the GA-3 subdivision likely overlaps significantly only with the latter half of GA-2 (see Figure 5.4).

The overlap between Etowah and Wilbanks complicated stamping traditions, and the overlap between assemblages characterizing the GA-2 and GA-3 subdivisions more broadly, is significant in that it raises questions about the character and mechanisms of social changes that occurred just after the turn of the first millennium AD. In particular, this overlap challenges previous arguments that referenced episodes of abandonment and reoccupation as major drivers of social change and societal reorganization (Cobb and King 2005; King 2012, 2003). It is difficult to make sweeping statements on these processes using only the distributions and temporalities of ceramic traditions, but a few potential implications might be offered. The two types of complicated stamped sherds, Etowah and Wilbanks, are quite distinct from one another. While Etowah stamping is more fine-lined exhibiting cleaner execution of stamping, Wilbanks stamps are bulky, bold, curvilinear, and sloppily executed. In terms of technical attributes, Etowah sherds are made using a fine-to-medium sand/grit tempering agent while Wilbanks sherds are often characterized by large, blocky inclusions of grit and quartz. Significantly, Etowah stamped sherds found throughout northern Georgia and eastern Tennessee are also tempered with shell and limestone materials while Wilbanks sherds found in both localities are rarely tempered with anything but grit. Both traditions are clearly rooted in the histories of ceramic production across Georgia, as they occur in only limited frequencies across eastern Tennessee. More specifically, given the lack of Wilbanks stamped sherds at Bell Field, a community contemporary with Etowah but located in the river valley just north of the Etowah River valley, it is likely that these two

traditions, Wilbanks and Etowah, abutted one another both temporally and spatially, most intensively in the Etowah River valley. While the relationship between these two traditions remains ambiguous, it is clear that sociopolitical transformations, especially the development of Etowah as a major center of sociopolitical activity, were likely contextualized by either, or all, of the following:

- 1) the movement of new peoples into the Etowah River valley and the subsequent use of two ceramic traditions (in terms of both surface treatments and temper usage) by indigenous populations and newcomers; 2) the heterogeneous, in situ development of two coeval ceramic traditions across northern Georgia; and/or 3) a change in ceramic tradition that developed so rapidly that the two cannot be temporally parsed out in the archaeological record.

In this last scenario, changes to ceramic traditions would likely indicate the rapid reorganization of communities of practices and alterations to the relationships between social groups as evidenced through changes to social signaling behaviors both regionally and within communities.

Eastern Tennessee

In eastern Tennessee, evidence for increased sedentism, village life, and the adoption of new practices, including the appearance of palisades, platform mounds, and wall-trench architecture have been traditionally assigned to the Martin Farm phase, characterized by the transition between the use of limestone and shell tempering agents in the production of ceramics. While the Martin Farm

phase has been traditionally dated to between AD 900 and 1100, the models presented here locate the start of the TN-2 subdivision, characterized by this limestone-shell gradient, at *cal. AD 935-1090*, roughly 35 to 200 years later than the extant chronology would suggest. In tracking the emergence of incipient villages across Southern Appalachia, these dates would suggest that these practices were adopted first in northern Georgia, as early as *cal. AD 815-910*, at least 25 years, before evidence for this kind of sedentism appears in the archaeological record of eastern Tennessee. However, while the earliest villages in eastern Tennessee were accompanied by platform mounds and public architecture, and dated to be more coeval with the earliest occupations at Etowah, the early villages across northern Georgia, characterized by Woodstock stamped pottery, did not exhibit these public facilities, except for palisades. The contemporaneity of TN-2 assemblages with GA-2 assemblages, or traditionally Martin Farm with Etowah assemblages, is not a stretch. In fact, the orientation of regional sociopolitics during TN-2 seems to mirror that of northern Georgia politics at this time with the emergence of incipient, localized central places across the landscape.

The TN-3 subdivision, characterized by almost exclusive shell tempering, the appearance of ceramic types from northern Georgia, and new modes of decoration, seems to significantly overlap with, and grade into, the TN-2 subdivision. This is not a new development, as researchers have previously noted the seamless gradient between the extant culture-historic phases of Martin Farm and Hiwassee Island. Significantly, the start of TN-3, during which major

monumental sociopolitical centers emerged across eastern Tennessee, aligns almost perfectly with the start of the GA-2 subdivision, or the increase in Etowah complicated stamping and the initial occupations at the Etowah site. Additionally, both TN-2 and TN-3, given their overlap, seem to have ended at the same time as subdivisions GA-2 and GA-3. The end dates for these ceramic subdivisions line up with the proposed abandonment of the Etowah community at roughly AD 1325 (discussed in Chapter 6). These end dates are further supported by the start dates of the GA-4 and TN-4 subdivisions at ca. AD 1300-1350, characterized by ceramic assemblages traditionally identified as Lamar and Dallas phase ceramics respectively. Both Etowah and Wilbanks stamped ceramics are found at sites in eastern Tennessee that fall within the TN-3 subdivision, lending credence to the argument that the two ceramic traditions were used contemporaneously in northern Georgia and to the supposition that major mound centers in eastern Tennessee started and ended roughly parallel with the mound centers across northern Georgia.

The implications and scenarios presented here are admittedly coarse in both temporal and spatial resolution. The analyses conducted in this chapter have been broad, seeking to refine and reconsider ceramic chronologies across the entirety of the Southern Appalachian region. While these new chronologies have provided valuable, preliminary insight into the sociopolitical histories of Southern Appalachia, they remain too broad to evaluate in detail particular trends in practice and the fine-scale transformations that were enacted within

communities across the region. In the next chapter, using more high-resolution *a priori* information, I build on the broad histories outlined here by evaluating temporalities of mound building, mortuary traditions, settlement patterning, and the use of ritual iconography. The integration of all of these datasets, in concert with the broad contextualization of the ceramic sequence, facilitates the construction of robust material chronologies that are then used as indicators for institutions and institutional change.

CHAPTER 6: INSTITUTIONAL CHANGE

As outlined in Chapter 2, there is no question that major social, political, and economic changes swept across the southeastern United States sometime after roughly AD 1000, with new practices and forms of society likely originating in the Lower Mississippi River Valley and spreading out from there across the greater midwestern and southeastern regions (Anderson and Sassaman 2012; Blitz 2010; Pauketat 2004b, 2002, 1998). It is argued that these changes included the introduction of centralized, hereditary leadership positions, intensified agricultural production, increased socioeconomic hierarchies, the exponential growth of village populations, and the widespread adoption of shared iconographic and religious traditions. All of these changes, often referred to in aggregate as the process of Mississippianization, represent changes to the institutions that governed the organization, enculturation, and reproduction of society. While the regional ceramic chronologies presented in Chapters 4 and 5 provided a broad, coarse-grained perspective on the sociopolitical histories of Southern Appalachia, in this chapter I produce high-resolution community-scale chronologies to identify major historical junctures and shifts in the Southern Appalachian political landscape. More specifically, I explore two periods of major social change: one characterized by the processes of Mississippianization described above and one period characterized by the collapse of Etowah and the subsequent reorganization of the sociopolitical terrain. It is during these periods that processes of collective action, especially the transformation or durability of

institutions and social networks, would have been vital for sustaining societal viability. In this chapter I explore the timing, temporality, and character of these major historical junctures. In Chapter 7, I investigate how these critical transitions articulated with the organization of regional social networks.

To achieve these goals, I evaluate the platform-mound chronologies of 20 sites from across the region, 10 from eastern Tennessee and 10 from northern Georgia, each of which fall between roughly AD 1150 and 1550 (Figure 6.1). While these were certainly not the only mounds in use across the region during this time, these twenty mounds represent the most well-recorded, providing a rich archaeological record. These platform mounds are accumulative in nature and are the product of the continuous rebuilding of public structures throughout the mound's use-life. Because of the accumulative nature of these platform mounds, and thus the archaeologically discrete nature of their construction phases, they yield precise temporal information on changes to ceramic, architectural, and ritual materials. As such, they encode important temporal information about changes to social, political, and economic practices that took place within communities and the relative timing of these changes across the region. Indeed the platform mounds themselves represent the political lives of communities and groups, representing the cornerstones of administrative organizations (e.g., Blitz 1999; Blitz and Livingood 2004; Hally 1996) and serving as monumental architecture

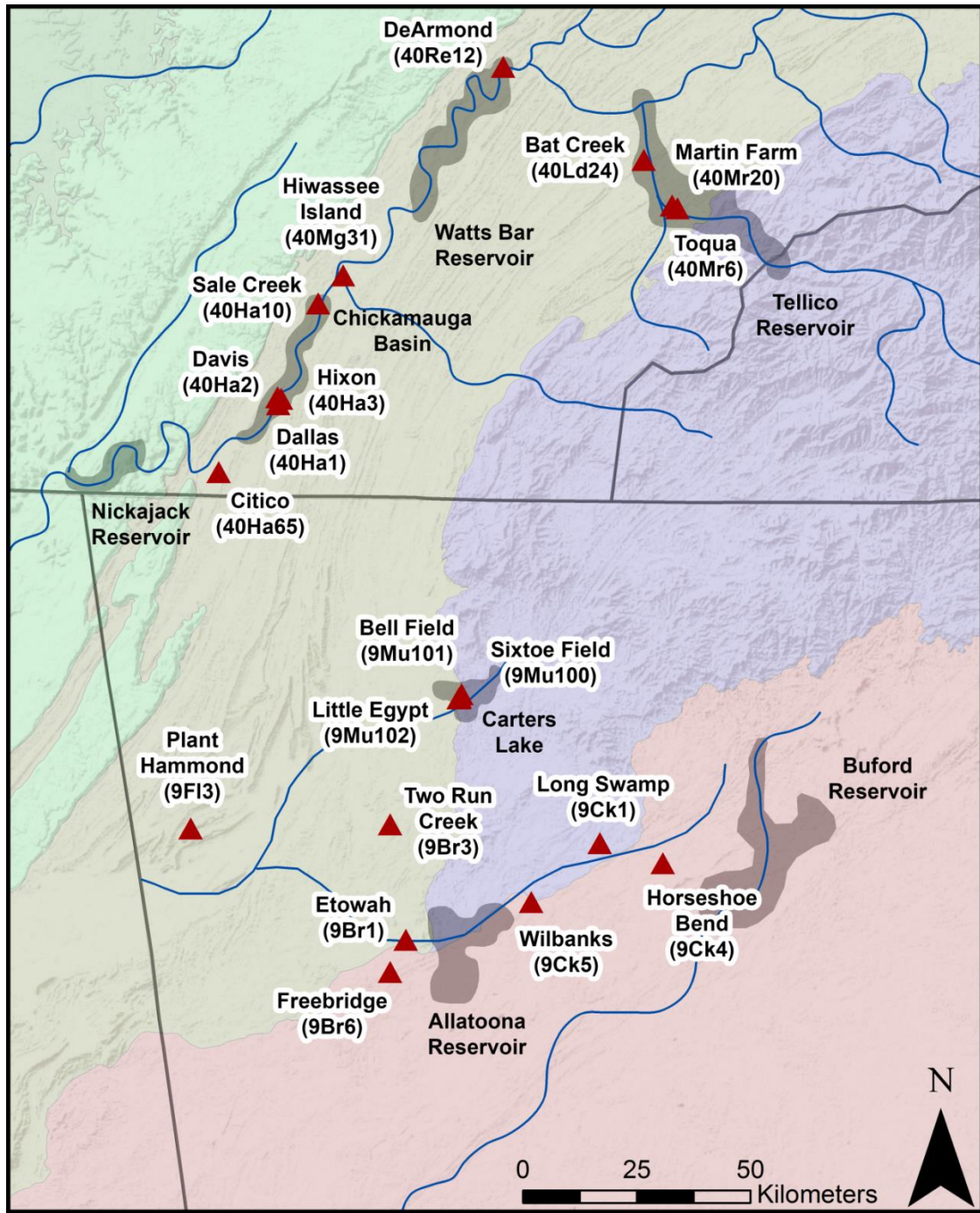


Figure 6.1. Map of platform mound sites considered here.

symbolizing and materializing processes of community and regional integration and differentiation (Knight 2001, 1986; Lindauer and Blitz 1997).

Thus, the goal of this chapter is to establish high-precision chronologies for each of these 20 platform mounds and, in turn, the material chronologies reflective of such practices as burial traditions, architectural changes, the distributions and use of ritual paraphernalia, and changes to both regional and community scale settlement patterns. These chronologies are built by incorporating new and extant radiocarbon data from mound contexts, constructing new Bayesian models for mound construction stages, and evaluating the ceramic data and regional chronologies gleaned from the analyses presented in Chapter 5. Beyond data derived from platform mounds, I also consider the wider community and incorporate information on architectural traditions in village contexts, settlement size, settlement features such as palisades, ditches, mounds, and plazas, and the overall arrangement of these features to form a community settlement pattern in order to elucidate disjunctures in material practices and evaluate the kinds of institutional changes that were enacted.

I begin by providing narrative descriptions for each of the 20 platform mound sites used here and include a brief summary of the available data on chronology, community organization, architectural practices, ceramic traditions, ritual/religious paraphernalia, and mortuary patterns for each. Using new and extant radiocarbon data, combined with *a priori* information derived from platform mound stratigraphies, I build a number of Bayesian models to determine absolute

platform mound chronologies. For mounds with no radiocarbon dates, contextual information on ceramic assemblages, stratigraphy, and other material indicators were consulted to estimate mound construction dates. These dates are assigned with reference to the absolute date ranges for ceramic sequences as presented in Chapter 5. Once absolute chronologies are determined, I place all 20 platform mounds in a sequence to establish general institutional narratives and to evaluate the timing and temporality of social change across Southern Appalachia.

Platform Mound Chronologies

The following are brief overviews of each of the 20 platform mound sites included in this analysis. The purpose of these overviews is to establish general narratives for a number of social practices including mortuary patterns, mound construction, architectural traditions, and ceramic technology. Table 6.1 summarizes these community-scale characteristics while Table 6.2 provides the final estimates for platform mound start and end dates. All radiocarbon data referenced or used in Bayesian models are presented in Table B.1 of Appendix B. In some cases, the seriation models from Chapter 4 and 5 are referenced. For some of the sites discussed below, new models were constructed to estimate the temporal ranges for platform mound use. These results are provided as in-text figures while code for all platform mound models can be found in Appendix D.

Because the data available for each mound varies from site to site, mound chronologies were differentially built depending on the availability of particular datasets. Where radiocarbon dates were available, they were combined with

Table 6.1. Major characteristics of the platform mound sites considered here.

Site Number	Site Name	Site Size (ha)	# Mound Stages	# Mound Burials	Total Burials (ca)	% Mound Burials	% with Grave Goods	Stone Box Graves	Log Tombs	Exotics Frequency	Wall Trenches	Round Structures	Ditch/Palisade	Palisade Start (AD)
40Ha1	Dallas	2.5	>4	>100	300	30%	~30%	x	x	High	No	No	Yes (Palisade)	1350
40Ha10	Sale Creek	0.5 (HI); 3	1	13 (Dallas)	114	10%	~25%			High	No	No	No	NA
40Ha2	Davis	0.5-1	5	9 (Dallas)	9	100%	~30%			Low	No	Yes	No	NA
40Ha3	Hixon	0.5-1	4	78	115	70%	~50%	x		Highest	Yes	Yes	Yes (Palisade)	1300
40Ha63	Citico	2	8-13	NA	>225	NA	70%			Highest	NA	NA	NA	NA
40Ld24	Bat Creek	1.5	1	0	NA	0%	NA			None	No	No	NA	NA
40Mg31	Hiwassee Island	3.5	7	9 (Dallas)	180	5%	~50%			High	Yes	Yes	Yes (Palisade)	1200
40Mr20	Martin Farm	0.5 (MF); 4 (HI)	*4	0	1	0%	0%			None	Yes	Yes	Yes (Palisade)	1100
40Mr6	Toqua	3.5	9	103 (A); 114 (B)	500	50%	~100%	x	x	High	Yes	Yes	Yes (Palisade)	1275
40Re12	DeArmond	2.5	7	93	95	97%	65%			High	Yes	No	No	NA
9Br1	Etowah	30	7	366	NA	NA	NA	x		Highest	Yes	Yes	Yes (Both)	1200
9Br3	Two Run Creek	3	9	0	NA	0%	NA			Low	No	No	NA	NA
9Ck1	Long Swamp	1	3	0	NA	0%	NA			Moderate	Yes	Yes	Yes (Palisade)	1200
9Ck4	Horseshoe Bend	1	1	0	NA	0%	NA	x		Low	NA	NA	NA	NA
9Ck5	Wilbanks	3	3-4	0	NA	0%	NA	x		Low	NA	NA	NA	NA
9F13	Plant Hammond	1.5	3-4	0	NA	0%	NA			None	No	No	Yes (Ditch)	1225
9Mu100	Sixtoe Field	2	2-3	21	25	50%	10%	x		Low	Yes	Yes	NA	NA
9Mu101	Bell Field	NA	3	18	NA	NA	50%		x	Moderate	Yes	No	NA	NA
9Mu102	Little Egypt	2.5	>4	NA	NA	NA	NA			Low	No	No	NA	NA
9Br6	Freebridge	NA	3	NA	NA	NA	NA			None	NA	NA	NA	NA

Table 6.2. Platform mound chronologies.

Site Number	Site Name	Earliest Possible Mound Start	Latest Possible Mound End	Likely Mound Start	Likely Mound End	Span (years)	Avg Stage Use (years)
40Ha1	Dallas	1320	1430	1325	1425	100	25
40Ha10	Sale Creek	1180	1310	1200	1225	25	25
40Ha2	Davis	1165	1340	1175	1275	100	20
40Ha3	Hixon	1280	1410	1300	1375	75	20
40Ha63	Citico	1290	1580	1325	1550	225	25
40Ld24	Bat Creek	1165	1340	1250	1275	25	25
40Mg31	Hiwassee Island	1150	1370	1175	1325	150	20
40Mr20	Martin Farm	1155	1280	1200	1275	50	20
40Mr6	Toqua	Before 1220	1575	1275	1475	200	20
40Re12	DeArmond	1090	1530	1200	1400	200	30
9Br1	Etowah	1180	1340	1200	1315	115	15
9Br3	Two Run Creek	1235	1380	1235	1380	150	15
9Ck1	Long Swamp	1185	1340	1225	1300	75	25
9Ck4	Horseshoe Bend	1235	1380	1275	1325	50	25
9Ck5	Wilbanks	1225	After 1255	1225	1300	75	20
9FI3	Plant Hammond	1225	1380	1225	1350	125	30
9Mu100	Sixtoe Field	1135	1310	1200	1275	75	25
9Mu101	Bell Field	1300	1460	1325	1400	75	25
9Mu102	Little Egypt	1300	1675	1350	1600	250	NA
9Br6	Freebridge	1235	1380	1300	1350	60-90	25

stratigraphic information (where available) to build new Bayesian models for mound construction stages. Where radiocarbon dates were not available, temporal information was gleaned from assessing the number of mound construction stages and their associated ceramic assemblages. These assemblages were then compared to the date ranges for ceramic frequencies presented in Chapters 4 and 5. In concert with the number of construction stages present, date ranges for platform mounds were estimated. In either case, whether using radiocarbon dates or more associative modes of chronology building, final estimates were verified, in part, by calculating the average lifespan of a single construction stage. Estimates were compared against Hally's (1996) estimates of an average of roughly 25 years per construction stage. In all cases,

estimates for the overall lifespans of platform mounds were verified using Hally's average and, in turn, also support Hally's claim.

While the chronologies built here specifically reference the construction of platform mounds, and changes to the material culture uncovered from these mounds, I connect these temporalities to the broader community within which the mounds are situated. This is justified in that very few of the mounds considered here are located at multi-component sites and there is no indication that, at single-component sites, mound use and residential occupation were not coeval (e.g., King 2003; Lewis and Kneberg 1946; Lewis et al. 1995; Polhemus 1987). That is, barring spurious cases, platform mounds are coeval with the lives of communities across Southern Appalachia and, as such, the chronologies presented here can offer general insight into the occupational histories of these communities. For multi-component sites with platform mounds in the Southern Appalachian region, there are no instances, based on ceramic materials, radiocarbon dates, and other material indicators, in which platform mounds are used during one component of a site's occupation and not another. That is, even at multi-component sites, the use of platform mounds is coeval with the occupation of the community. In correlating material signatures from the mound and village contexts, general temporal patterns of community organization and occupational histories can be gleaned.

Eastern Tennessee

Bat Creek (40Ld24). Bat Creek (40Ld24) is located on the Little Tennessee River in the Tellico Reservoir area just south of the confluence of the Little Tennessee and Tennessee Rivers. The site was excavated by archaeologists from both the Tennessee Valley Authority (TVA) and the University of Tennessee-Knoxville (UTK) (Schroedl 1975). All data reported here are derived from Schroedl (1975) except for new AMS dates and Bayesian models. The site encompasses the remains of a small, ca. 1.5ha settlement with an associated platform mound. The mound seems to have been built in a single stage, with no later additions or construction phases, although years of plowing and erosion may have obliterated evidence of terminal mound construction. Underneath the mound is evidence for three possible structures, all rectangular and exhibiting single-post construction techniques, no wall-trenches. No post molds or patterns were found in mound fill or on the mound summit, although, again, erosion may be responsible for this result. Similar to other low platform mounds in eastern Tennessee, the platform mound at Bat Creek was likely rectangular in form. No burials were found in the mound while no wall trench structures, round structures, or exotic paraphernalia were found at the site. A single date, UGAMS-28825 (this dissertation), is available from the village area of the site (Area C) from a shallow pit associated with a wall/fence structure running between, and connecting, two rectangular, single-post house structures. The date was included in the seriation models presented in Chapter 5 and is modeled to *cal. AD 1245-1275 (68% confidence interval)*. Given the single mound construction stage, abundance of shell

tempered and ceramic assemblages consistent with a transition from TN-3 to TN-4, the platform mound was likely utilized between AD 1250 and 1275.

Citico (40Ha63). Located along the Tennessee River, just north of the Georgia-Tennessee border, the Citico site (40Ha63) was originally excavated in the late 19th and early 20th centuries (see Hatch 1976). Due to the nature of these early excavations, there is little remaining or reliable sources of data to fully characterize the community at Citico, although Hatch's (1976) reevaluation provides one of the best attempts and is the source of the information provided here. The lack of information on these early excavations and the poor quality of the remaining data are especially unfortunate considering the undoubtedly important role of the Citico community within its socio-political landscape. The quality and quantity of ritual and exotic paraphernalia recovered from the Citico site is comparable to the materials recovered from both the Etowah and Hixon sites and represents one of the most elaborate assemblages of classic Mississippian paraphernalia and iconography. Because of poor recording, it is impossible to evaluate architectural features at Citico. While it has been difficult to connect particular burials with particular proveniences at the site, over 225 total burials were recovered with over 70% of these accompanied by some sort of grave good. Although the number of mound interments cannot be deduced, records indicate that burials were indeed found in the main platform mound. This would suggest the use of the platform mound began after the use of Hamilton burial mounds had ceased, thus placing the start of the platform mound's use

after ca. AD 1300 (discussed below). No radiocarbon determinations are available from the Citico site. Given the start date for the Hixon platform mound ca. AD 1300 (discussed below), and the presence of both Hiwassee Island, Etowah, and Wilbanks ceramics at Hixon, it is likely that construction on the Hixon mound began just before construction on the Citico mound, but that the two overlapped significantly in use. As such, I estimate that the Citico platform mound came into use at approximately AD 1325 and continued to be used until at least AD 1550. While this span is long, ca. 225 years, with the rough assumption that mound stages were generally used for between 15 and 30 years, this lines up well with records which indicate that the mound was composed of between 8 and 13 stages.

Dallas (40Ha1). The Dallas site (40Ha1) is located along the Tennessee River in the Chickamauga Basin and has undergone substantial horizontal excavation by WPA archaeologists in the early 20th century (Lewis et al. 1995:305-371). All data available for the Dallas site can be found in Lewis et al. (1995:305-371), the primary source of excavation data. The site compares similarly to other contemporary sites in terms of areal extent at roughly 2.5ha. There is no evidence for wall trench structures or round structures, but there is evidence for a palisade. The main platform mound consists of four construction stages made of a number of superimposed structures. Of the ca. 300 burials found across the site, roughly one-third of these were interred in the platform mound. Of the total number of burials, roughly one-third were buried with grave goods of any sort

while the frequency of exotic or ritual paraphernalia is one of the highest in the region. The site itself seems to have been intentionally organized, with a formal layout of platform mound, plaza, palisade, and houses. This compact nature, increased population, and more formal community layout likely also characterized the settlement at Citico, but this remains speculative. While four construction stages were recognized within the mound, records indicate that in the mid to early 19th century, the mound was leveled to some extent. Thus, the mound may have been built in more than four stages, although this cannot be confirmed. Four radiocarbon dates are available from the Dallas mound (Table B.1). Considering the modeled dates (Figure 6.2), regional ceramic seriation, and the number of mound construction stages, the platform mound at Dallas was likely used between AD 1325 and 1425.

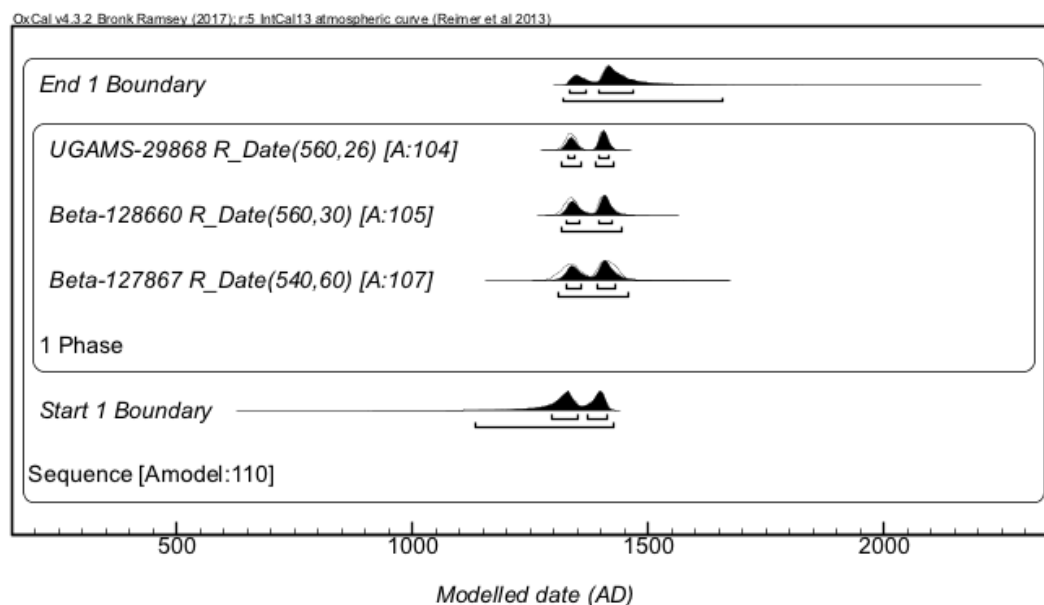


Figure 6.2. Bayesian model for the Dallas (40Ha1) platform mound.

Davis (40Ha2). Located just 2km up river from the Dallas site in the Chickamauga Basin, the Davis site (40Ha2) was a small, 0.5-1ha, settlement with an associated, low platform mound (Lewis et al. 1995:419-440). All data presented here is reported in Lewis et al. (1995:419-440) which is the primary source of archaeological information from the site. The Davis site is likely one of the earliest platform mound sites in the Southern Appalachian region that can be considered Mississippian and is likely contemporaneous with the early Mississippian occupation at the Martin Farm site (40Mr20) in the Tellico reservoir area (discussed below). While round, single post structures are present at Davis, there is no evidence for the use of wall trench structures at the site. The mound, originating as two low mounds and eventually being combined into one large mound, was likely built in five stages. While there is a small, later component at the site, resulting in intrusive mound interments, the mound was likely completely built during the earliest occupation as suggested by ceramic, architectural, and radiocarbon data. Just two radiocarbon dates are available from premound and mound contexts at Davis. A single date from below the mound yielded a calibrated range of cal. AD 80-125 (68% confidence interval) (this dissertation). This is consistent with the large Woodland period occupation observed at the site. The single date from within the platform mound (Sullivan 2012), modeled as part of the regional ceramic seriation, yields a range of cal. AD 1060-1195 (68% confidence interval). Given the ceramic profile, number of construction stages, absence of wall trench architecture, and lack of exotic paraphernalia, the Davis platform mound was likely used between AD 1175 and 1275. During the later

occupation of the site, sometime after AD 1300, nine interments were placed in the mound. No other burials found at the site have been determined to be contemporary with these nine mound burials. Of these nine, only three were accompanied by grave goods.

DeArmond (40Re12). The DeArmond site (40Re12) is the only mound site considered here that is located in the Watts Bar reservoir area, north and east of both the Tellico and Chickamauga areas. All data reported here are derived from Koerner (2005), which is a synthesis of primary field notes and records collected during the early 20th century excavations. The extent of the settlement at DeArmond was likely loosely spread over an area of roughly 2.5ha. The site was excavated by WPA archaeologists in the early 20th century, but re-analyses by Shannon Koerner (Koerner 2005), especially of the mound excavations, have made this data readily accessible. While wall trench structures are found at the site, no round, contemporaneous structures have been identified (one round structure has been identified as a Late Woodland structure (Sullivan and Koerner 2010). The platform mound was constructed in seven stages, each of which was topped with sequentially rebuilt structures. Ten radiocarbon dates are available from the DeArmond platform mound. When modeled based on mound stratigraphy (Figure 6.3), a maximum range of *cal. AD 1090-1530* is produced. When considering the number of construction stages and the ceramic profile within the mound, it is likely that this range can be constrained to between AD 1200 and 1400. There is a clear shift between TN-3 and TN-4 ceramic

characteristics throughout the use-life of the mound, indicating the use of the platform mound before and after the general shift in ceramic practices that took place across the region at roughly AD 1300. While Hamilton burial mounds were likely used by DeArmond residents throughout the first half of its occupation, at least 93 burials were included in later mound stages. As only 95 burials have been recovered at the site, almost all of the known burials from DeArmond were buried in mound contexts. At another site in the Watts Bar region, Upper Hampton (40Rh141), a Hamilton burial mound was completely buried by later occupants, possibly as a way of distancing themselves from these early traditions (Dalton-Carriger 2011).

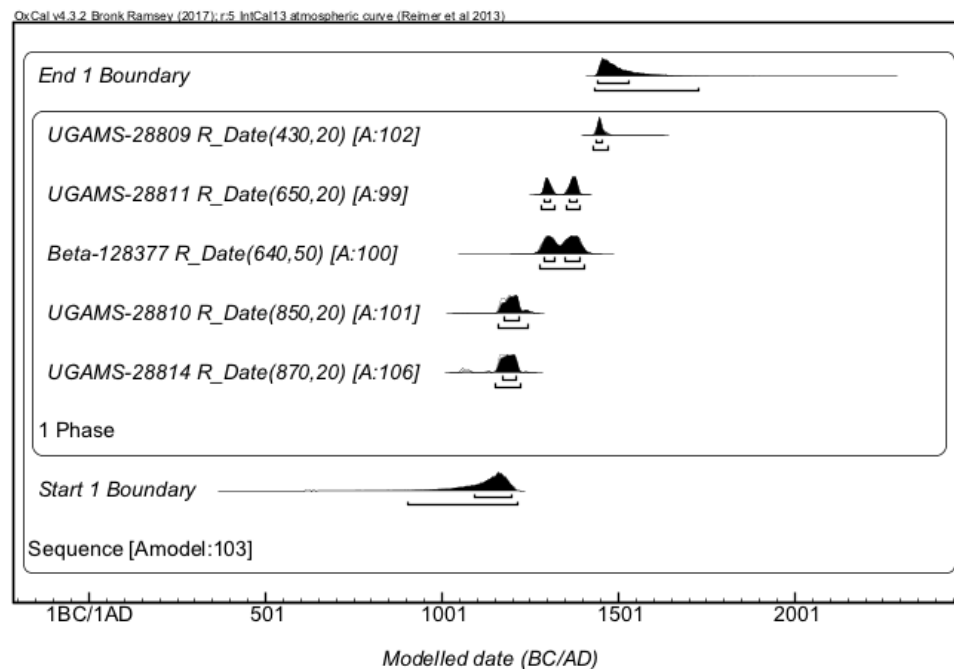


Figure 6.3. Bayesian model for the DeArmond (40Re12) platform mound.

Unlike these earlier Hamilton burials, which are most abundant in the Watts Bar area, ca. 65% of individuals interred in the platform mound at DeArmond were buried with grave goods. Overall, the frequency of exotic and ritual paraphernalia, including intricate copper and shell artifacts, from DeArmond is high, similar to the assemblages found at sites in the Chickamauga Basin (Hixon, Hiwassee Island, and Dallas).

Hiwassee Island (40Mg31). The Hiwassee Island site (40Mg31) is located on Hiwassee Island at the confluence of the Tennessee and Hiwassee Rivers at the northern end of the Chickamauga Basin. The bulk of data used here to characterize the occupational history of Hiwassee Island is derived from Lewis and Kneberg's (1946) monograph on their excavations at the site in the early 20th century. The site has strong Late Woodland, Early, Middle, and Late Mississippian components and includes a large platform mound and village area, a number of Hamilton burial mounds, numerous shell middens, and several rebuilt palisades (Lewis and Kneberg 1946; Patch et al. 2017). While it is difficult to parse these components apart archaeologically, at its greatest extent the community at Hiwassee Island was likely spread over an area of roughly 3.5ha. There is evidence for both round and wall trench structures in both village and mound contexts. The mound was constructed in seven stages and includes just nine burials, likely dating to the latest phases of mound construction. There are six radiocarbon determinations available from four of the mound stages and one from underneath the mound. When modeled (Figure 6.4), the maximum span of

use falls in the range of *cal. AD 1150-1370*, but given the number of construction stages and the ceramic profile of the later stages of mound construction, its use more likely falls in the constrained range of AD 1175-1325. This range would place the last few stages of mound use coeval with the earliest stages of mound use at the Dallas and Hixon sites (discussed below) which are much more similar to one another in terms of mortuary patterns and ritual paraphernalia. This would also put the use of Hiwassee Island's platform mound exactly contemporaneous with the use of the large platform/burial mound at Etowah in northwestern Georgia (discussed below).

Of the 180 burials recovered from Hiwassee Island, just 5% were interred in the large platform mound and only 50% were interred with grave goods. This would suggest that after the Hamilton burial mounds fell out of use, the large platform mound was used for only a short time thereafter and it is likely that many of these 180 burials found at the site belong to the latter part of the community's

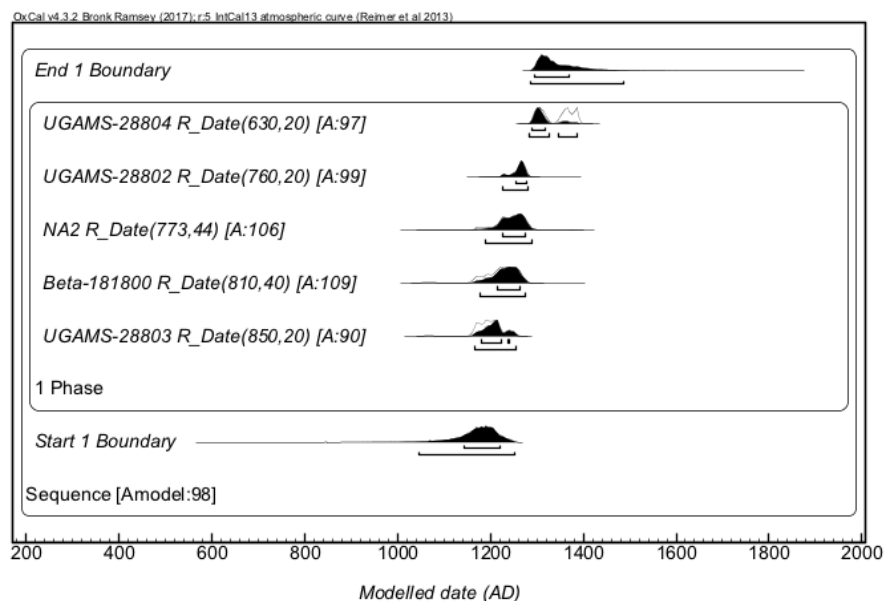


Figure 6.4. Bayesian model for the Hiwassee Island (40Mg31) platform mound.

occupation. This may indicate that Hiwassee Island only grew to its maximum extent during these final stages, but was a relatively modest community during most of its earlier occupation, despite the investment in mound architecture, public buildings, and exotic imports. Either way, the level of population aggregation seen at the Etowah site was not witnessed at the Hiwassee Island community. It may be that Hiwassee Island's community remained dispersed, across the rest of the island or on the banks and terraces across the river. This would be consistent with Mississippian settlement patterns identified by Davis (1990) in the Tellico reservoir area.

Hixon (40Ha3). Hixon (40Ha3) is located in the Chickamauga Basin along the Tennessee River in the vicinity of the Dallas, Davis, and Sale Creek sites. All primary data considered here is derived from Lewis et al.'s (1995) reporting of field notes and records from early 20th century excavations. The major feature of the Hixon site is a large platform/burial mound. While Lewis et al. (1995) argued for the possibility of a village area that had mostly eroded into the river, Sullivan (2016) questions this assumption and posits the likelihood that no village accompanied the platform mound at the Hixon site. Indeed, the few structures found in the vicinity of the mound are small, unlikely to represent any permanent dwellings. Both wall trench structures and round structures are found at the site. The mound itself is notable for the number of burials interred throughout its use (n=78) and even more so for the high frequency of elaborate exotica found with these burials. Indeed, over 50% of interments at Hixon were buried with grave

goods while over 70% of burials recovered from the site were buried in the mound. The assemblages includes tens of thousands of marine shell beads, copper plates, stone celts and axes, shell gorgets, etc... In fact, the extravagant material assemblages recovered from Hixon's mound, Etowah's Mound C, and the mound at Citico all show striking similarity to one another. However, the five modeled radiocarbon determinations from Hixon place its use between *cal. AD 1280-1410* (Figure 6.5). Given that only four construction stages were identified in the Hixon mound, this range likely overestimates the mound's use, which probably dates more closely to AD 1280-1340, making it contemporaneous with the initial use of the Citico mound and post-dating the majority of the use-life of Etowah's Mound C, likely overlapping with Mound C's final stages.

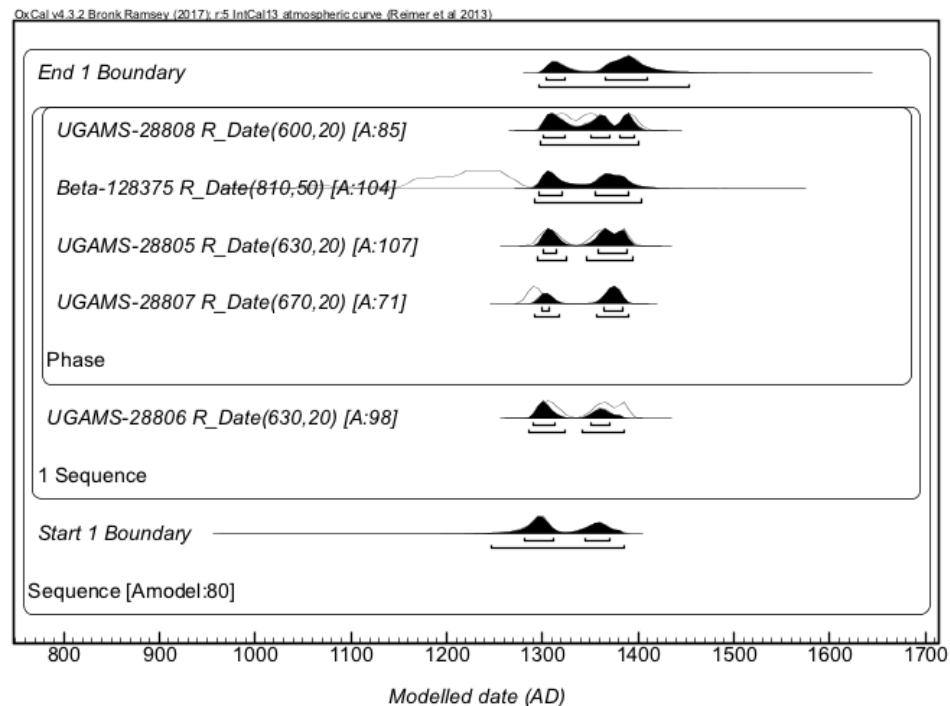


Figure 6.5. Bayesian model for the Hixon (40Ha3) platform mound.

A recent study on the biodistances of eastern Tennessee populations makes this potential sequence (Hixon following Etowah) particularly interesting. According to McCarthy (2011), the biological population interred in the Hixon mound is unlike any of the other four eastern Tennessee sites that were analyzed. In fact, of all sites analyzed, it was the least similar to the population at the contemporaneous Dallas site located a mere kilometer away, while the Dallas site was very similar to DeArmond and Rymer sites located much further away than the Hixon site. While speculative, this biological dissimilarity combined with the similarities between ceramic assemblages and paraphernalia/ iconography recovered at Hixon and at Etowah, may suggest a biological relationship between the occupants of the two communities. Given that the burial mound at Hixon likely started after the end stages of the use of Mound C at Etowah, the Hixon population may have moved up to eastern Tennessee from northern Georgia following the collapse of the polity centered on the Etowah community. Biodistance or genetic studies would need to be used to confirm this, although petrographic and elemental studies of some of the pottery found at Hixon may also shed light on the movement of peoples, materials, or practices between the two sites.

Martin Farm (40Mr20). Martin Farm (40Mr20) was a small, 0.5ha community on the Little Tennessee River in the Tellico reservoir area. Originally visited by Salo (1969), large-scale excavations were later undertaken by Schroedl et al. (1985). All data reported here are taken from these two sources. The Martin Farm site is

known for clarifying some of the issues related to the Late Woodland/Early Mississippian transition in eastern Tennessee and the Martin Farm phase, named after the site, is often referred to as the Emergent Mississippian phase. Early on in the site's history, there was a small, 0.5ha community. During this time, limestone tempered ceramics continued to dominate and both wall trench and round structures were used at the site. Also during this early phase, the structures underneath the low platform mound were in use and the first stages of mound construction were likely undertaken. The mound started as two low mounds which were eventually combined into one low lying mound for a total of four stages of construction. No burials were recovered from the mound and the site has yielded no exotic or elaborate ritual paraphernalia. During the occupation at the site, the ceramic profile shifted from TN-2 to TN-3 ceramic assemblages with greater amounts of shell tempered pottery along with the expansion of the occupation to an extent of roughly four hectares. A number of fence or wall structures have been identified, but their purpose and their extent remain ambiguous. While nine dates are available from the site, none of these are from mound contexts. Three are from a feature located beneath the mound's first construction stage and the contemporaneity between the feature and other dated features at the site, combined with the ceramic profile of the mound and the number of construction stages, places the use of the mound likely in the range of AD 1200-1275.

Sale Creek (40Ha10). Sale Creek (40Ha10) is located in the Chickamauga Basin near Hixon, Dallas, and Davis (Lewis et al. 1995). The little information available on the site's occupational history comes from Lewis et al.'s (1995) report on their excavations. Its low mound seems to consist of only a single construction stage. A single, large structure was found in the mound directly above deposits characterized exclusively by limestone tempered sherds. The occupation at this point was likely small, extending just 0.5ha. The site was apparently reoccupied later in its history and 13 burials were placed in the preexisting mound while a total of 113 were recovered from across the site. Each of these burials seems to date to the later occupation which extended to roughly 3ha at this point. Of these 113 later burials, just 25% were interred with grave goods. While this is relatively low, Sale Creek has produced a sizeable assemblage of exotic material that likely dates to this later occupation. No wall trench structures or round structures have been found at the site. Given the single stage of mound construction and the large mound structure associated with overwhelmingly limestone tempered sherds, the initial use of the mound, including its construction, likely dates to AD 1200-1250 while its later occupation likely dates to sometime between AD 1300 and 1375, although it would be difficult to estimate a more precise date. Either way, it is unlikely that any mound construction activities took place at the site during this later occupation.

Toqua (40Mr6). The Toqua site (40Mr6) is one of the most well documented Mississippian sites in eastern Tennessee, and possibly across all of Southern

Appalachia. Excavated and reported on by Polhemus (1987), the Toqua site is located in the Tellico reservoir area and represents a moderately sized, 3.5ha mound, village, and plaza complex. Thousands of houses, burials, and features have been uncovered at the site and two large mounds have been extensively investigated. The largest mound at the site, Mound A, was built in nine stages and hosted the remains of at least 103 individuals while 114 individuals were interred in Mound B. These mound burials account for roughly 50% of the burials recovered from the site and nearly all burials recovered were accompanied by some kind of associated grave goods. Both wall trench structures and round structures are present in the early occupations at the site, while ritual and exotic paraphernalia are abundant. Nine radiocarbon determinations are available from the Toqua site, six of which are from Mound A. When modeled, the maximum range for the mound's use falls between *cal. AD 1200 and 1575* (Figure 6.6). This is likely an overestimation of the mound's actual use as the radiocarbon calibration curve for this time period does not provide a clean estimation for the exact measurement of the modeled dates. Given the presence of TN-2 and TN-3 ceramic assemblages, the presence of wall trench and round structures, and the abundance of later burials at the site, the use of Mound A is more likely dated to between AD 1275 and 1475. The site itself is often cited as an example of a planned, Dallas phase village, with the plaza, Mound A, and Mound B all oriented in regards to one another and surrounded by a substantial palisade. The village was compact and highly populated, likely similar to a handful of other communities occupied after AD 1300 including the Dallas site.

Northern Georgia

Bell Field (9Mu101). The Bell Field site (9Mu101) is located in the Carter's Dam area in the Coosawattee drainage basin just north of the Etowah River valley. The site is situated in the vicinity of three other sites considered here: Little Egypt (9Mu102), Sixtoe Field (9Mu100), and Potts Tract (9Mu103). The mound at Bell Field (and parts of the village) were excavated in the 1960s by Arthur Kelly and are reported in two manuscripts (Kelly 1972). The data considered here are derived from these manuscripts as well as my own ceramic analyses. Most of the work was concentrated

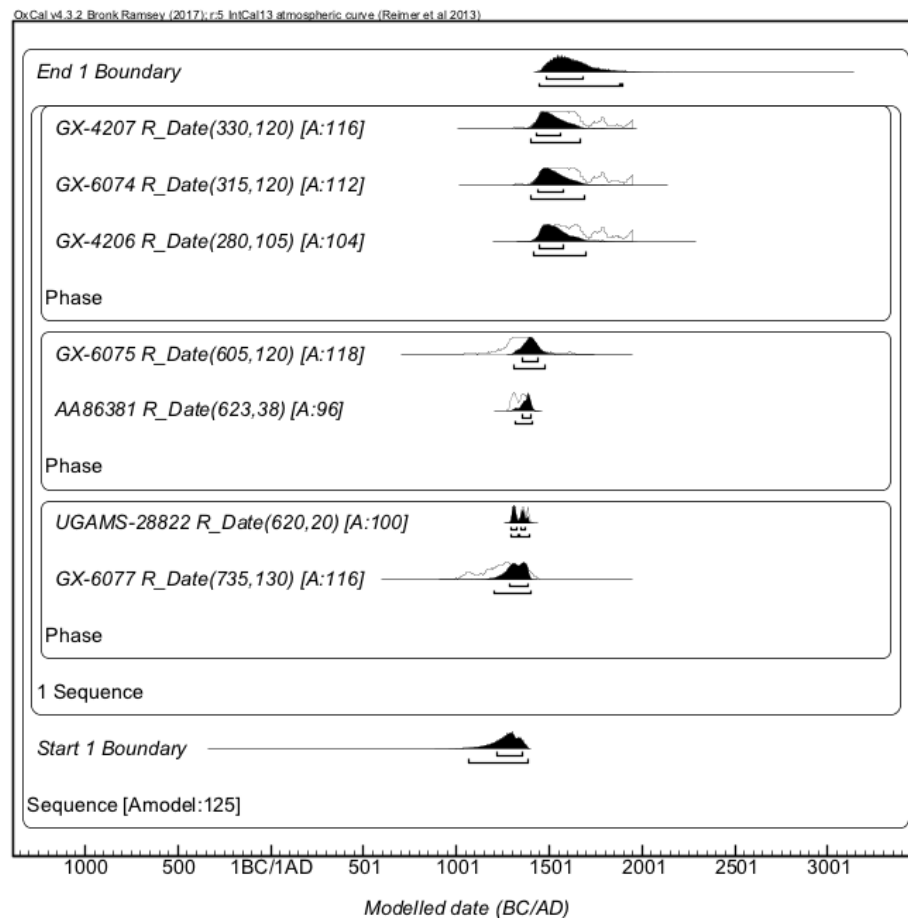


Figure 6.6. Bayesian model for the Toqua (40Mr6) platform mound.

on mound excavations and as such, little is known about the extent or character of the associated village. The mound was constructed in three main construction stages, yielding a total of roughly 20 superimposed, large structures. While wall trench architecture has been identified at the site, no evidence for round structures was uncovered. Eighteen burials were recovered from mound contexts, 50% of which were accompanied by grave goods, including a moderately sized assemblage of exotic and ritual paraphernalia. The ceramic profile at Bell Field, made up of primarily shell tempered cordmarked and plain sherds, is actually more similar to many of the later eastern Tennessee sites than to contemporary sites in northern Georgia. Using eleven dates from the mound at Bell Field, its use was modeled to fall in the maximum range of *cal. AD 1300-1460 (68% confidence interval)* (Figure 6.7). Considering the “wiggle” in the radiocarbon calibration curve at this time, the ceramic profile, and the number of mound construction stages, I estimate that a more reasonable range for the Bell Field platform mound is AD 1325-1400. This range makes Bell Field contemporary with both Hixon and Citico in eastern Tennessee, coming into use just after or during the decline of Mound C use at Etowah.

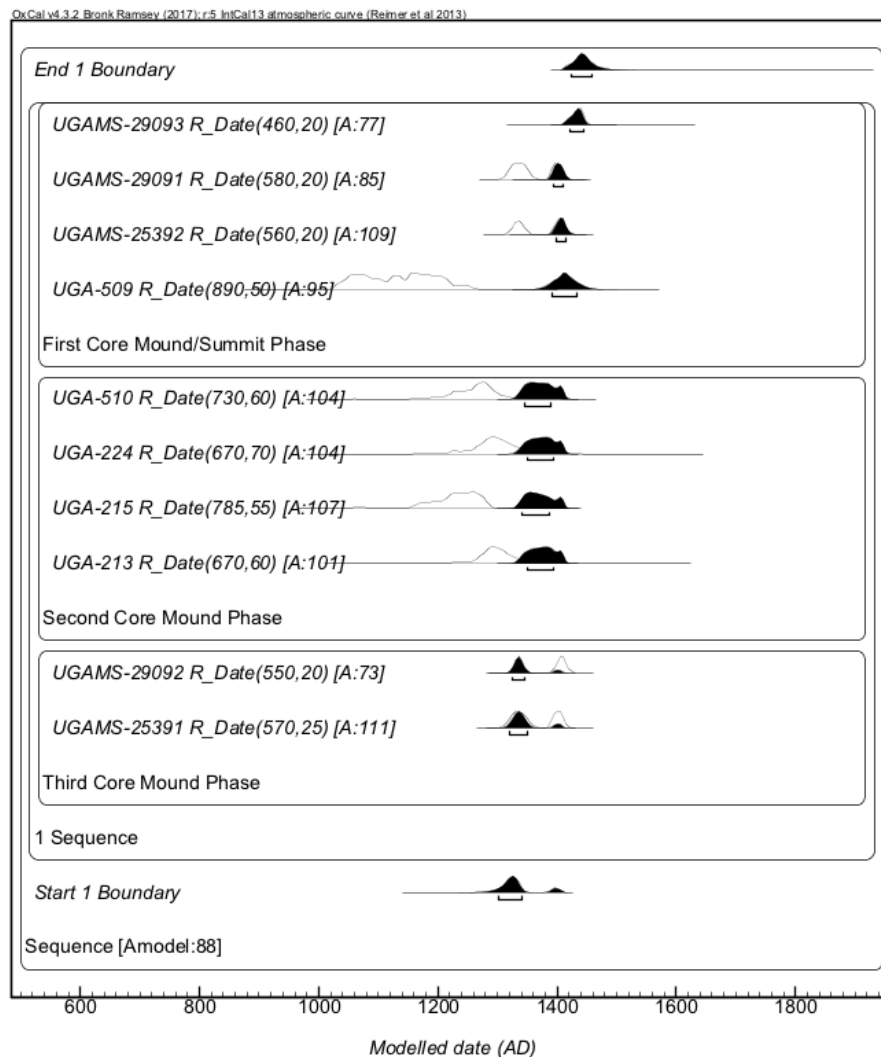


Figure 6.7. Bayesian model for the Bell Field (9Mu101) platform mound.

Etowah (9Br1). With a ditch and palisade enclosing an area of over 23ha, and settlement likely expanding beyond these bounds, the Etowah site (9Br1) is the largest site, and was likely the largest community, in the Southern Appalachian region. Archaeological work at Etowah began over 100 years ago (Thomas 1894), continued through the 1930s with work by Moorehead (Moorehead 1932), was intensively revisited between the late 1950s and early 1970s (Kelly and Larson 1957; Larson 1971), and most recently was significantly reevaluated by

King (Bigman et al. 2011; King 1996, 2001, 2003a, 2003b, 2005, 2012). The currently accepted chronology for the Etowah site is based on the work of King (1996, 2001, 2003; Cobb and King 2005) and is discussed only briefly here. Using ceramics from Etowah and across the Etowah River valley, combined with calibrated radiocarbon dates from a limited number of contexts at the Etowah site itself, King has posed that Etowah's occupation began sometime around AD 1000. He argues that the first phase of occupation, between AD 1000 and 1200, is represented by a number of large, saucer shaped middens which are interpreted as evidence for large-scale, corporately-oriented activities. By AD 1200, King argues for the abandonment of Etowah and the Etowah River valley followed by a reoccupation of the site at roughly AD 1250. It is at this point, and between AD 1250 and 1375 that the site grows to its largest extent, the construction of the largest platform mound, Mound A, is undertaken, the ditch and palisade are constructed, and Mound C, a large platform/burial mound, comes into use. Based on their inclusion in the Bayesian models used to situate the seriations presented in Chapter 4 and 5, the eight radiocarbon dates from the early saucer features at Etowah suggest the date of these features to fall somewhere between AD 1000 and 1275. The ceramic assemblages, evaluated in the context of the Chapters 4 and 5 seriations, and the modeled radiocarbon determinations, place these saucers in the more likely range of AD 1125-1250. Dates associated with the ditch and palisade, modeled as part of the seriation models in Chapters 4 and 5, suggest that these features were built sometime between AD 1250 and 1300. The later occupation of the site, associated with the

TN-3 ceramic assemblages likely dates to between AD 1200 and 1350, overlapping significantly the range for the “early” occupation that, when considering the seriation models, should date to between AD 1125 and 1300. This overlap at the Etowah site is consistent with the overlap of Etowah and Wilbanks ceramics modeled for the regional ceramic sequence.

Nineteen dates are available from the burial/platform mound, Mound C. Mound C has yielded one of the richest assemblages of Mississippian ritual paraphernalia and iconography in all of the southeastern United States. At least 366 individuals were interred in Mound C throughout its use, many of whom were buried with elaborate materials including copper headdresses and copper plates, shell gorgets and beads, and intricately carved stone items (King 2003, 2005). While the data related to exact proveniences and mound construction events is lacking in integrity, Mound C was likely built in seven stages (King 2003, 2005). Given the presence of a large, premound structure and evidence for ramp-like features, it is possible that each of these seven stages were used as a platform for some kind of structure. While recent geophysical work has revealed the presence of structures on the tallest platform mound, Mound A, only limited excavations have targeted this use. Both wall trench structures and round structures have been found at Etowah. Compared to the rest of northern Georgia sites (barring the Carter’s Dam sites), Etowah’s ceramic assemblage is exceptionally diverse with substantial amounts of both shell and limestone tempering, and a variety of surface treatments. Mound C in particular shows a general trend from ceramics characteristic of GA-2 to GA-3, or from Etowah

complicated stamped to Wilbanks stamped ceramics, although Etowah stamped ceramics are found in substantial quantities throughout the entirety of the mound (King 1996). When modeled, the 11 dates associated with Mound C yield a maximum span of between *cal. AD 1180 and 1340 (68% confidence)* (Figure 6.8). Considering the number of construction stages, regional seriations, and comparison to other features and ceramic assemblages at the site itself, it is likely that this range can be constrained to the period between AD 1200 and 1315, while previous estimates placed its used between AD 1250 and 1375 (King 2003). While this new range deviates significantly from the extant chronology for Mound C and the Etowah site, as will be discussed below, a reevaluation of a number of platform mound chronologies across northern Georgia do not significantly alter the extant understandings of contemporaneity of sites and communities.

Free Bridge (9Br6). Located just down river from Etowah is the Free Bridge site (9Br6). The site was tested by Wauchope in 1939 (Wauchope 1939, 1966) where he investigated both mound and non-mound contexts. The mound was likely built in two or three stages, with each stage supporting a rectangular structure, including one rectangular structure below the mound. In the non-mound areas, beyond surface scatters, no buried evidence for occupation was identified. While Wauchope's ceramic collection from this site is no longer available, using narrative descriptions provided by Wauchope, King (2003) argues that the Free Bridge site likely represents a later Mississippian occupation, with Wilbanks-like

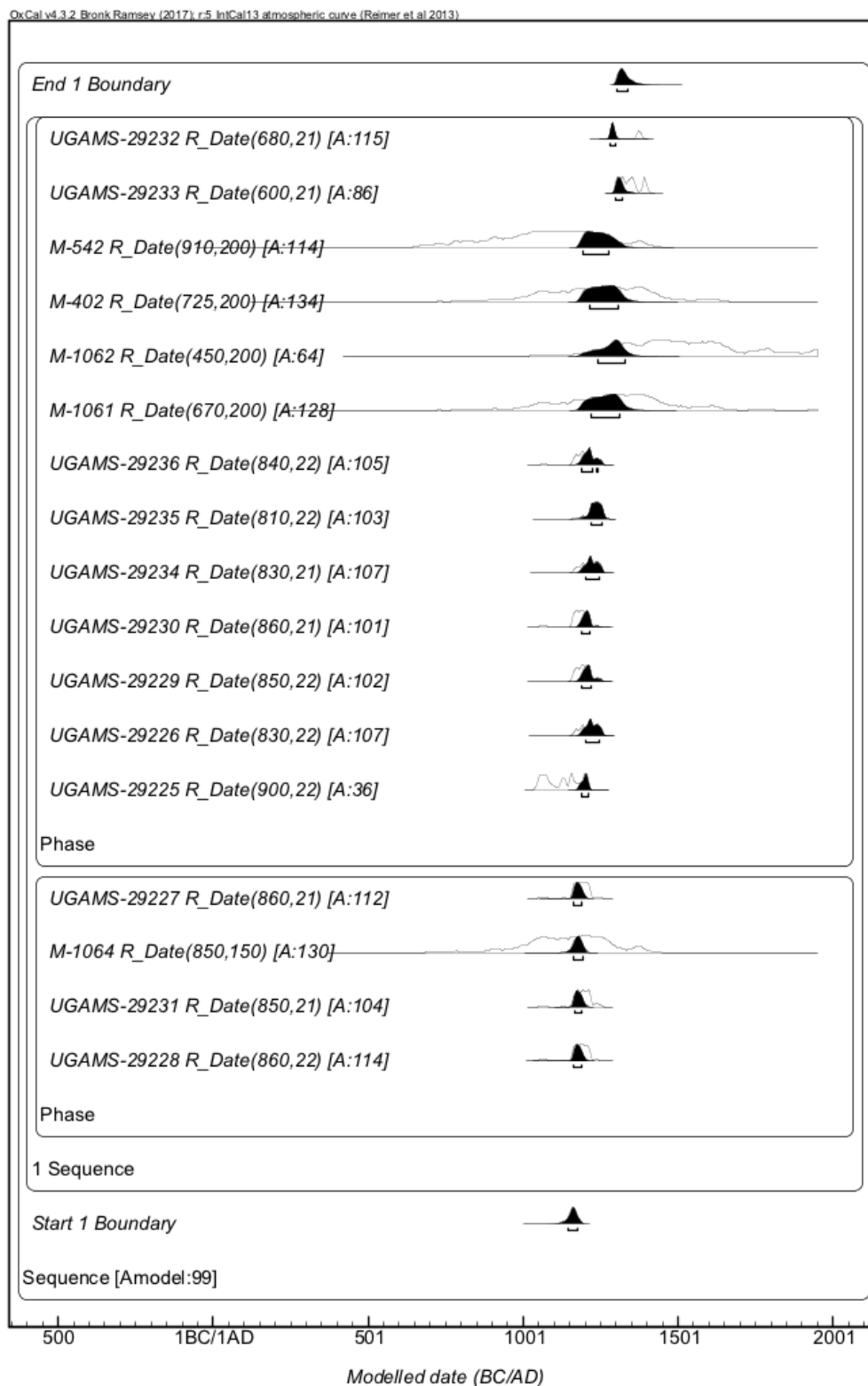


Figure 6.8. Bayesian model for the Etowah (9Br1) platform mound (Mound C).

ceramics and Lamar-like rim types. Given the dates for the seriations presented in Chapter 5, Free Bridge may have been occupied between AD 1300 and 1350, although confidence for this estimate is relatively low. No ritual or exotic materials were recovered from the site by Wauchope.

Horseshoe Bend (9Ck4). Horseshoe Bend (9Ck4), also located in the Etowah River valley, was a small, 1ha village with an associated low platform mound. Like Free Bridge, Horseshoe Bend was also excavated by Wauchope in 1939 (Wauchope 1939, 1966). The mound was built in a single stage (or two) and has no associated burials. The amount of paraphernalia recovered from the site is low and the archaeological work at the site was too limited to determine any village or architectural characteristics. Two large midden filled pits were recovered by Wauchope and his crew (King 2003; Wauchope 1939) which extend from the village area to underneath the mound construction stages. The mound itself yielded a mixture of both Etowah and Wilbanks-type complicated stamping. Thus, the use of the mound likely falls in the range of AD 1275-1325, coeval with the both the Free Bridge and Etowah occupations as well as the Long Swamp, Plant Hammond, Two Run Creek, and Wilbanks sites discussed below.

Little Egypt (9Mu102). The Little Egypt site (9Mu103) is located in the Carter's Dam area and is hypothesized to be the former capitol of the Coosa chiefdom. The settlement once covered roughly 2.5ha and was accompanied by a platform

mound built in at least four stages, likely more. Extensive excavations of the site were undertaken by Hally (1979) while more recent re-analyses of selected households have been undertaken by Gougeon (2002). The data considered here has been derived primarily from these two sources. Neither wall trenches nor round structures were found at the site and, surprisingly, few exotic or ritual items were recovered. Considering the ceramic profile, and its place in the seriations presented in previous chapters, the maximum range for the occupation at the Little Egypt site is between AD 1300 and 1675. For the mound in particular, its construction likely began around AD 1350. It is more difficult however to estimate when the mound fell out of use. Based on the limited testing of the mound, we can estimate with some confidence that it was used at least until sometime after AD 1400, but an exact span cannot be determined. If the site indeed is represented in ethnohistoric accounts, the mound may have been in use until at least 1550, if not later. This would make the use of the mound and occupation at Little Egypt contemporary with the occupations at both Citico and Dallas just to the north in the Chickamauga Basin of eastern Tennessee.

Long Swamp (9Ck1). The Long Swamp site is also located in the Etowah River valley and occupies an area of roughly one hectare. The site was initially visited by Wauchope (Wauchope 1966) and then by Larson in the 1940s, but was subject to more large-scale, horizontal excavations in the mid-2000s (Lewis et al. 2012). The site has a single mound, built in three stages and made up of a sequence of large, round structures. In addition to these large round structures,

wall trench architecture has also been recovered at the site while a moderate amount of exotica has also been found. No burials were interred in mound contexts. Six dates are available from the Long Swamp site, although none are directly from mound contexts. Considering the modeled results of these dates presented in Chapter 5, the ceramic profiles, and the architectural traditions present, it is likely that the main occupation, and mound use, at Long Swamp occurred between AD 1225 and 1300.

Plant Hammond (9FI3). The Plant Hammond site (9FI3) is located towards the western end of the Etowah River valley and was excavated in the 1930s by Moorehead (Moorehead 1932) and later in the 1960s by Arthur Kelly. Moorehead and Kelly's work was re-analyzed and reported by Chamblee et al. (1998) from which the data considered here have been derived. The community at Plant Hammond likely extended to cover an area of approximately 1.5ha and has an associated, low platform mound constructed in three or four stages. No burials were found in the mound, no exotic materials were recovered, and no evidence for wall trenches or round structures has been reported. Five radiocarbon dates are available from the site, but none associated with the mound itself. When modeled according to their place in the seriations presented in Chapters 4 and 5, these dates suggest an occupational range of between AD 1225 and 1350, making it contemporary with each of the other platform mound sites across the Etowah River valley considered here.

Sixtoe Field (9Mu100). Sixtoe Field (9Mu100), located in the Carter's Dam area, was excavated by Arthur Kelly in the 1960s (Kelly et al. 1966) and was likely contemporary with the occupations at Etowah and the other Etowah River valley platform mound sites. There are five radiocarbon determinations available from the mound at Sixtoe Field and one from village context. Three of the dates from the mound and the one from village context suggest a range of *cal. AD 1135 to 1310 (68% confidence interval)*, which can confidently be constrained to roughly AD 1200 to 1275 given its ceramic assemblages and architectural features. Both wall trenches and round structures have been identified at the site while very few ritual or exotic paraphernalia have been recovered. Like the Bell Field site, occupied after the Sixtoe Field site, the Sixtoe Field ceramic assemblages show similarities to both northern Georgia and eastern Tennessee traditions, with substantial amounts of both limestone tempering and Etowah complicated stamped designs. Unlike contemporary northern Georgia and eastern Tennessee sites at this time (barring Etowah), 21 burials were found in mound contexts, although only 10% were buried with grave goods, similar to burials found in Hamilton mounds across eastern Tennessee. Unlike these Hamilton mounds however, the mound at Sixtoe Field was a true platform mound, built in stages, with successive rebuildings of public structures.

Two dates from the mound at Sixtoe Field do not fit this temporal narrative, but are worth discussing. During Kelly's excavations of the mound (Kelly et al. 1966), he identified a large, round structure with a floor covered in a thick, intentional layer of red ochre and an abundance of burnt faunal material,

ash, and organic refuse. I submitted two samples to be dated from this “Casa Colorada.” One sample was a twig (UGAMS-29089) while the other was run on bark (UGAMS-29865), both of which are short-lived materials reliable for dating purposes. These two samples were run two months apart as separate batches of samples, yet each returned the exact same uncalibrated date of 1280 ± 20 . Few ceramics were found associated with the Casa Colorada, so confidence in seriation to achieve a relative date is low. While this will not be considered in detail here, a few thoughts are offered and are worth further exploration. There does seem to have been an earlier occupation at the site as identified by the presence of Swift Creek stamped ceramics. It is possible that the Casa Colorada represents a Woodland period platform mound used sometime in the range of AD 600-1000 or earlier. This would not be uncommon for the region, as both the Summerour site (9Fo16) (Pluckhahn 1996) and the Anneewakee Creek site (9Do2) (Williams 2014) are defined by low platform mounds and associated villages dating to this time period. Without an intensive evaluation of Kelly’s notes and records however, this remains speculation, based only on two new radiocarbon determinations.

Two Run Creek (9Br3). Two Run Creek (9Br3) is a moderately sized, 3ha site with an associated village and platform mound in the Etowah River valley. There is no evidence for either wall trench or round structures and no burials were recovered in mound excavations conducted by Wauchope in the 1930s (Wauchope 1966). According to Wauchope (1966) the mound was built in nine

stages made up of a number of sequentially built public structures. The frequency of exotica found at the site is low and the ceramic assemblage suggests a temporal placement between AD 1235 and 1380. This span is curiously longer than the other platform mounds across the Etowah River valley, although it lines up well with the increased number of identified mound construction stages compared to contemporary platform mounds. The data available for many of these sites, focusing sometimes very particularly on mound contexts, make it difficult to determine if any of these villages located adjacent to platform mounds were occupied after the mounds ceased to be used. Two Run Creek may be unique in that the mound continued to be used while other villages ceased mound construction activities, but continued to live in the vicinity of these mounds. Another explanation may be that many of these mounds in northern Georgia have been heavily plowed over time, possibly stripping away many of the later stages of mound construction, although for this to have happened at all of the other platform mound sites across the region seems unlikely. It is more likely that, for some reason, the occupation at Two Run Creek, at least as evidenced by the continued addition of mound stages, was longer lived than many of its contemporaries.

Wilbanks (9Ck5). The Wilbanks site (9Ck5) has been investigated by both Wauchope (1966) and Sears (1958a). It represents a moderately sized, 3ha community accompanied by a low substructure platform mound built in three to four stages. No burials were interred in the mound and few ritual materials have

been found at the site. Not enough excavations at the site have been completed to determine the presence of architectural traditions. The mound shows a clear mix between Etowah and Wilbanks stamped sherds with a general trend from Etowah-dominated to Wilbanks-dominated mound stages. A large structure was uncovered underneath the mound at Wilbanks and has been argued to represent an earth-lodge (Sears 1958a), although others have been critical of this interpretation (Larson 1994; Rudolph 1984). One radiocarbon date has been recovered from this premound structure and, when included in the models presented in Chapter 5, dates to *cal. AD 1225-1255 (68% confidence interval)*. Given the ceramic profile and the number of mound stages, the mound was likely used between AD 1225 and 1300, making it coeval with the rest of the Etowah River valley platform mound sites including Mound C at Etowah.

Defining Historical Junctures

The results of the analyses presented above are a number of high-resolution sociomaterial histories for across Southern Appalachia (Figure 6.9). Through these material timelines for mound construction activities (Figures 6.10 and 6.11), architectural traditions (Figures 6.12 and 6.13), burial practices (Figures 6.14 and 6.15), and the use of materials imbued with ritual iconography (Figure 6.16), I have identified two material disjunctures in the Southern Appalachian archaeological record, one ca. AD 1150/75 and one ca. AD 1325/1350, which I interpret as major points of social transformation, the first

related to the emergence of hierarchical/centralized political activities and the second by the collapse of Etowah as a major central place I argue that over the course of the 1000 years considered here, the social, political, and economic changes occurring at these two historical junctures would have generated significant amounts of uncertainty among Southern Appalachian societies. Indeed, as I outline below, each of these transitions would have created spaces for the transformation, adoption, or strengthening of the institutions that structured the sociopolitical “rules” and “norms” governing societal organization (e.g., North 1990). In this section I characterize these changes and attempt to understand the kinds of institutional changes that would have driven and produced the material changes identified here.

Use of Platform Mounds: The results of the reevaluation of platform mound chronologies are presented in Figures 6.10 and 6.11 and in Table 6.2. In reviewing both Figures 6.10 and 6.11, similar temporal trends in platform mound use for eastern Tennessee and northern Georgia, and potentially the role of these places in their sociopolitical landscapes, can be identified. By ca. AD 1150-1200, platform mounds were beginning to be built across both eastern Tennessee and northern Georgia, possibly up to 25 years earlier in eastern Tennessee than in northern Georgia. Nevertheless, by AD 1225, at least ten platform mounds were in use across the Southern Appalachian region, including Davis, Hiwassee Island, Sale Creek, Martin Farm, and DeArmond in eastern Tennessee and Sixtoe Field, Etowah, Long Swamp, Wilbanks, Plant Hammond,

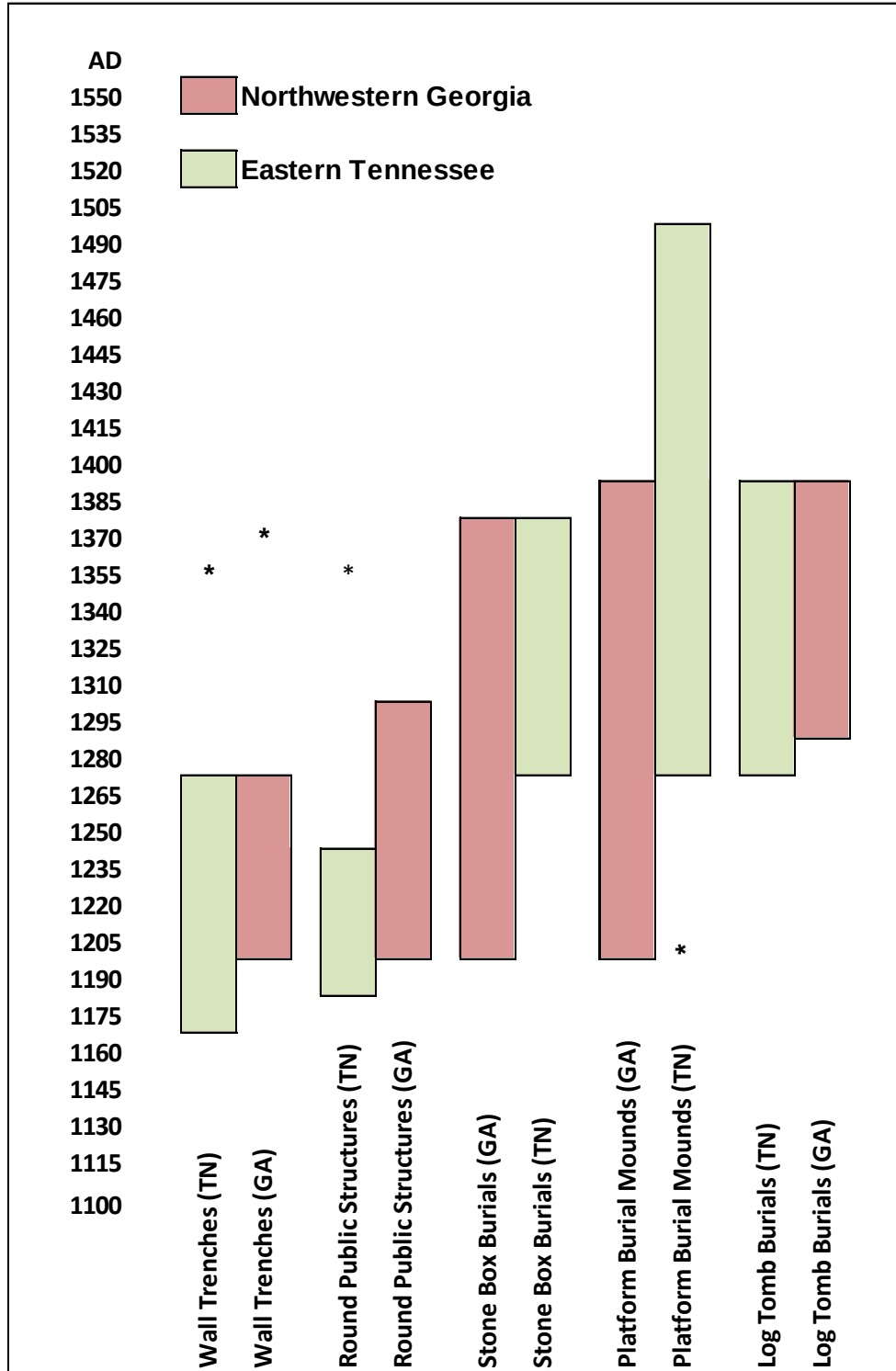


Figure 6.9. Sociomaterial chronologies for architectural and mortuary practices. Bars represent the span of particular practices. Asterisks represent singular outliers.

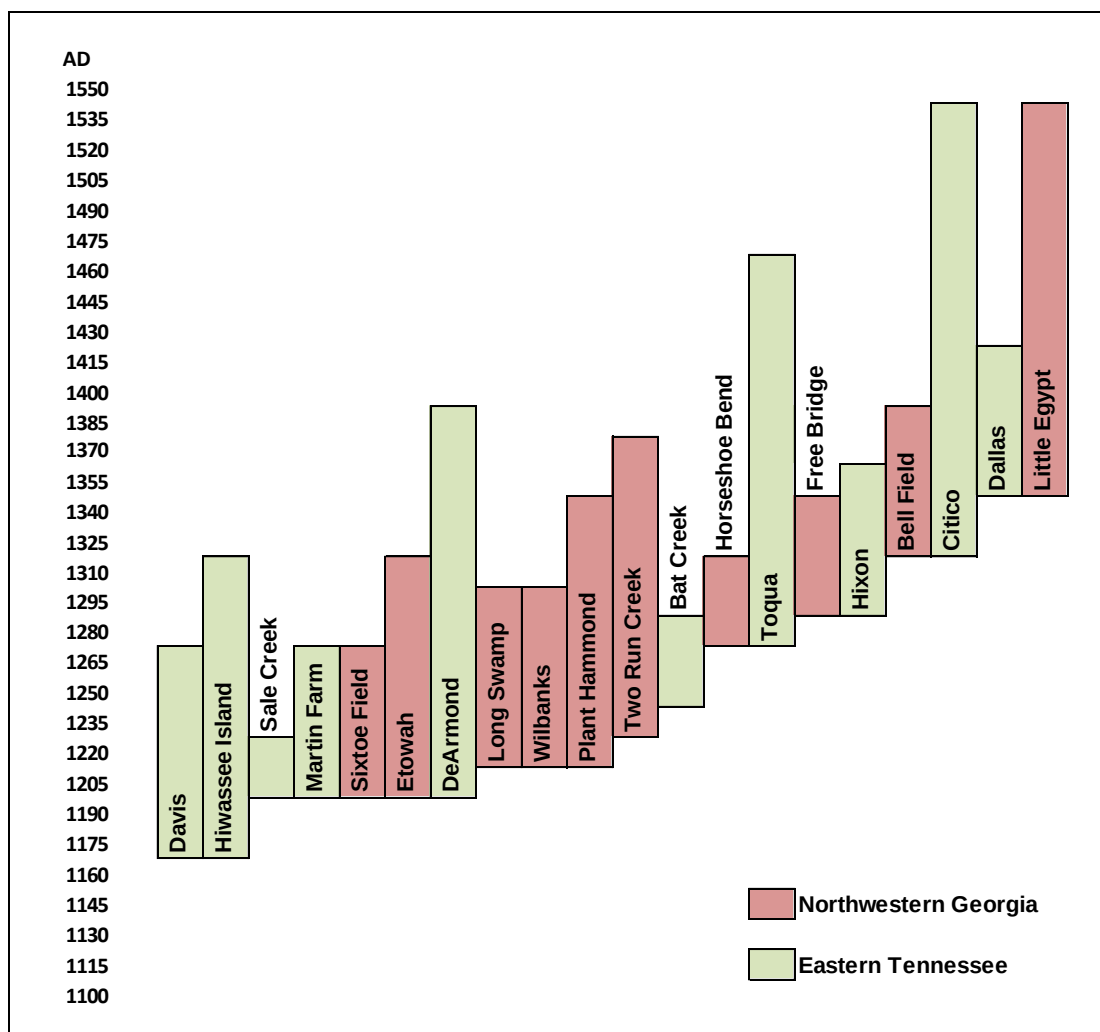


Figure 6.10. Platform mound spans for eastern Tennessee and northern Georgia.

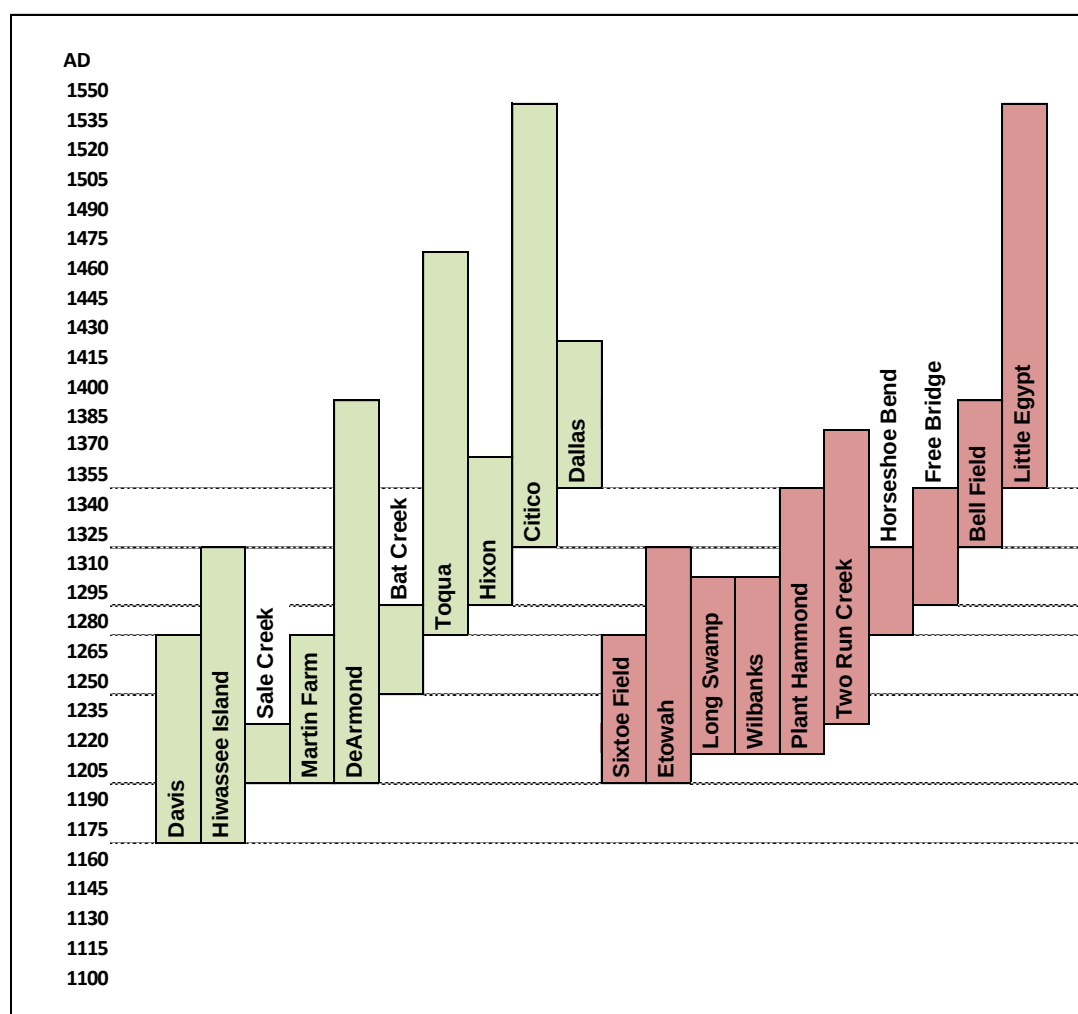


Figure 6.11. Platform mound spans for eastern Tennessee (green) and northern Georgia (red) separated by region.

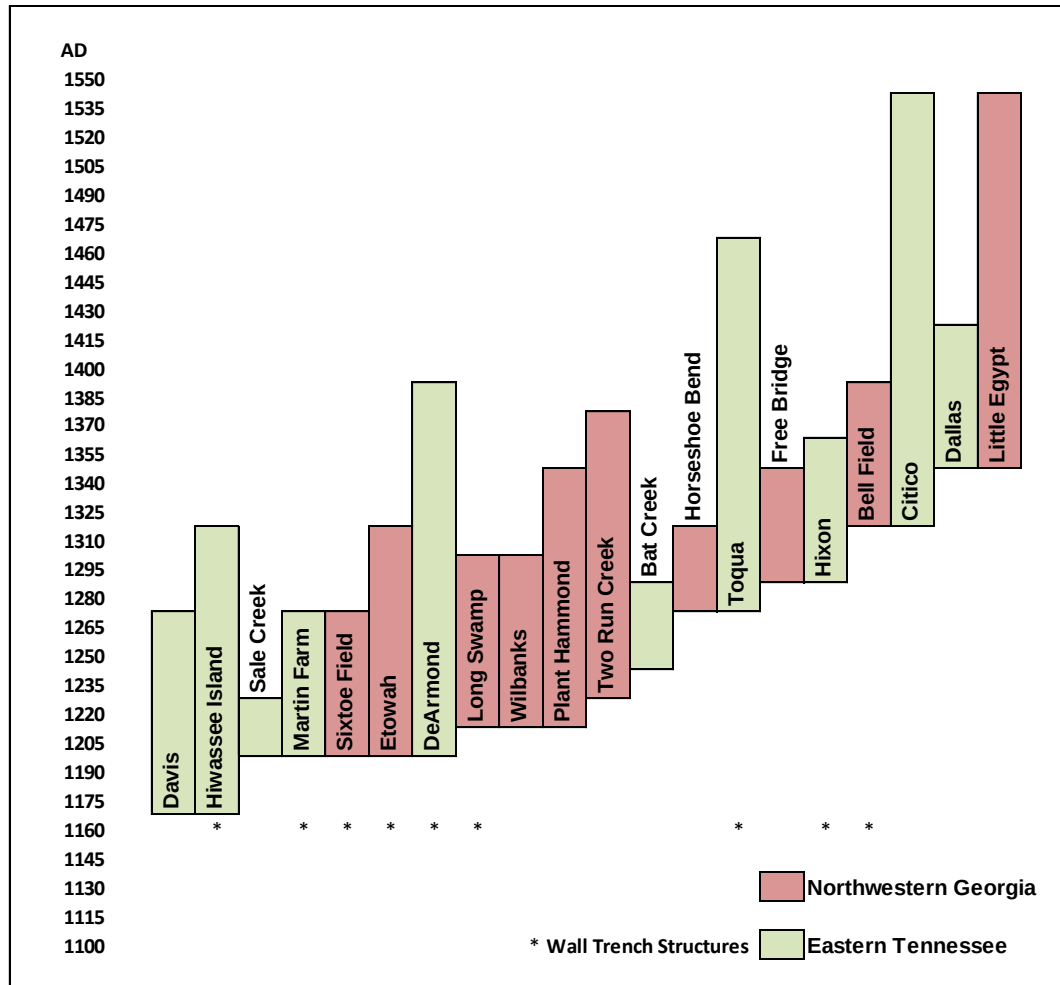


Figure 6.12. The lifespans of platform mounds across Southern Appalachia with asterisks indicating the presence of wall-trench structures at particular communities.

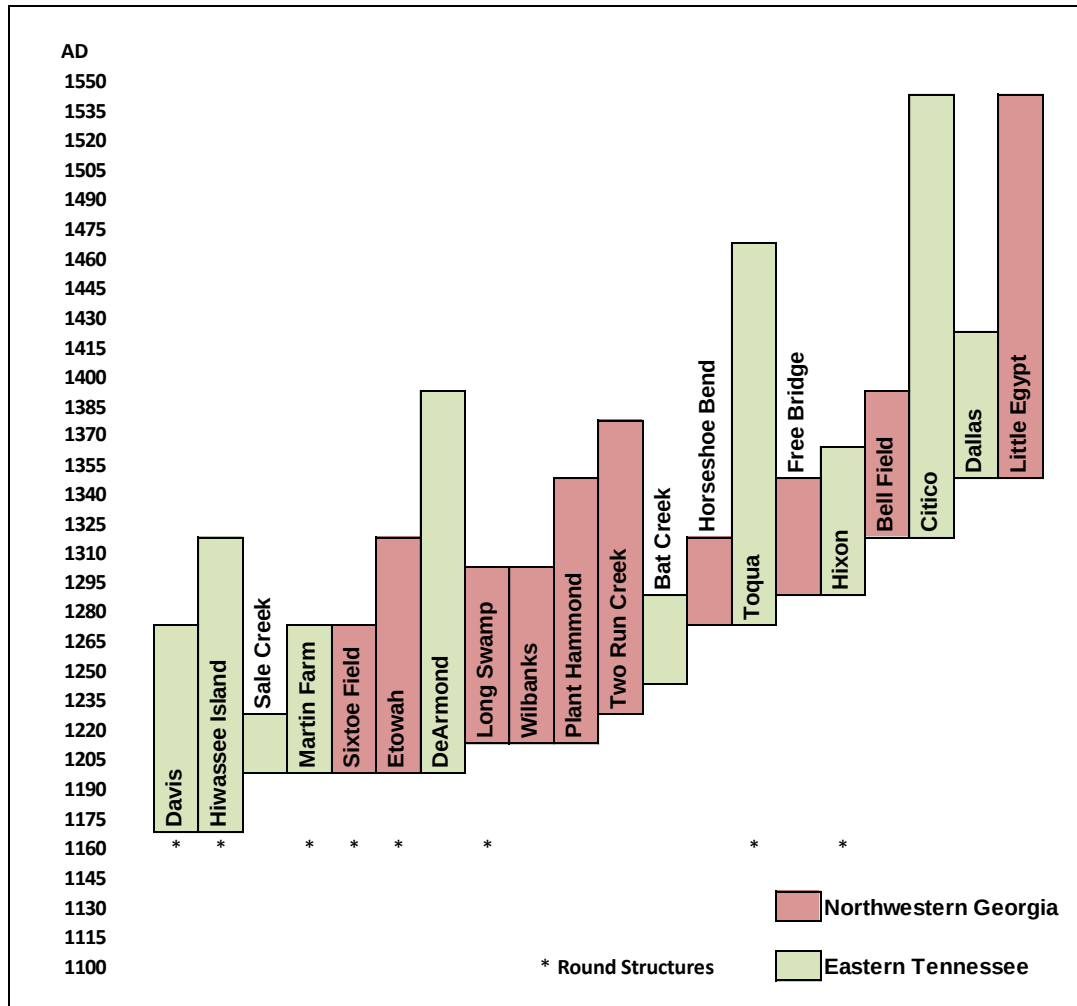


Figure 6.13. The lifespans of platform mounds across Southern Appalachia with asterisks indicating the presence of round structures at particular communities.

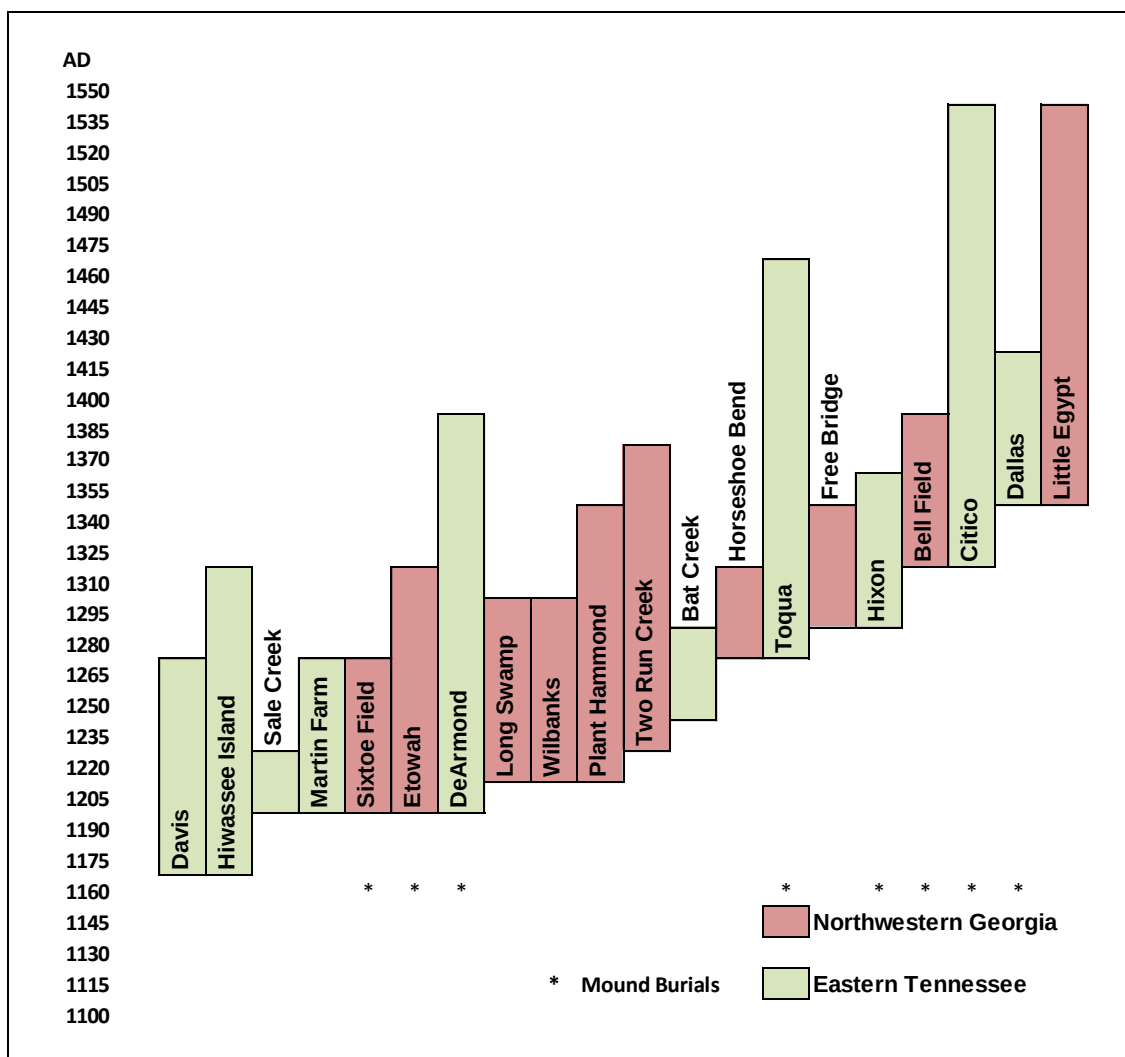


Figure 6.14. The lifespans of platform mounds across Southern Appalachia with asterisks indicating the presence of burials in those platforms mounds.

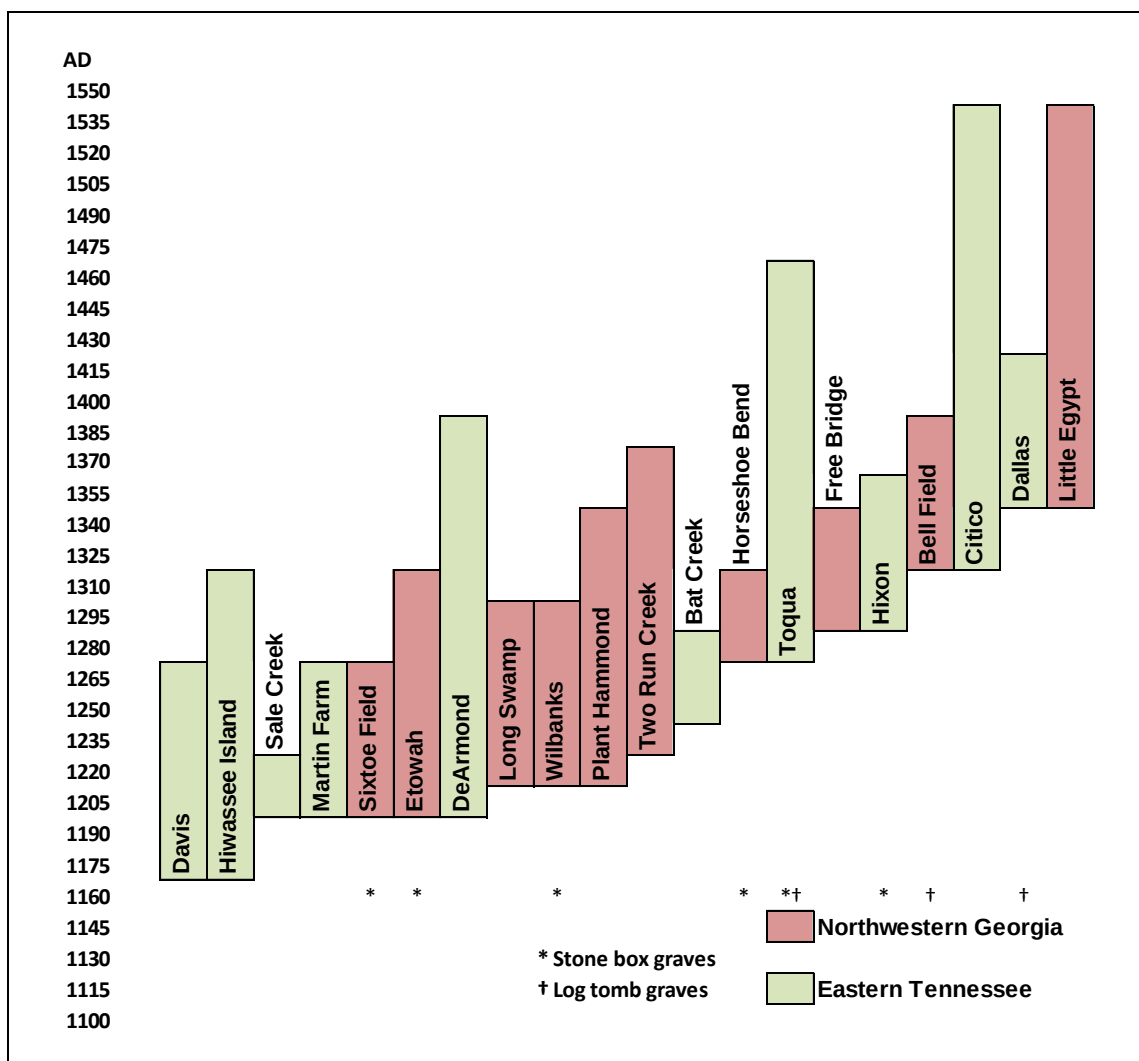


Figure 6.15. The lifespans of platform mounds across Southern Appalachia with asterisks indicating the presence of stone box graves and crosses indicating the presence of log tomb burials at those particular communities.

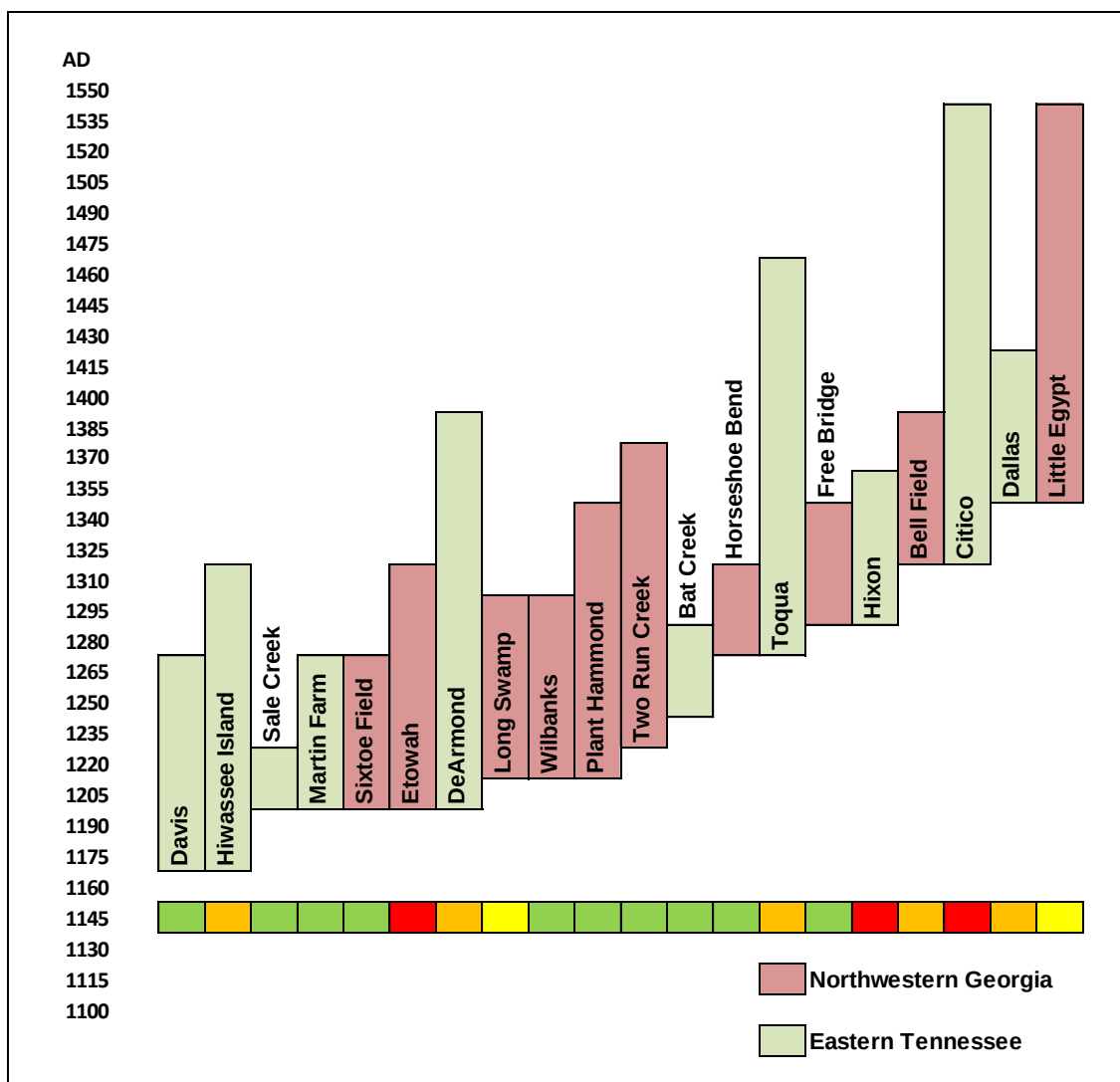


Figure 6.16. The lifespans of platform mounds across Southern Appalachia with a color scale indicating the frequency of ritual paraphernalia at each community. Gradient ranges from green (least frequent/absent) to red (most frequent/abundant).

and potentially Two Run Creek in northern Georgia. The continued use and reconstruction of these mounds seems to have continued from their initial stages through roughly AD 1300, for a period of approximately 100 years. As these mounds ceased to be used, beginning ca. AD 1275, the pattern of mound use and construction across the region seems to have been drastically altered.

While the period between ca. AD 1150 and 1325 is defined by the contemporary occupation and use of a number of platform mounds across the region, the succeeding period, beginning after ca. AD 1275, was characterized by a series of temporally-successive platform mound constructions. In eastern Tennessee, this sequence is defined by the beginning of the construction of the mound at Toqua at ca. AD 1275, followed by the use of the Hixon mound starting at ca. AD 1325-1340, the Citico mound at ca. AD 1325, and finally the initial occupation of the Dallas site sometime between roughly AD 1325 and 1350. In northern Georgia, this sequence begins with the occupation at Horseshoe Bend at roughly AD 1275, the occupation at Free Bridge commencing sometime ca. AD 1300, the initial construction stages of the Bell Field mound ca. AD 1325, and the establishment of the occupation at Little Egypt ca. AD 1350. While the use of the platform mounds at each of these sites overlaps with one another in each sequence, their estimated start and end dates are decidedly successive. The platform mounds built during the first wave of these traditions, especially Hiwassee Island and Etowah, seem to have all ended between roughly AD 1315 and 1340. As such, both Hiwassee Island and Etowah likely overlapped with the earliest occupations at Toqua, Hixon, and potentially Citico, but they were not

contemporary for long. This shift from many contemporary mound sites, to the successive establishment of a number of new, more compact settlements, by roughly AD 1315, represents a drastic reorganization of relationships across the Southern Appalachian region, especially in regards to the constitution, enactment, and display of political power.

Two more notes can be made concerning the platform mound chronologies presented here. The first pertains to the estimated spans for the use of platform mounds, especially the comparison between the spans of mound-use in eastern Tennessee and in northern Georgia. The platform mounds in eastern Tennessee have an average use-life of roughly 115 years while the platform mounds of northern Georgia span on average just 90 years (if Little Egypt is excluded as an outlier). While at least six of the platform mounds from eastern Tennessee discussed here exceed a use-life of 100 years, only four platform mounds in northern Georgia exceed this 100-year mark. This may indicate a difference in the stability of the local sociopolitical relationships that defined each region, the structure of which will be investigated in the next chapter.

The final note concerns the evaluation of these results in the context of extant sociopolitical narratives. The platform mound chronologies presented here generally conform to the results of extant studies that posit the contemporaneity of the Etowah River valley sites including Etowah, Long Swamp, Wilbanks, Plant Hammond, Two Run Creek, Horseshoe Bend, and Free Bridge (although these last two to a lesser extent) (King 2003). The contemporaneity of these sites has

traditionally formed the basis for assuming a relationship between Etowah as a primary sociopolitical center and the others as secondary, single-mound centers forming a chiefdom-level political organization (King 2003). While the results presented here do conform to these contemporaneity narratives, they alone do not provide insight into the qualities of the relationships between these platform mound sites. This will be the task of the formal network analyses presented in Chapter 7. Whatever the relationships may have been between these contemporary communities, these structures seem to have broken down by AD 1325, supporting the Bayesian models presented in Chapter 5, and in contrast to extant narratives that point to a terminal date of AD 1375 (Cobb and King 2005; King 2003) for the dissolution of whatever relational structures may have existed. In regard to the patterns observed across eastern Tennessee, they generally stand in contrast to those observed in northern Georgia. In eastern Tennessee, the longest lived platform mounds, and most extensive communities, including Hiwassee Island, DeArmond, Toqua, and Citico, are all located in different areas across the region (Figure 2.2). While a number of smaller mound sites are clearly occupied across the region as well, the evidence for potential centralization or regional consolidation is lacking. On top of this, even the largest sites in eastern Tennessee, at roughly 2-3ha, which do compare in size to most of the platform mound sites across northern Georgia, do not come close to matching the ca. 30ha extent of the community at Etowah.

Architectural Practices: Both wall-trench architecture and the use of round public structures seem to have been adopted at roughly the same time as the use of platform mounds across the region sometime between AD 1150 and 1175 (Figure 6.12 and 6.13; Table 6.3). While the use of both types of architectural traditions ranged from between AD 1175 and 1350, they were likely used most frequently between AD 1175 and 1250, for a period of 75 years. Both architectural traditions appear more frequently at eastern Tennessee sites. Of the ten northern Georgia sites, both wall-trench architecture and the use of round public structures only occur at Etowah, Sixtoe Field, and Long Swamp, with wall-trench architecture also found at Bell Field. The only three sites where these traditions are found to be in use after AD 1275 are Toqua, Hixon, and Bell Field. Otherwise, after AD 1275, preference seems to have shifted towards single-set post architecture and rectangular structures. This break, at AD 1275, lines up with the break in the patterns of platform mound use described above, once again lending support to possible discontinuities in material practices and traditions across the region.

While previous date estimates for wall-trench structures, especially from the Martin Farm site, placed the initial adoption of such traditions at ca. AD 1050 (or earlier), it is clear from the chronological modeling presented here and in Chapter 5, that the use of the platform mound at Martin Farm does not commence until at least AD 1200. While the earliest appearance of wall-trench architecture does not seem to appear in eastern Tennessee until at least AD 1150-1175, it still appears here earlier than in northern Georgia where it appears

at least 25-50 years later at Sixtoe Field and Etowah, the two sites that are geographically closest, and most contemporaneous, with the early adopter sites in eastern Tennessee. This new perspective on the timing of the adoption of wall-trench architecture has significant implications for understanding the movement of classically Mississippian traditions across eastern North America. While the sociopolitical height of Cahokia likely occurred at roughly AD 1050 (Pauketat 2004b; Pauketat and Alt 2005), the tradition of wall-trench architecture, likely originating in the Lower Mississippi River valley (Pauketat and Alt 2005), does not seem to have reached the Southern Appalachian region until between AD 1150-1200, 100-150 years after Cahokia's sociopolitical climax and towards its eventual decline. While previous estimates have located the emergence of major sociopolitical centers and societal reorganization across Southern Appalachia at roughly AD 1000, coeval with the social and cultural dominance of Cahokia, the chronological models presented here and in Chapter 5 indicate a significant lag time between the height of Cahokia at ca. AD 1050 and the emergence of new sociopolitical forms across Southern Appalachia at roughly AD 1200, including the initial stages of mound construction at Hiwassee Island and Etowah, a period marked by the decline of Cahokia's prominence (Pauketat 2004b).

Mortuary Traditions: Two dimensions of mortuary traditions are considered here: interment contexts and grave types. The first, interment contexts, has to do with where people were buried, specifically whether or not traditions included platform mound burials, conical burial mounds, or no mounds at all. Figure 6.14 presents

the timing of platform mound burials across Southern Appalachia. It is clear that burial in platform mounds began as a northern Georgia practice, but only at two sites, Sixtoe Field and Etowah, as early as AD 1200. Evidence for platform mound burials this early in eastern Tennessee is found only at the DeArmond site. No other platform mound or burial mound burials have been identified across northern Georgia besides Sixtoe Field, Bell Field, and Etowah where 21, 18, and over 366 burials have been recovered respectively from platform mound contexts. None of the other single-platform mound sites across northern Georgia have yielded burials interred in platform mound contexts contemporary with the use of the platform mound itself.

In eastern Tennessee, the paucity of platform mound burials before AD 1275/1300 can likely be attributed to the continued use of burial mounds, known colloquially as the Hamilton complex. These mounds have long been the marker for Late Woodland traditions across eastern Tennessee. While hundreds of these burial mounds have been identified and investigated (e.g. Cole 1975; Schroedl 1978), very few have been systematically excavated, and even fewer have been dated. The extant chronological range for the use of these mounds falls between AD 700 and 1200. The burials in these mounds often have little to no associated artifacts. Combining two newly acquired dates with 17 extant dates from two Hamilton burial mound sites (5 Hamilton burial mounds), I constructed a Bayesian model that places the range for the use of these mounds between roughly AD 875 and 1275 (Figure 6.17). The start date for the use of Hamilton burial mounds likely extends back further than AD 875. What the model

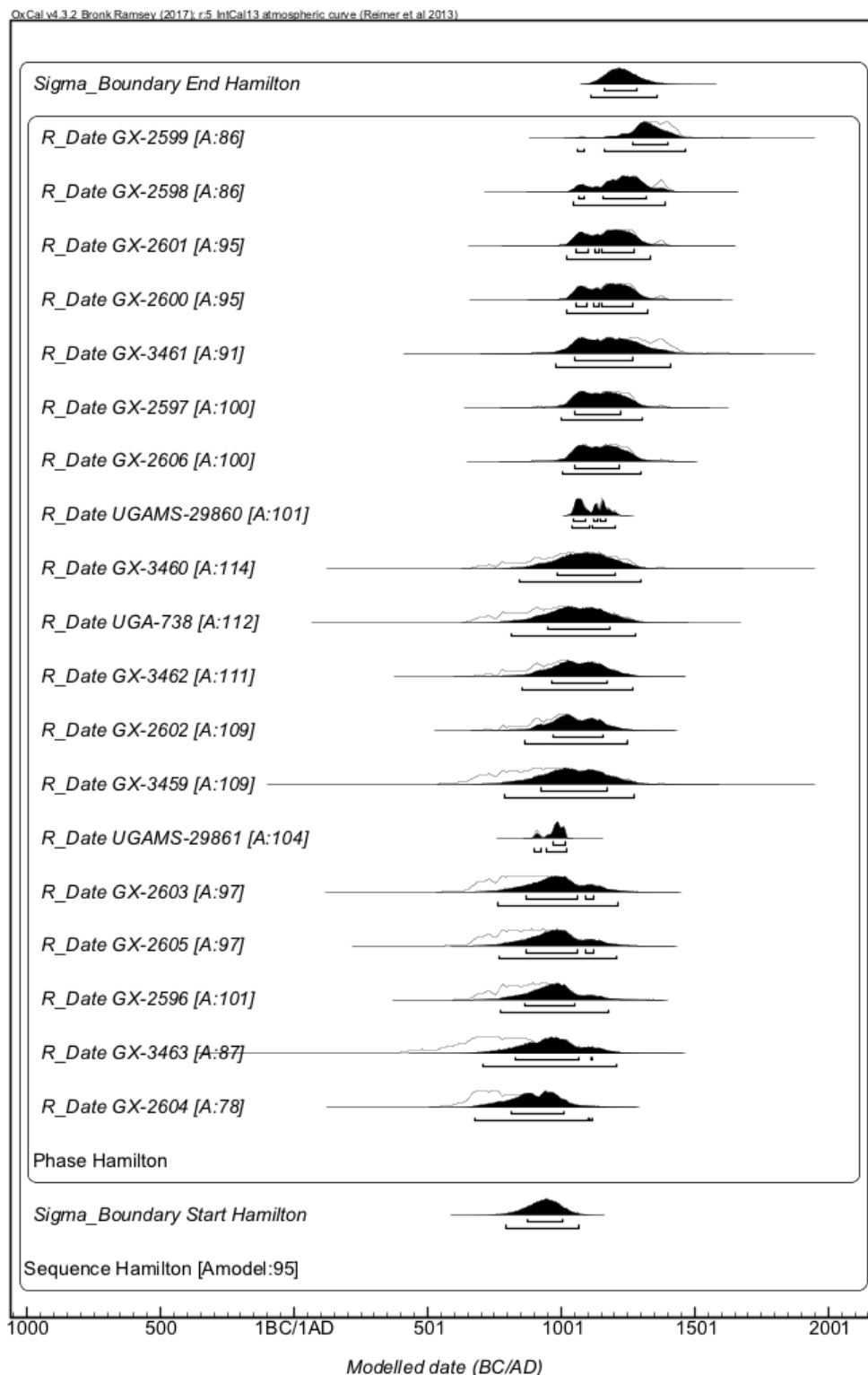


Figure 6.17. Bayesian model for the Hamilton Burial Mound tradition.

presented here does show however, is that these Hamilton burial mounds were likely used beyond AD 1200, as late as AD 1275/1300, corroborating a break in social continuity at ca. AD 1275-1300 as suggest by the platform mound and architectural data. It is not until after the break, when Hamilton mounds are ceased to be used, that burials begin to be interred in platform mounds across eastern Tennessee, representing an even more profound piece of evidence for the reorganization of social and interpersonal relationships across Southern Appalachia, reorganization that would have generated uncertainty and prompted the reevaluation of institutions across Southern Appalachian societies.

The second aspect of mortuary traditions I discuss is grave types, specifically the timing of the use of limestone slab burials and log tomb burials (Figure 6.15; Table 6.3). Limestone slab burials were likely used between ca. AD 1250 and 1375. At this time it remains unclear who was buried in these kinds of interments. They have been found in both platform mound contexts (King 2004; Lewis et al. 1995; Polhemus 1987) and in non-mound contexts (Wauchope 1966). While they are known from five of the ten northern Georgia platform mound sites discussed here, they are found only at Toqua and Hixon in eastern Tennessee where they do not show up until 25-75 years after their initial adoption in northern Georgia. Log tomb burials have only been uncovered in platform mound contexts at three sites, Toqua and Dallas in eastern Tennessee and Bell Field in northern Georgia, and date to between AD 1275 and 1400, overlapping with, but later than, stone slab burials. The two types of burials are found together only at a single site, Toqua, whose long occupational history

spans between roughly AD 1275 and 1500. The use of stone slab burials began first in northern Georgia while the use of log tomb burials corresponds to the decline in the use of stone slab burials. What is curious about the timing of the use of stone slab burials is that they occurred first in northern Georgia, where limestone was not traditionally utilized, compared to its long history of use in the production of eastern Tennessee ceramics. While both types of burials are found across the region, neither represents a predominant mode of burial, with most individuals placed in simple pit or house-floor interments throughout the entire span of time considered here.

Ritual Paraphernalia: The temporal distribution of the frequency of ritual paraphernalia follows a similar pattern to the other practices already described (Table 6.1). The frequency of these items in archaeological contexts does not seem to increase significantly until ca. AD 1250-1275 (Figure 6.16). While the earliest uses of these materials seem to have occurred at Hiwassee Island and Etowah, only at Etowah did they occur in high frequency, whereas only few items have been found at Hiwassee Island. Even at Etowah, this heightened frequency occurred at or after AD 1250, corroborating the timing proposed by the extant chronology (Cobb and King 2005; King 2003). None of the other platform mound sites initiated before AD 1275 have yielded such exotica except for DeArmond (Hatch 1974; Koerner 2005) and Long Swamp (Wauchope 1966), along with a single pair of decorated earspools found at Wilbanks (Sears 1958a), indicating a concentration of these goods at a limited number of sites across the region. After

AD 1275/1300, the frequency of these materials picks up dramatically, with Etowah, DeArmond, Toqua, Hixon, Bell Field, Citico, Dallas, and Little Egypt all yielding significant amounts of ritual paraphernalia consistent with symbols of Mississippian ideology.

One of the most notable patterns in the distribution of ritual paraphernalia across Southern Appalachia are the striking similarities between assemblages recovered from Etowah, Hixon, and Citico (see Sullivan 2016). The potential biological relationships between Etowah and Hixon have been discussed above, but the social and political aspects of those relationships remain ambiguous. These three sites include the intensive use of a platform mound for burials, the use of stone slab burial traditions, extreme similarities in ritual materials, and presence of ceramic assemblages that indicate potential co-residence of, or at least some movement of people between, northern Georgia and eastern Tennessee groups. While the network analyses presented in the following chapter provide some insight into potential relationships, a more detailed understanding of these interactions will likely only be achieved through bioarchaeological means and geochemical materials analyses. What stands out about Hixon however, is the lack of evidence for an associated village or substantial palisade. While Lewis et al. (1995) suggest that the village contexts have been washed away by river bank erosion, Sullivan (2016) suggests that this is unlikely, citing the small areas of the structures that do remain, arguing that there is little evidence for the existence of an associated village. While no village may have existed at Hixon, and only a small screen or fence was constructed

around the mound, major palisade projects were completed at a number of other sites across the region including Hiwassee Island, Etowah, Toqua, and Dallas.

The movement of burials into platform mound contexts, the increase in the frequency of ritual paraphernalia, and the construction of substantial defensive features all support the extant proposition of a shift from corporate-based political strategies to network strategies of political control and consolidation sometime ca. AD 1275-1300 (Blanton et al. 1996; Cobb and King 2005; King 2003). While this may be an effective characterization of macroregional trends, there are clearly unique historical contexts that worked to structure how these societal transformations were enacted both within local sociopolitical contexts across eastern Tennessee and northern Georgia separately, taking into account the regional interactions and historical connections between the populations living in each sub-region. The next chapter explores these historically situated relational structures in the context of the increased social uncertainties that would have characterized these periods of major sociopolitical disjuncture.

Community Organization: Relatively robust insights on the relationships between changing community organization and regional sociopolitics may be extracted from at least three sites across the study area: Etowah, Hiwassee Island, and Dallas. The earliest occupations at Etowah likely postdate the use of Woodstock ceramics and occurred during the time when Etowah stamped ceramics were already in use. This likely occurred sometime after AD 1125 (see Chapter 5). The earliest dates from Etowah come from a series of saucer-shaped middens that

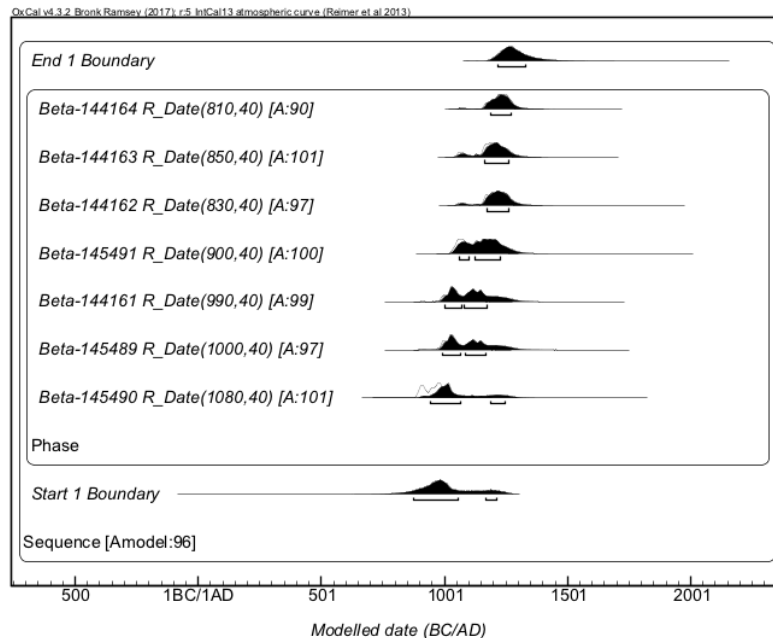


Figure 6.18. Bayesian model for the saucer middens at Etowah.

likely represent the remains of corporately-oriented feasting activities (King 2003). When modeled (Figure 6.18), the dates associated with these saucer features yield a potential start date that falls between *cal. AD 870-1190*. Using the results from the seriation models in Chapter 5 to refine this range, these saucers likely came into use between AD 1135 and 1190. The model presented in Figure 6.18 estimates an end boundary for this group of seven dates of *cal. AD 1220-1330*. Fortunately, these saucer features are part of a well-stratified sequence of deposits, immediately overlain by a dense black midden layer, which in turn is overlain by an orange midden layer, and finally topped by a dense midden of faunal refuse (King 2001). When this entire sequence is modeled (Figure 6.19), the single date from the black midden layer (Beta-14481) models to *cal. AD 1225-1270*, meaning the saucers must have ceased to be used by AD 1225 at the earliest and AD 1270 at the latest. Like the saucer

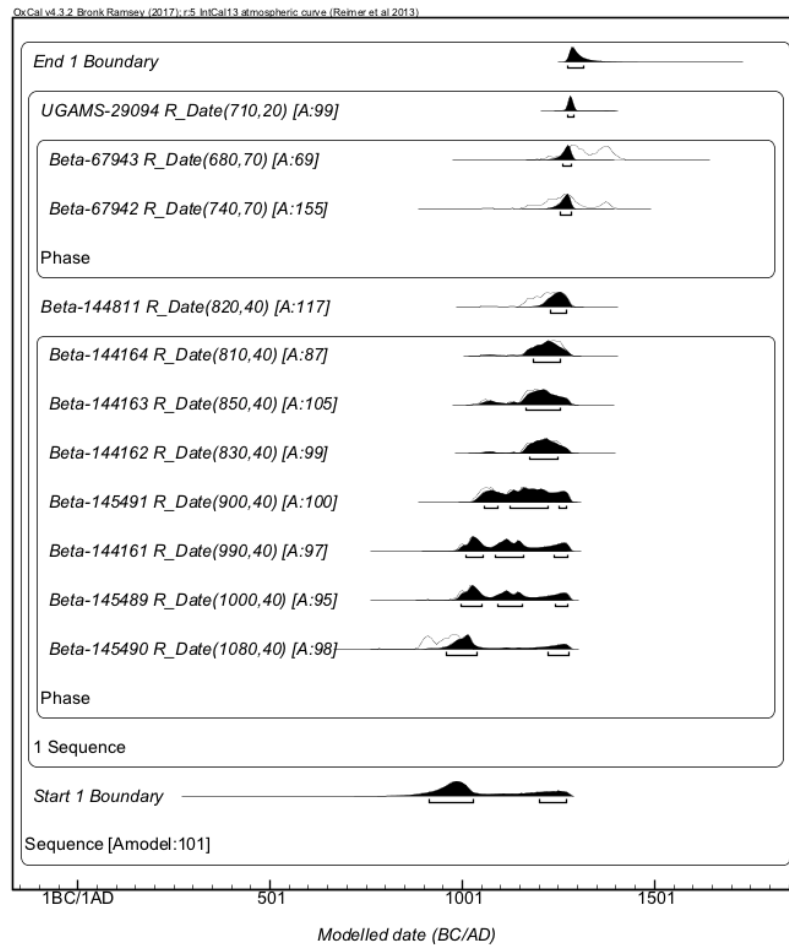


Figure 6.19. Bayesian model for the midden sequence at Etowah.

features, the black midden layer continues to be defined by Etowah stamped ceramics. The orange layer overlaying the black midden layer however is dense in Wilbanks stamped ceramics. The two dates from this orange layer model to roughly *cal AD 1260-1285* while the single date from the bone dense layer above the orange layer dates to *cal. AD 1275-1290*. The dating of this stratified sequence corroborates the regional ceramic chronologies presented in Chapter 5, wherein the appearance of Wilbanks stamped sherds, in ceramic subdivision GA-3, begins ca. *cal. AD 1235-1295*. This sequence also lines up with the dating of Mound C presented above, whereby the construction of Mound C likely began

ca. AD 1200 and ended ca. AD 1315. Seeing as the terminal use of Mound C likely corresponds to the abandonment of Etowah (Cobb and King 2005; King 2003), the saucer/midden sequence corroborates this claim. Given all of the temporal ranges together however, this abandonment likely happened at ca. AD 1315, not AD 1375 as offered by the extant narrative. Finally, two dates from the palisade were included in the seriation models presented in Chapter 5 (Beta-134792 and Beta-134793) and model to *cal. AD 1200-1300* and *cal. AD 1245-1315*, suggesting the palisade began to be built at the same time as Mound C and while the black midden was being deposited over top of the saucer features. At this time, Etowah ceramics were still in use, as evidenced by the dense concentration of them in both the black midden ceramic assemblage and in Mound C contexts. The dating of the palisade further corroborates an abandonment episode by AD 1315.

At what point Etowah grew to its maximum extent remains ambiguous, but it is likely that at least part of the palisade was beginning to be built by at least *cal. AD 1200-1300* and probably occurred at the same time that Mound C was beginning to be constructed and the corporately oriented activities associated with the saucer middens were being discontinued. It is at this same time, at least by *cal. AD 1235-1295* that a new ceramic tradition was introduced across the region and at the Etowah community. Given all of these lines of evidence, we can, with some degree of certainty, point to major changes enveloping the community at Etowah between AD 1200 and 1250, consistent with the extant narrative (Cobb and King 2005; King 2003, 2001).

While less rich in temporal data, the organizational history of Hiwassee Island in eastern Tennessee seems to mirror the occupational history at Etowah. As discussed above, construction on the major platform mound at Hiwassee Island likely commenced by ca. AD 1175, around the same time as construction likely started on Etowah's Mound C (ca. AD 1200). Like Etowah, there was also likely a burgeoning population at Hiwassee Island before construction was begun on the mound, as there is ample evidence for premound activities at the site. For instance, a ditch feature that segregates the mound area from the rest of the village area was recently dated and likely corresponds in time with the premound occupation (Sullivan, personal communication). By the mid-1200s however, this ditch was filled in and new AMS dates indicate that a number of single-post palisades were rapidly constructed around the village (Sullivan, personal communication). Again, this mirrors the activities taking place at Etowah whereby the palisade was likely constructed sometime between AD 1200 and 1300. While Hiwassee Island clearly did not experience the population aggregation experienced at Etowah, reaching a maximum extent of just 2-3ha, community-scale sociopolitical changes, as evidenced by mound construction activities and the construction of a material community boundary, were likely occurring. Unlike the community at Etowah however, where socioeconomic and sociopolitical inequalities were likely being emphasized in the context of societal reorganization, the populations across eastern Tennessee continued to maintain corporately oriented practices including dispersed settlement patterns and the use of local communal burial mounds located away from villages.

The latter part of Hiwassee Island's occupational history is less well understood. What we do know is that Dallas-like ceramics, present in subdivision TN-4 of the Tennessee seriation, appear in the top three layers of the main platform mound at the site and are the primary component in the ceramic assemblage of the last construction layer. Additionally, we now know that the large, bastioned palisade does not overlap in time with the earlier palisades built at the site and is likely associated with these later mound stages (Sullivan, personal communication). Given the temporal ranges for ceramic subdivision TN-4, this latter phase of occupation began between *cal. AD 1290-1345*, and more likely dates to just between AD 1300 and 1325 based on the proposed end date for the use of the platform mound. Notably, the start of this major organizational change, reflected in both changes to ceramic assemblages and the construction of a bastioned palisade, seems to correspond with the violent abandonment of the Etowah site to the south.

By AD 1325, the platform mound at Hiwassee Island likely fell out of use, although the community likely continued to be occupied. At this time, *ca. AD 1325*, the community at the Dallas site was established. Both the Dallas site in the Chickamauga Basin and the Toqua site in the Tellico Reservoir, provide valuable insight into major organizational changes enacted by communities beginning in the 14th century AD. Both the Dallas and Toqua sites (specifically the latter part of the occupation at Toqua) exhibit intentional, planned community organizations. Each had a platform mound, burial mound, and plaza area all oriented in regards to one another (Polhemus 1990; Schroedl 1998; Sullivan

1995). Compared to earlier communities, these communities were compact, dense, and surrounded by substantial palisades. Burials moved from communal Hamilton burial mounds to burials within platform mounds and under house floors, bringing into focus emerging sociopolitical inequalities and marked changes to the social relationships that structured community organization. Importantly, all of these changes took place after the proposed abandonment of Etowah at ca. AD 1315. Although Etowah was abandoned, communities across both eastern Tennessee and northern Georgia seem to have continued to thrive. Of particular interest are the emerging occupations at both Bell Field in northern Georgia (which looks very similar in material culture to eastern Tennessee communities) and at Hixon, whose ritual material assemblage mimics that of Etowah's now defunct Mound C.

Characterizing Transitions

Political Restructuring, AD 1150

The gradual transition centered at roughly AD 1150 was characterized archaeologically by the introduction of new architectural forms, significant agricultural intensification (Markin 2007, 2015), the commencement of the use of platform mounds and substantial public buildings, the aggregation of populations at larger village settlements, and, eventually, the appearance of Mississippian iconography and the use of community burial mounds as a major form of internment. The introduction of new architectural forms, namely wall-trench

architecture would have been both a technological and social development as these material changes were likely induced by the spread of practices from external sources, potentially from the west (Pauketat 2007) and could possibly indicate an increase in communal planning and collective activities among community members. The use of platform mounds and public structures, where no such indicators of public spaces existed previously, indicates a shift in organizational or decision making strategies at the community level, whereby leadership, in whatever form, seems to have been institutionalized, centralized, and materialized within communities. The increase in agricultural productivity, especially the intensification of maize agriculture would have presented opportunities, or constraints, on organizational relationships as the relations of production and the organization of labor would have needed to adapt to a changing subsistence economy. The appearance of Mississippian iconography additionally points to external contacts and, combined with the evidence for increased social inequality, as evidenced through changing mortuary patterns, it seems that these contacts were restricted, established in the context of newly emerging leadership strategies based on the cultivation of external relationships and social capital.

While traditions of ceramic production in eastern Tennessee changed dramatically with a shift to the exclusive use of shell tempering over limestone tempering, ceramic technologies and practices across northern Georgia seem to have retained their historical durability, signaling the potential durability of the social interactions and organizations (or indeed the traditions) that produced

these ceramic patterns archaeologically. Even though new stamping motifs and surface decorations were introduced, complicated stamping remained the major mode of decoration while sand and grit tempering was never abandoned in favor of new technologies. The implications of this durability are explored in more detail in the next chapter, which focuses exclusively on ceramic-based evidence.

In eastern Tennessee, the practice of using communal burial mounds, located away from communities, remained stable despite changes to other aspects of society. These Hamilton burial mounds actually continued to be used across all of eastern Tennessee up until the late 13th century, indicating that the institutions and social relationships materialized in these practices continued to play a role in the maintenance and generation of eastern Tennessee societies. In this way, these durable institutions likely would have served to mediate shifting political landscapes and used to buffer against uncertainty that would be expected in times of major social transformation and reorganization. Additionally, while a single, major sociopolitical center emerged in northern Georgia at Etowah, no single comparable center emerged in eastern Tennessee. Indeed, although platform mounds did come into use and populations did, to a degree, aggregate at particular places across the eastern Tennessee landscape, small communities and individual farmsteads remained ubiquitous across the landscape, indicating potential differences in the regional materializations of institutional change across eastern Tennessee and northern Georgia, and thus differences in how each locality may have collectively mediated sociopolitical change between ca. AD 1150 and 1325.

Collapse and Response, AD 1325/1350

The major sociopolitical disjuncture occurring at ca. AD 1325, characterized by the collapse/abandonment of Etowah is manifest materially by changes to mortuary practices in both eastern Tennessee and northern Georgia, changes to ceramic styles across Southern Appalachia, the introduction of seemingly planned community organizations across eastern Tennessee, and the abandonment of many of the contemporary platform mound and village sites across northern Georgia. Aside from the possibility for a major migration event of populations from middle Tennessee moving into Southern Appalachia in the context of severe drought (Sullivan, personal communication), one of the major events occurring at roughly AD 1315 is the abandonment of the community at Etowah and a shift of population concentration from the Etowah River valley north to Little Egypt located in the river valley just to the north and in proximity to the contemporary Bell Field community. Unlike Etowah, Little Egypt was modest in size, with only a single low platform mound and likely a substantially smaller resident population (Gougeon 2002; Hally 1970). In eastern Tennessee, planned villages seem to have developed that included the introduction of plaza spaces to communities, the alignment of earthen mounds within communities, and the movement of burial mounds into the community as the Hamilton burial mound tradition was discontinued.

Additionally, concurrent with the timing of this second turning point, major migratory events may have been underway as populations from middle

Tennessee began moving into the Southern Appalachian region and into eastern Tennessee and northern Georgia communities in the context of extreme drought events (Sullivan, personal communication). While the evidence for these potential migrations are circumstantial, based on increased similarities in mortuary practices, ceramic materials, iconography, and agricultural practices, namely the introduction of beans to eastern Tennessee (Baumann and Althizer 2017; Monaghan et al. 2014), such processes would have indeed contributed to sociopolitical uncertainty across Southern Appalachia. All of these changes, the collapse of a major central place, the potential introduction of migrants into extant communities, and the increased interactions between northern Georgia and eastern Tennessee populations as indicated through ceramic materials and settlement patterns, likely represent the material residues of collective societal responses to a period of heightened sociopolitical uncertainty. Like the changes experienced at ca. AD 1150, the material changes identified here likely represent changes to institutions, the rules and norms governing societal organization, which would have undoubtedly included changes to the relationships through which society was given form.

The kinds, qualities, and quantities of social capital available within Southern Appalachian societies would have played a major role in mediating these transformations through collective processes of response and adaptation to evolving sociopolitical landscapes. Here, I have demonstrated that between AD 600 and 1600, there were likely two major social transformations that induced critical changes to the institutions constituting societal norms, governing

relational organizations, and structuring interactions between actors across Southern Appalachia. I have shown that while many changes to the archaeological record may indeed indicate significant transitions, I have also presented evidence that some institutions and practices may have been more durable than others, surviving major disjunctures in sociopolitical organization. The durability of some institutions and the flexibility of others would have undoubtedly all contributed to processes of collective response to periods of reorganization in which the rules, norms, and relationships constituting society were all subject to uncertain futures. While in this chapter I have focused on the material proxies for potential institutional changes, in the next chapter I focus explicitly on the network histories of Southern Appalachian societies as I explore how social networks were affected by, or responded to, the major changes outlined here.

CHAPTER 7: SOCIAL NETWORKS

In this chapter, I explore the social networks that gave form to Southern Appalachian societies between AD 600 and 1600. More specifically, I evaluate the durability of two particular types of networks across major historical junctures defined by critical institutional change, namely the centralization and hierarchization of political leadership and the collapse of Etowah as a regional central place. In the previous chapter, I identified these two periods of substantial sociopolitical transformation as reflected in a number of sociomaterial histories: the first at ca. AD 1150 and the latter at ca. AD 1325. Here I evaluate networks for three time periods, separated generally by these substantial pivots in sociopolitical practices and guided by the ceramic seriations presented in Chapters 4 and 5 (note from Chapter 5 the slight differences in the ceramic chronologies for eastern Tennessee and northern Georgia): AD 800-1050, AD 1050-1325, and AD 1325-1650. These transitions would have affected varying alterations to power relations, social organizations, economic interactions, and ideologies across Southern Appalachia. In this chapter I evaluate the durability and flexibility of different kinds of social networks across these historical thresholds. I argue that these networks constituted measures of trust, reciprocity, and capital which could have been accessed to facilitate collective processes of managing uncertainties introduced by shifting political landscapes.

Social Network Analysis and Archaeological Materials

Network analyses and perspectives have flourished as components of social science research over the last fifty years (see Borgatti et al. 2009 for review). From research on power and social/cultural roles (e.g. Bonacich 1972, 1987; Borgatti 2006; Borgatti and Everett 2006; Brieger and Pattinson 1986; Everett 1985; Faust 1997; Freeman 1978; Friedkin 1991; Mandel 1983) to explorations of exchange, organizational structure, and the relationships between individuals and societies (e.g. Brieger 1974; Feld 1981; Granovetter 1973, 1983, 1985; McPherson et al. 2001; McPherson and Smith-Lovin 2002; Markovsky et al. 1988; Padgett 1993; Watts and Strogatz 1998), both network method and theory have continued to be developed towards addressing perennial issues in social science research.

Archaeologists are among those who have used network analyses and perspectives to inform a range of research themes including identity and affiliation (e.g. Blair 2015; Hart and Engelbrecht 2011; Peeples 2018, 2011; Terrell 2010), social movements and transformations including migration (e.g. Borck 2016; Borck et al. 2015; Mills et al. 2013a, 2013b, 2015; Peeples 2018, 2011), sociopolitical organization and roles (e.g. Birch and Hart 2018; Dermarkar et al. 2016; Hart et al. 2016; Mizoguchi 2009; Peeples and Haas 2013; Schortman and Ashmore 2012), and regional interaction and exchange (e.g. Golitko and Feinman 2015; Golitko et al. 2012; Thompson et al. 2017). Archaeologists have continued to explore the articulation between network metaphors and formal applications (e.g. Knappett 2013), especially in regard to

the melding of network perspectives with other theoretical frameworks including Actor-Network Theory (e.g. Van Oyen 2016) and notions of entanglements (e.g. Mol et al. 2015). These applications by archaeologists, and discussions of associated challenges, have manifest themselves in a number of edited volumes (Brughmans et al. 2016a; Evans and Felder 2014; Knappett 2013) and have been reviewed extensively (see Brughmans et al. 2016b; Collar et al. 2015; Knappett 2011, 2013a, 2014, 2016; Ostborn and Gerding 2014; Peeples et al. 2016). As Brughmans et al. (2016b:5) point out, “Archaeologists are interested in past phenomena that can often be abstracted using relational concepts, and they make assumptions about what entities and relationships mean, what kind of behaviors they allowed for, and the implications for understanding the past phenomena in which they are interested.” Towards these ends, “network perspectives require us to explicitly express our assumptions about connections between nodes; what the relationships mean, how they affect other relationships, and what kinds of behaviors and opportunities they allow for” (Brughmans et al. 2016b:10).

Unlike sociological and ethnographic applications of social network analyses, based on the observations of direct connections between actors, individuals, groups, or other entities, archaeological applications in most cases, by necessity, must rely on proxies to determine relational connections. One of the most obvious applications of network analysis in archaeological contexts utilizes data from provenance studies where both the starting and ending points of an object are known, and thus generalized connections between entities are

assumed (e.g. Mills et al. 2013a; Peeples 2018, 2011). Also common however, and from which the current study draws inspiration, have been studies that employ assumptions about relationships between entities based on the distribution of practices. These recent studies rely on such behaviors and formations as social signaling and communities of practice as evidenced by material similarities (e.g. Birch and Hart 2018; Borck 2016; Hart and Engelbrecht 2011; Hart et al. 2016; Mills et al. 2015; Peeples 2018, 2011). Each of these represents the manifestations of different kinds of relationships that we may infer using archaeological data. Each realm of practice is, in essence, the manifestation of the perception, construction, maintenance, and delineation, either conscious or not, of social relationships and thus can be used to evaluate, to an extent, the organization of particular kinds of relationships. It is important to recognize, however that the analyses presented here, no matter how justified, are undertaken and interpreted within an etic context. While the materials used in this study, specifically the visible surfaces of ceramic vessels and the additive aplastics (temper) included in clay pastes, likely reflect some forms of relationships, it is not necessarily the case that they constituted identities or even played an active role in maintaining relational structures. It may well be the case that the data used here, and the patterns identified herein, may be ancillary products of other social processes indirectly related to relationships, identities, and the organization of society. Nonetheless, in the context of archaeological research, these limitations are not unique.

Networks in This Study

As archaeologists and specialists on the materiality of self and society, we occupy a place from which we can investigate the social content of techniques and procedures related to the production of the material record, which are, in their own right, first and foremost social productions (Lemonnier 1993:2). Potters of course have “ideas” about every element, step, technique, and procedure related to the production of pottery and these ideas and mental processes, that underlie actions on the material world, are invariably embedded in broader symbolic systems and relational fields, the recognition of which allows us to illuminate the connections between technical phenomena and social realities (Lemonnier 1993:4, 1983:17; Mahias 1993). From the first conception of a product in a potter's mind, the product in question, and the process through which it comes to fruition, is in essence the translation of social interests and strategies into particular technical representations (Latour 1993).

As social interests and strategies are inherently variable, objects may acquire a wide range of meanings during their manufacture and use as potters and their products are embedded in many networks and social contexts (Appadurai 1986; Gosden and Marshall 1999; Gosselain 2000:189; Hoskins 1998). As Olivier Gosselain outlines from his ethnoarchaeological work in Cameroon (Gosselain 1992, 1998, 2000), potters engage with techniques that make them unmistakable members of particular communities. They fashion vessels with techniques shared by a group of individuals larger than the group with which they share clay processing techniques. They use the same

ornamental tools and motifs as an even larger group of potters. They fire pots in structures and with fuels typically associated with communal or local traditions. And the way that they treat pots after firing are represented by techniques shared and distributed at yet another social and spatial scale (Gosselain 1995, 1998, 2000:189). Gosselain himself proposes the term "technical identity" to refer to the incorporation of different facets of a potter's social identity which corresponds with an intricate set of boundaries and networks experienced by these individuals (Gosselain 2000:189).

A productive distinction is made here between high visibility and low visibility ceramic attributes. High visibility attributes, like surface decorations and motifs, allow a wide range of people to be aware of a potter's behavior, thus potentially influencing the potter's choice of techniques (Gosselain 2000:191). In this way, we can understand the decisions that go into producing high visibility attributes as part of a process of social signaling (e.g. Bliege-Bird and Smith 2005; Bowser 2000; Degoy 2008; Dietler and Herbich 1998, 1994). Because these attributes are highly visible, the diversity of individuals who may potentially be influencing a potter's decisions is higher. This is especially dependent on the context within which the potter expects their pots to be consumed or displayed. Additionally, high visibility attributes are easily transmissible and thus allow for the identification of loose or situational networks of interaction that may or may not be highly influenced by geographic proximity or processes of conformity (Gosselain 2000:209; Wobst 1977). Low visibility attributes on the other hand, resulting from those techniques related to such procedures as raw material

processing, temper sorting, clay mixing, etc... may not be so easily "read" from a finished pot and thus those with the potential to influence a potter's behavior on these matters is more restricted (Gosselain 2000:192). This more restricted body of individuals may be in some cases referred to as a community of practice, (e.g. Crown 2014; Wendrich 2012; Wenger 1998), or identified as more local networks of interactions (DeBoer 1986; Dietler and Herbich 1989, 1998; Gosselain 1995, 1998, 2000; Wahlman 1972) materialized in such activities as participation in clay collection groups, communal firing parties, or the engagement in processes of teaching and learning likely through inter-generational apprenticeships.

The analytical separation of high and low visibility attributes may allow for the separation between "surface cultural expressions and deep structural dispositions" (Jones 1997:92). At a more basic level however, the distinction made here allows us to account for the possibility that cultural elements, including ceramic attributes, technical procedures, and variable social networks, do not necessarily co-vary or evolve in the same ways (Gosselain 2000:209). Thus, when we attempt to unravel complex social histories by collapsing this variability into essentialized ceramic "types" we are left unable to ask important questions about how societies were actually organized and the different kinds of relational fields which underlie, and produce, organizational structures. This is especially important if we are to determine what kinds of relationships and networks were transformed, or remained unaffected, by major sociopolitical change. For instance, while situational networks may exhibit a certain degree of flexibility in accounting for institutional change, historically durable networks

predicated on kinship systems and frequent interaction may be characterized by more durable structures in the face of major social change. The evaluation of both high and low visibility attributes, used as proxies for two types of social networks, allow for these considerations.

Data

The ceramic data used here totals to 365,331 sherds from 84 components across Southern Appalachia including 276,626 sherds from 43 components across eastern Tennessee and 88,705 sherds from 41 components across northern Georgia spanning between ca. A.D. 600 and 1600. Raw attribute data and counts are presented by site and by time period in Tables F.1, F.2, and F.3 of Appendix E. While the seriation analyses in Chapters 4 and 5 used assemblage data at the intra-community scale, the network analyses in this chapter are based on the same assemblages, but aggregated to the scale of the archaeological component by site. That is, assemblages located at the same site that were assigned to the same temporal subdivision in Chapters 4 and 5 were aggregated to achieve site-level analyses. For instance, if three features from one site were assigned to temporal subdivision one, these three features were aggregated to represent a single site which would be represented by a single node for a single time period in the network analyses. An example of this aggregation procedure is illustrated in Table 7.1. The raw assemblage data and their assigned temporal subdivisions, derived from analyses in Chapters 4 and 5, are presented in Appendix A, Tables A.1 and A.2. Due to these procedures, the

same site can potentially appear as a node in each of the networks depicted for each of the three time periods, as earlier features from a single site could be combined to form a node in the earliest network while features assigned to a later temporal division may be combined and depicted as a node in a network of a later temporal division.

Networks that represent three successive time periods were constructed. While the seriation analyses presented in Chapters 4 and 5 identified four temporal subdivision for each locality, subdivisions two and three, for both Tennessee and Georgia, temporally overlapped with one another significantly and thus are likely more contemporary than they are successive. Because of this overlap, subdivisions two and three were combined to form a single subdivision located between subdivisions one and four. As the networks presented below combine data for both eastern Tennessee and northern Georgia into single Southern Appalachian datasets, the temporal subdivisions for each locality have been reconciled and generalized to produce the following periods: ca. AD 800-1050, ca. AD 1050-1325, and ca. AD 1350-1650.

Network Analyses

Much like ceramic data is used here as a proxy for relationships and connections, measures and indices of network structures are used as proxies for the qualities of those relationships, and more specifically as proxies for the kinds of social capital available to Southern Appalachian societies in responding to and

Table 7.1. Example of how assemblages were aggregated to the level of the component for network analyses.

Time Period	Site	Assemblage	Limestone	Shell	Sand
1	9Br1	Saucer 1	25	30	50
1	9Br1	Saucer 2	62	55	125
1	9Br1	Structure 3	16	25	45
1	9Ck5	Mound Stage 1	5	25	100
1	9Ck5	Mound Stage 2	2	15	98
1	9Ck1	Feature 757	15	2	250
1	9Mu100	Feature 60	90	35	30
1	9Mu100	Feature 75	58	40	40
2	9Br1	Lamar Bone Bed	2	25	50
2	9Mu102	Structure 1	8	65	29
2	9Mu102	Structure 2	6	78	57
2	9Mu202	Feature 18	9	24	16
2	9Mu103	Structure 3	7	49	21
2	9Go4	Unit 2, Layer 4	2	20	5
2	9Go4	Unit 3, Layer 2	1	23	3
Time Period	Site	Assemblage	Limestone	Shell	Sand
1	9Br1	Aggregated	103	110	220
1	9Ck5	Aggregated	7	40	198
1	9Ck1	Aggregated	15	2	250
1	9Mu100	Aggregated	148	75	70
2	9Br1	Aggregated	2	25	50
2	9Mu102	Aggregated	23	167	102
2	9Mu103	Aggregated	7	49	21
2	9Go4	Aggregated	3	43	8

mediating sociopolitical change. Below I describe the procedures used to prepare ceramic data for network analyses and I define the network and node level measures used to characterize network structures. Ceramic assemblage similarity data was prepared by executing script written by Peeples (2011) using R version 3.3.2 statistical software. Visualization of network graphs were made in UCINET 6 (Borgatti et al. 2002) and NetDraw (Borgatti 2002). Network and node

level measures were produced using UCINET 6 (Borgatti et al. 2002) and R script written by Peeples (2017) and executed using R version 3.3.2 statistical software.

Transforming Ceramic Data

Preparing archaeological data for social network analysis is essentially a practice in converting two-mode data into one-mode data. As Borgatti et al. (2013:231) point out, it is common that we cannot directly determine ties among actors, but we may be able to infer ties based on belonging to the same groups or attending the same events. Archaeologically, barring cases that include written documents explicitly referencing connections, or the presence of connections via road networks for example, ties between nodes are commonly inferred based on the presence of similar artifacts, and especially similarities in tabulations of artifacts assigned to nominal categories. When we start with two-mode data, like that shown in Table 7.2, our data essentially consists of two types of entities. In this case, there are only connections between the two types of actors (e.g. sites and ceramic categories) and not between actors of the same type (e.g. connections between sites) (Borgatti et al. 2013:231; Brieger 1974). In moving from two-mode archaeological data to one-mode archaeological data, we make the assumption that similarity in material assemblages between actors (often sites) is likely an indicator of some social, political, economic, or other kind of connection (or at least the potential for a connection).

Table 7.2. Example of two-mode archaeological data.

Site	Limestone	Shell	Sand
9Br1	103	110	220
9Ck5	7	40	198
9Ck1	15	2	250
9Mu100	148	75	70
9Mu102	23	167	102
9Mu103	7	49	21
9Go4	3	43	8

To illustrate the simple conversion of a binary two-mode dataset to a one-mode dataset, Borgatti et al. (2013) cite an example by Davis et al. (1941) in which they collected data on the attendance at 14 society events by 18 Southern women. If a woman attended an event, that event (column) for that woman (row) was given a “1.” If the woman did not attend the event, it was assigned a “0.” This resulted in a binary two-mode dataset where each row represents a woman and each column represents a society event. To transform this data to a one-mode matrix, where both rows and columns represent women, we would simply sum the number of co-attended events for each pair of women which would fill each cell with the number of similar events attended by each pair of women.

Archaeological data on artifact tabulations necessitates a more complicated mode of transformation for two apparent reasons. The first reason is that data are often valued as counts or proportions and not presented as binary. The second is that, even when data are binary, the substantive implications for the presence or absence of an artifact type do not correlate exactly with the example

provided above where the assignment of a “1” reflects straightforward attendance at an event at which other actors may or may not have been present.

While there are countless similarity measures that could be employed to transform two-mode to one-mode data, archaeologists have overwhelmingly utilized a single method, the Brainerd-Robinson Coefficient of Similarity (e.g. Birch and Hart 2018; Blair 2015; Borck 2016; Borck et al. 2015; Golitko et al. 2012; Hart and Engelbrecht 2012; Hart et al. 2017; Mills et al. 2013a, 2013b; Peeples 2011; Peeples and Haas 2013; Peeples et al. 2016). The Brainerd-Robinson coefficient is essentially a city-block metric that has been shown to be effective in comparing assemblages presented as frequencies of nominal categories (Cowgill 1990; Peeples 2011; Peeples and Roberts 2013) where the similarity (S) between sites a and b is defined as:

$$S = 200 - \sum_{k=1}^p |P_{ak} - P_{bk}|$$

where k is all ceramic categories, P_{ak} is the percent of ceramic category k at site a , and P_{bk} is the percent of ceramic category for k at site b (Brainerd 1951; Robinson 1951). The measure ranges between 0 and 200, with a value of 0 reflecting 0% similarity and a value of 200 reflecting 100% similarity. Using this measure of similarity, we can convert two-mode data (Table 7.2) to one-mode data (Table 7.3) in which the relationship between two sites is represented as a function of the similarity between those two sites' ceramic assemblages.

Table 7.3. Example of one-mode data converted from two-mode data using the Brainerd-Robinson Coefficient of Similarity.

	9Br1	9Ck5	9Ck1	9Mu100	9Mu102	9Mu103	9Go4
9Br1		140	114	146	136	124	92
9Ck5	140		169	86	108	93	68
9Ck1	114	169		61	83	67	42
9Mu100	146	86	61		115	117	92
9Mu102	136	108	83	115		185	155
9Mu103	124	93	67	117	185		168
9Go4	92	68	42	92	155	168	

Constructing Networks

Using a matrix of Brainerd-Robinson values representing similarities between ceramic assemblages at the component level, network graphs can be produced. Each of the network graphs visualized throughout this study are based on binarized versions of the Brainerd-Robinson similarity matrices. That is, in order to pull out the most prominent and important features of the social networks reviewed here, data for each network were binarized by choosing a Brainerd-Robinson value as a cutoff point. Cutoff points were chosen that highlighted the structure of the networks and that were just above the threshold of breaking the network into multiple, isolated sub-graphs. In other words, cutoffs chosen represent the highest similarity values at which the integrity of the network as a single component could be maintained. Not only does this provide the visualization of network structure, it also provides valuable, generalized information on the degree of similarity between assemblages used in each

network and the overall strength of network ties. The cutoff points used for each network visualization are included in the description of each graph and in Table 7.4.

While network graphs are produced using binarized data, as Peeples and Roberts (2013) have demonstrated the resulting matrices of valued similarity scores should be used to calculate network metrics including cohesion measures and node centralities. As such, all of the network measures described below were calculated using weighted data, or the actual Brainerd-Robinson values for each matrix, not binarized data. No cutoff values were used. As such, the measures recorded here may not correspond directly to the network structures presented in the visualized graphs. As an example, in a binarized network,

Table 7.4. Network measures and indices for each network and each time period considered here.

Measure	AD 800-1050	AD 1050-1325	AD 1325-1650	AD 800-1050	AD 1050-1325	AD 1325-1650
	Temper	Temper	Temper	Surface	Surface	Surface
BR Cutoff for Graph	80	70	100	120	155	145
Average Tie Strength	75	72	108	116	116	127
Network Degree Centrality	13	6	10	13	9	11
Node Degree Centralities > 1 σ	0	7	0	3	0	0
Network Betweenness Centrality	2	1	8	3	0	7
Node Betweenness Centralities > 1 σ	0	2	0	3	4	1
Network Eigenvector Centrality	6	3	8	7	3	4
Node Eigenvector Centralities > 1 σ	1	2	1	3	0	0
Longest Geodesic Distance	11	18	13	14	21	9
Average Geodesic Distance	4.06	8.61	5.31	5.41	7.71	4.51
Compactness/Cohesion	0.514	0.231	0.323	0.277	0.218	0.334
Fragmentation/Breadth	0.486	0.769	0.677	0.723	0.782	0.666
Max k-core	17	15	10	5	9	9
% of Nodes in Max k-core	63	38	55	19	23	50
% of Nodes in k-core of ≥ 3	67	100	61	85	74	78
Type of Network (Crowe 2007)	Coalitional/ Factional	Coalitional	Coalitional	Bridging	Bridging	Complete/ Bridging

arbitrary cutoff points would define the ties between nodes which would then be used to calculate network measures like overall coherency or node centralities. If one node had many connections in this binarized network there would be implications for the overall structure of the networks as well as for the centrality of that particular node. If the relationships were weighted, or valued, however, it may be observed that the node in question has many weak or moderate connections while another node may have a few very strong connections. In analyses using binarized data, these strengths are not taken into account and valuable information on the quality and organization of relationships is lost.

Network Structure

Eleven weighted measures of network characteristics and structure are presented to assess changes to Southern Appalachian networks and from which information about the relationships between networks, insights about the distribution of social capital, and processes collective action is derived. Each of the eleven measures on their own provide slightly different kinds of information about networks and have different substantive implications for understanding collective responses to sociopolitical change across the region. Many of the measures described here differ only slightly in the network characteristics they describe, but these slight differences are important for understanding the nuances and dimensions of relationships that comprise the social networks.

Maximum geodesic distance: The shortest distance between a pair of nodes is a geodesic distance. For a weighted network with valued ties, the geodesic distance between two nodes is the strongest path between two nodes. The maximum weighted geodesic distance for a graph is the longest path between two nodes accounted for when all paths between all nodes are calculated. Maximum geodesic distance provides a measure related to how far and through how many entities information or resources might need to travel between any pair of nodes (Borgatti et al. 2002).

Average geodesic distance: The average geodesic distance of a network is the average of all shortest, or strongest paths, between all pairs of nodes in the network. Similar to the maximum geodesic distance, average geodesic distance provides a measure related to the average distance, and thus number of nodes or path lengths, information may need to travel through a network which could have an effect on both the temporality and access of information flow and resource access and mobilization (Borgatti et al. 2002).

Compactness/cohesion: Weighted distance-based cohesion is a measure of overall cohesiveness of the network. The measure characterizes the compactness of the network as a function of geodesic distances. This value ranges between 0 and 1 with larger values indicating greater cohesiveness (Borgatti et al. 2002).

Breadth: Breadth is the opposite of compactness/cohesion and characterizes the spread or looseness of the network based on geodesic distances. It is calculated by subtracting the compactness measure from one (Borgatti et al. 2002).

Density (average tie value): For a valued network, density is the total of all tie values divided by the number of possible ties. In the case of weighted network density, a density measure represents an overall average tie value (Borgatti et al. 2002).

Density (average degree)/ network-level and node-level degree centrality:

Instead of an average value for all ties, the average weighted degree is the average sum of ties for each node. For instance, if many nodes have many strong ties, average degree density will be high. In contrast, if many nodes have many weak ties, the average degree density will be lower. An average tie value for each node is calculated, and then the average of those node-level tie values is calculated to produce the measure (Borgatti et al. 2002). Degree centrality is a coarse, yet simple, measure of centrality that reflects the number of ties a node has. As Borgatti et al. (2013:165) point out, degree centrality is technically not a measure of centrality as it is not a property of a node's position in the network. In fact, not much information has to be known about the overall structure of the network to compute degree centrality, or to count the number of ties a node has. In some cases, a node's degree can reflect the node's exposure in the network as the probability of information flowing through the node increases proportional

to the number of connections a node holds. In a weighted network, degree centrality for a node is the sum of valued ties.

Network-level and node-level betweenness centrality: Network-level centrality measures are essentially measures reflecting the centrality of all nodes in a network in relation to a theoretical maximum (Peeples 2017). Betweenness centrality is based on the number of times a node falls along the shortest path between all other pairs of nodes in the network (Freeman 1979, 1978). A node's betweenness centrality reflects the potential for a node to connect nodes, or groups of nodes, that are otherwise not directly connected. In this way, nodes with high betweenness values are often considered brokers or gatekeepers within their network. This privileged position within the network can be related to the ability of the node to have more control over flows through the network (Borgatti et al. 2013:175). As Borgatti et al. (2013:175) highlight, nodes with high betweenness scores are in a position to filter and distort information as it flows through the network and have the highest potential to threaten the network with disruption by fracturing important ties holding different parts of the network together. In a weighted network, shortest paths are defined as the paths of least resistance between pairs of nodes; the stronger the path, the shorter the path between two nodes (Opsahl et al. 2010; Peeples 2017).

Network-level and node-level eigenvector centrality: Taking into account network structure, and especially the properties of nodes to which a given node is

connected, eigenvector centrality is essentially a variation on degree centrality in which the number of nodes connected to a given node are counted and then weighted based on how many connections each of those nodes hold (Bonacich 1972; Borgatti et al. 2013:168). Simply, eigenvector centrality is a measure of centrality in which a node's centrality is its summed connections to others, weighted by those nodes' centralities (Bonacich 1987:1172, 1972). A node thus can only be as central as its network (Borgatti et al. 2013:168). Eigenvector centrality reflects to some degree a measure of popularity, as nodes with high eigenvector centralities are themselves connected to other well-connected nodes. In theory, a node with a low degree centrality, if their limited connections are to very well-connected nodes, may well have a higher eigenvector centrality than nodes that originally had higher degree centralities. Eigenvector centrality may also be an indicator of the amount of power a node has within its network (Markovsky et al. 1988) or, alternatively, the level of risk for a node to experience or receive unwanted flows (Bonacich 1987; Borgatti et al. 2013:170).

k-cores: A k -core is a maximal subgraph in which each node is directly connected to at least k other nodes (Borgatti et al. 2002; Crowe 2007). An isolated node connected to no other nodes is thus referred to as a "0-core" (Crowe 2007). A "4-core" would thus represent a subgraph of four nodes, embedded in a larger graph, within which all four nodes are connected to one another through direct ties. In this study both maximum k -cores and the proportion of k -cores in a network equal to or greater than three are recorded.

Results

In this section I present the results of the network analyses conducted from data on both ceramic surface decorations and temper. Results from all analyses described above, and referenced below, are presented in Table 7.4. In Table 7.5 I present a generalized description for the data presented in Table 7.4 and include the sociomaterial practices associated with the networks for each time period as presented in Chapter 6. In the following, I present summaries of the results for each set of networks separately, and explore how each network independently changed through time, between AD 600 and 1600. In the final discussion section, I interpret these results, structures, and indices against models that explicitly relate type of social capital to particular network characteristics.

Communities of Practice/Low-Visibility Signaling

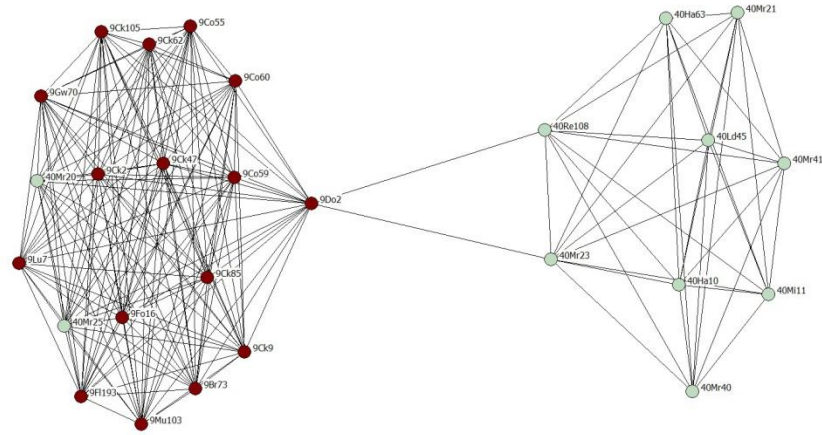
As outlined previously, the networks that can be conceived of as communities of practice are those based on the use of particular kinds of tempering agents across Southern Appalachia. In general, the kinds of temper used across the entire region were limited to four major categories: quartz, sand/grit, limestone, and shell. Thus, the networks presented here are based explicitly on the distribution of these different kinds of practices across the region and within individual communities. These networks are presented in Figure 7.1.

Table 7.5. Network properties and sociomaterial practices across each of the three time periods considered here.

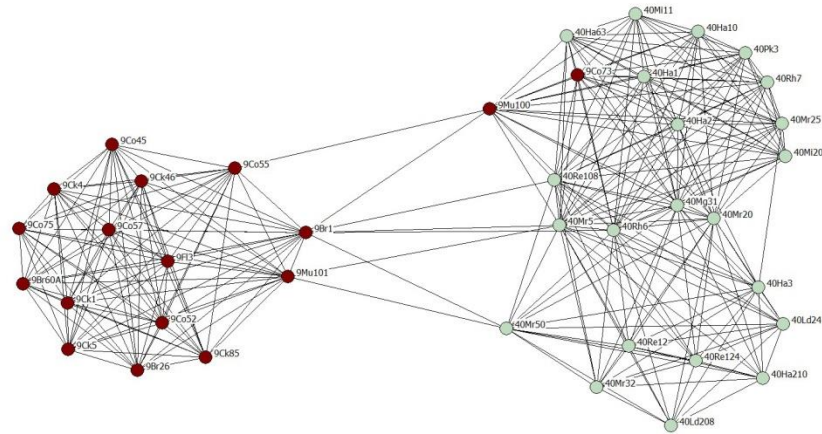
Period	Social Networks (Temper)	Social Networks (Decoration)	Sociomaterial Practices
AD 800-1050	Strongly coalitional; highly cohesive within each locality, but few ties between NWGA and ETN	No clear distinction in the use of decorative styles between NWGA and ETN; a few subgroups of dense ties, but overall held together by weak, ties between communities	Community Organization: Small, semi-sedentary communities; first palisades; no formal layouts; no public structures; possible early platform mounds in NWGA; no substantial communities in ETN Mortuary Practices: In ETN, use of conical burial mounds across the region; burial mounds located away from habitation sites; few grave goods; likely used by many residential populations; In NWGA, little evidence for burial practices; no burial mounds Politico-Ritual Participation: No evidence for expansive exchange networks, exotic goods, or pan-regional iconography; no evidence for religious or ritual paraphernalia
AD 1050-1325	Coalitional; highly cohesive within each locality; more connections established between NWGA and ETN through a few select communities	More strong ties between communities; many ties between NWGA and ETN sites; no strong subgroups based on geographic proximity, although more distinction than previous period	Community Organization: Large, aggregate communities, 2-5ha average; substantial palisades; public spaces and buildings; use of platform mounds; some evidence for formalized layouts Mortuary Practices: In ETN, use of conical burial mounds located away from villages; no village burials; no platform mound burials; no grave goods; only platform mound burials are at Hixon; in NWGA, platform mound burials at some places; increased grave goods; use of limestone box tombs Politico-Ritual Participation: Increased frequency of non-local raw materials and finished products; increased use of Mississippian iconography; ritual paraphernalia abundant
AD 1325-1650	A more cohesive network overall; less distinction between NWGA and ETN communities; more ties between the two localities; more similar uses of temper across whole region	A more cohesive overall network with one main network component of dense ties between both ETN and NWGA communities; overall more similarity in decorative traditions	Community Organization: Large, aggregate communities, 2-5ha average; substantial palisades; compact village organization; formal community layouts; some public structures and spaces; compact villages and homesteads/farmsteads Mortuary Practices: In ETN, no more communal burial mounds; use of platform mounds within the community; not all are buried in platform mound contexts; limestone box and log tomb burials; in NWGA; some platform mounds burials; log tombs and limestone box burials; house floor burials Politico-Ritual Participation: Continued use of Mississippian iconography; continued use of non-local raw materials and ritual paraphernalia

For each of the three time periods, the same general network structure is retained throughout the entire 1,000 year period considered here (Figure 7.1). What the visual assessment of these networks make clear is that choice of temper is highly correlated with geographic proximity, as there is a clear distinction between subgraphs between northern Georgia nodes and eastern Tennessee nodes across all three periods. There are however some significant temporal patterns that can be highlighted. In the first period, AD 800-1050, only two connections exist between the northern Georgia and eastern Tennessee subgraphs which consist of one site from Georgia, Anneewakee Creek (9Do2), connected to two sites from eastern Tennessee, Icehouse Bottom (40Mr23) and 40Re108. While these sites exhibit the strongest connections between subgraphs, each site remains heavily tied into, and more similar to, its own geographic subgraph. From both general visualization and an assessment of network metrics, no sites included in this early period are central to any part of the network beyond the unique connections between 9Do2, 40Mr23, and 40Re108. Indeed, each side of the graph represents an almost complete graph, one for Georgia and one for Tennessee, in which connections are just about ubiquitous among all sites, indicating a high degree of similarity in temper usage. While potters in Tennessee use almost exclusively limestone tempering, those in Georgia utilized almost exclusively sand/grit tempering agents. The connection between 9Do2 and the Tennessee cluster is thus likely due to the presence of minority sand/grit tempered sherds at 40Mr23 and 40Re108 and the presence of limestone tempered sherds at 9Do2. Whatever the case, even if driven primarily

AD 800-1050 Temper



AD 1050-1325 Temper



AD 1325-1650 Temper

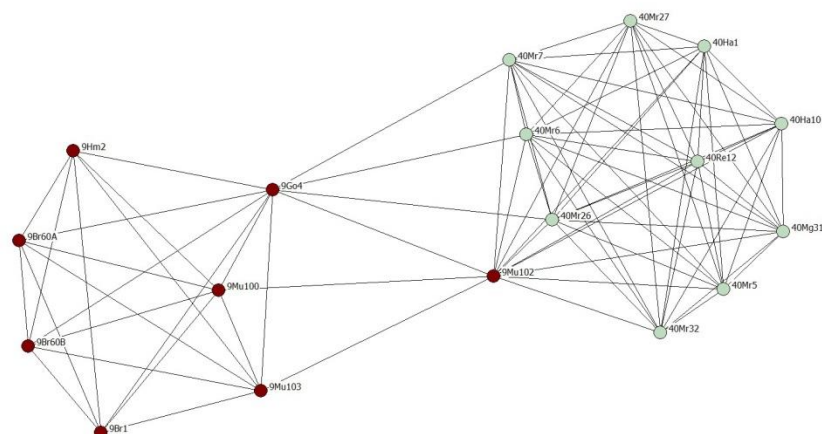


Figure 7.1. Networks based on the distribution of temper use for each of the three time periods considered here. Green nodes are components of eastern Tennessee while red nodes are components of northern Georgia.

by raw material variability, interactions resulting in either the transfer of technological information, finished products, raw materials, or people seem to have been limited during this period.

During the following period, AD 1050-1325, while the general structure characterized by two primary, geographically defined subgraphs is maintained, many more connections between the two subgraphs are established. Most of these connections are funneled through Etowah (9Br1), Bell Field (9Mu100), and Sixtoe Field (9Mu100). Indeed, Sixtoe Field, as well as 9Co73, is actually located within the Tennessee subgraph, indicating their similarity to eastern Tennessee sites despite being located in northern Georgia. It is clear that certain kinds of interactions and relationships that were absent during the previous period (date range) are clearly established during this succeeding period (date range).

While limestone and shell tempering increases at Etowah, Bell Field, and Sixtoe Field during this time period (Figure 7.2), it does not increase evenly across all decorative treatments. That is, while the number of limestone and shell tempered plain and cordmarked increases dramatically, the increase is less marked when considering only complicated stamped sherds (Figure 7.3). This suggests that, just as sand tempering seems to be an historically rooted tradition across northern Georgia, so too is complicated stamping. While Etowah and Wilbanks complicated stamping styles are tempered with shell and limestone, especially in eastern Tennessee and at Sixtoe Field, the majority of complicated stamping remains linked to a tradition of sand tempering. This may be an

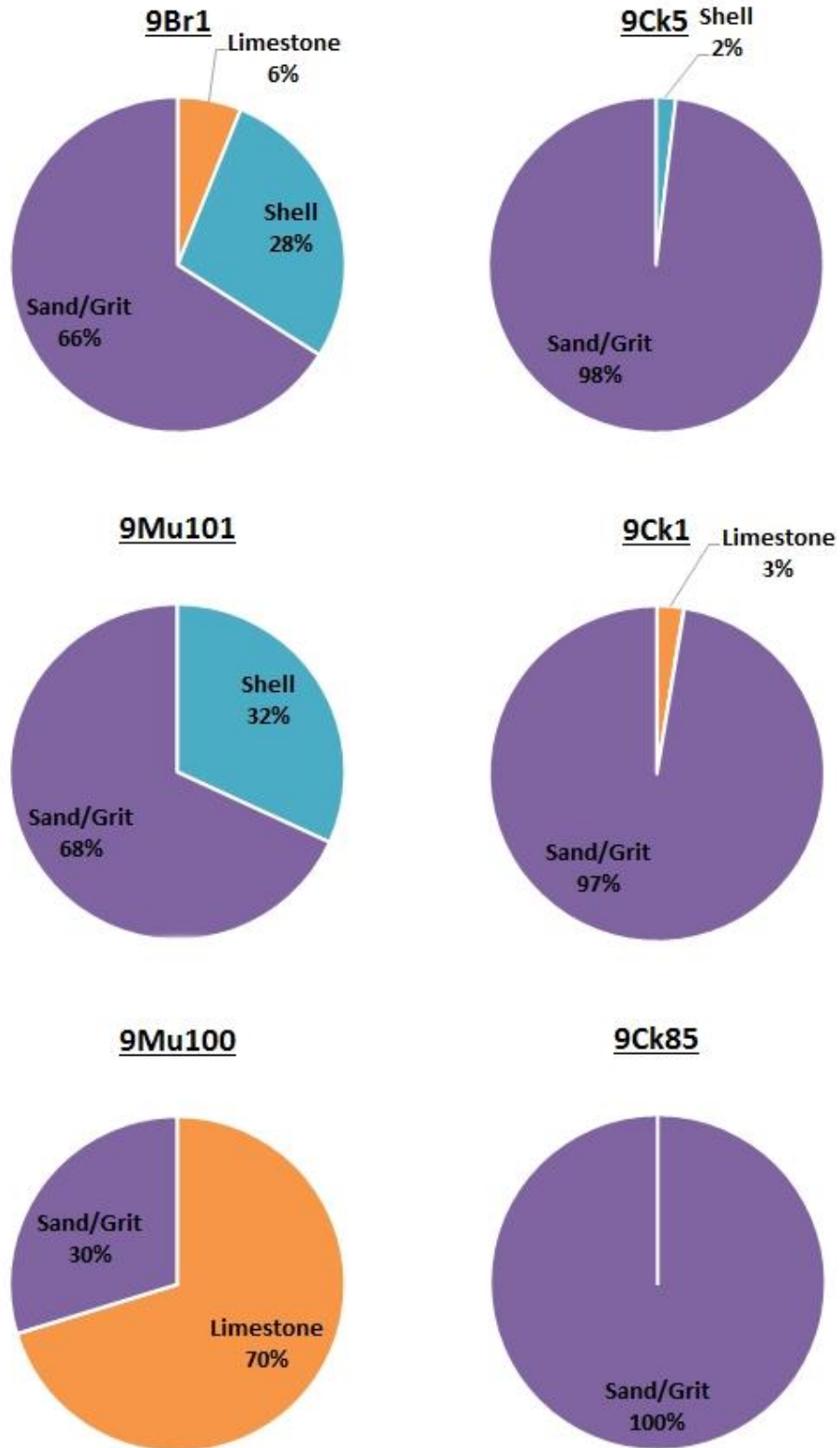


Figure 7.2. The distribution of temper types at six northern Georgia components dating to the period of AD 1050-1325.

indication that the increase in temper diversity, at Etowah in particular, may be the result of either the movement of peoples from eastern Tennessee to Etowah or the movement of their finished pots instead of the exchange of technological traditions or practices. If it were primarily the result of information exchange, we might expect more shell and limestone tempered complicated stamped pottery, as this is the traditional mode of decoration across northern Georgia. But this is not the case. Instead, practices consistent with those in eastern Tennessee, including plain and cordmarked sherds, are those exhibiting increases in non-local tempering.

The same general structure that characterized the AD 1050-1325 period seems to have continued to characterize the succeeding AD 1325-1650 period (Figure 7.1). Again, while two distinct subgraphs remain, connections between the two subgraphs remain heightened, as evidenced by higher average BR coefficients and an increased number of ties between subgraphs (Table 7.4), compared to the earliest period, AD 800-1050. Thus, even after the abandonment of Etowah and the major reorganization of the sociopolitical landscape, the integrity of patterns of interactions producing these networks was retained. As Etowah (9Br1) subsumed a more modest position within its northern Georgia network, Little Egypt (9Mu102), the proposed capital of the Coosa Chiefdom, secures a position between the two subgraphs yet more similar in

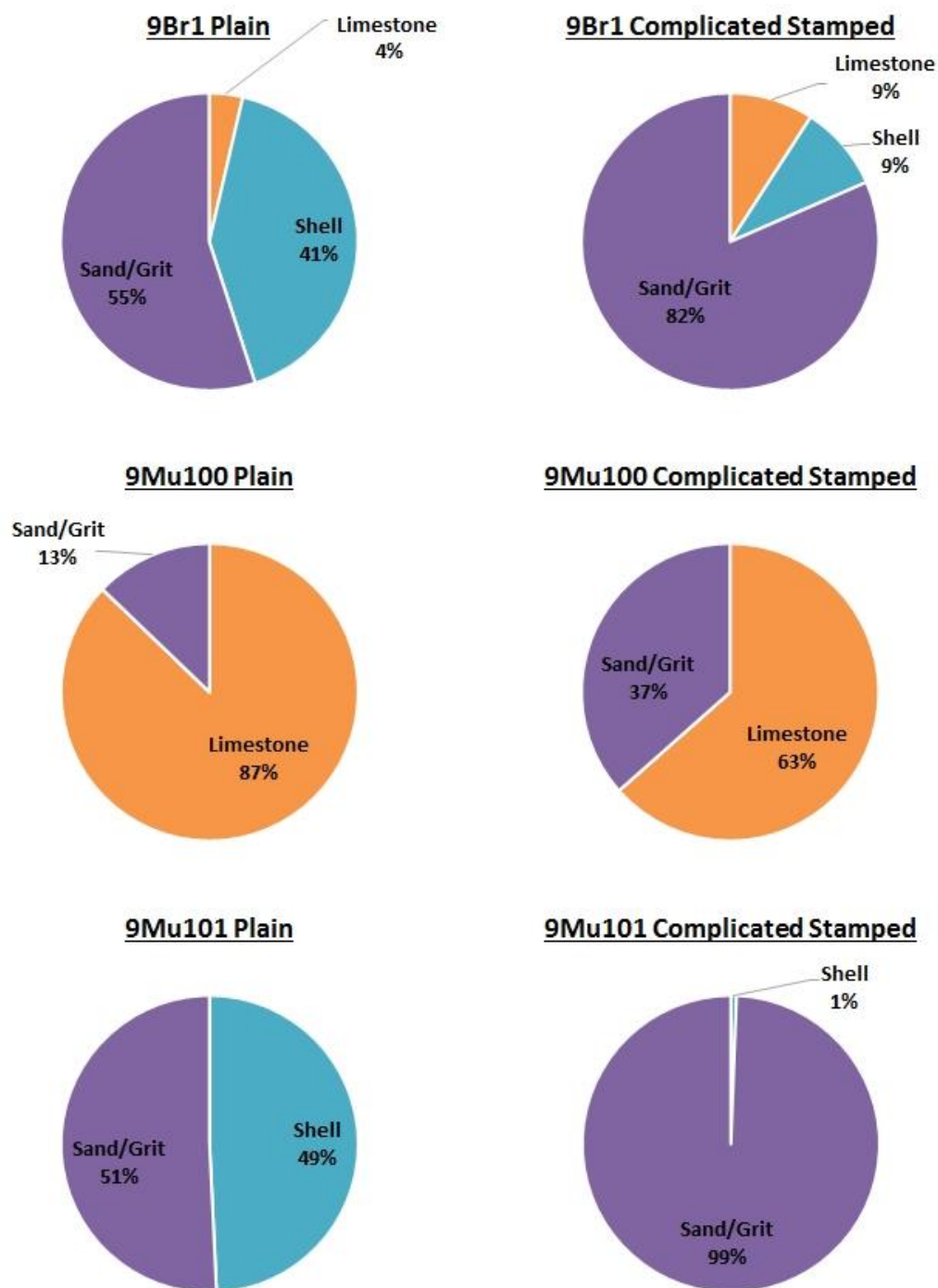


Figure 7.3. The relationship between temper types and surface decorations at three northern Georgia components dating to the period of AD 1050-1325.

assemblage composition to eastern Tennessee sites than to Georgia sites, despite being located in northern Georgia. Unlike Etowah during the preceding period, who was linked in to many Georgia and Tennessee sites, Little Egypt is connected to only three Georgia sites (Thompson (9Go4), Sixtoe Field (9Mu100), and Bell Field (9Mu103)), all of which are located geographically nearest to the Little Egypt site itself (mere kilometers or less). This suggests that while Little Egypt maintained relationships and interactions with other Georgia sites in near proximity, possibly only situationally, it was heavily embedded in interactions, exchanges, and relationships with eastern Tennessee communities to the north, much like Sixtoe Field (located roughly a kilometer away from Little Egypt) was in the previous time period, AD 1050-1325. Notably, for the region as a whole, the overall similarity between all sites was heightened compared to previous periods. For the first and second periods, average tie strength was 75 and 72 respectively, with BR cutoffs of 80 and 70 separately. In contrast, the period of AD 1325-1650 exhibits in average tie strength of 100 while the network remained intact as a single component through a BR cutoff as high as 108, indicating significantly more intense or frequent interactions between northern Georgia and eastern Tennessee communities during this time.

Overall, while the general structure of networks remained similar the qualities of the relationships comprising these networks changed quite significantly. In the first period, no nodes emerge as central to any parts of the network. This is also seems to be the case for the third period, AD 1325-1650. In the second period, AD 1050-1325, however, seven nodes exhibit degree

centrality scores over one standard deviation, two nodes have betweenness scores over the standard deviation, and two have eigenvector scores over a single standard deviation (see Table 7.4). It is thus clear that there exists some relationship between institutional change and network structures as the sociopolitical institutions that characterized the period between AD 1050 and 1325 clearly facilitated the emergence of central actors in their social networks, at least those indicated by an analysis of the distribution of technological practices. As noted above, these emergent central actors drew on opened networks of interaction and exchange at the regional scale, establishing connections and relationships with communities from across the Southern Appalachian region as opposed to their local networks. These patterns are consistent with extant narratives (e.g., Cobb and King 2005; King 2003) that argue for a shift towards network-based political strategies (sensu Blanton et al. 1996) just after the turn of the first millennium AD. Thus, as leadership roles became regionally centralized, political actors drew on preexisting networks of relationship to establish a landscape of exclusive interactions. The networks through which hierarchical political organizations and socioeconomic inequality emerged were established long before the emergence of the systems themselves.

Signaling Networks/High-Visibility Practices

As outlined previously, the networks that can be deduced from patterns of social signaling are those based on the use of different kinds of surface

treatments and decorations across Southern Appalachia. The kinds of surface treatments used across the entire region included such procedures as complicated stamping, check stamping, incising, brushing, painting, etc. Thus, the networks presented here are based explicitly on the distribution of these different traditions across the region and within individual communities. These networks are presented in Figure 7.4.

Similar to the general trend identified by the networks based on temper, the overall network structure represented by surface decorations generally retain their structures throughout the 1,000 year period considered here. Indeed, however, there are significant temporal trends that can still be identified. In contrast to the structures represented by the distribution and use of tempers, the structures related to signaling practices are much less segregated by geographical locale and indeed much less polarizing in general. In each of the three networks, no distinct subgraphs emerge as they did in the temper networks as sites from both northern Georgia and eastern Tennessee are tied to one another in a number of patterns that do not reflect geographic proximity. In the first period, AD 800-1050, the network is characterized by three weak subgroups that are all still heavily connected to one another and all of which include sites from both Tennessee and northern Georgia. In the second period, AD 1050-1325, the integration between sites from both locales is further enhanced as any indication of subgroups disappears and a structure characterized by a general mixture of both strong and weak ties seems to have emerged. While the average tie strength remains the same as the tie strength for the previous network, at a

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BR of 116, the cutoff is significant higher, at a BR of 155 instead of 120. Both, however, are substantially higher than the BR values characterizing the networks based on temper alone. The network for the first period is characterized by a number of central actors, with three nodes exhibiting high degree centralities (40Ha63, 40Mr21, and 9Ck47), three exhibiting high betweenness centralities (40Ha63, 40Mi11, and 9Ck47), and three exhibiting high eigenvector centralities (40Mr21, 40Re108, 9Ck105). During the next period however, no nodes exceed one standard deviation for either degree or eigenvector centrality, while four stand out as having heightened betweenness centralities (40Mg31, 9Co52, 9FI3, and 9Mu100).

While the integration between sites across both was strengthened, the integration of the overall network becomes more compartmentalized. In the first period, the longest geodesic distance is 14, with an average geodesic distance of 5.41. This means that the average number of nodes that you need to pass through to get to any other node is 5.41. For this second period, the maximum geodesic distance increases to 21 while the average increases to 7.71. This would indicate that information, resources, and interactions would have been more restricted and less freely flowing. Combined with an increase in the number of actors with heightened betweenness centralities, it would seem that relationships were organized in a way that information and interactions were more highly controlled than they previously would have been.

In the final period considered here, AD 1325-1650, the average tie strength increases even more, to a BR value of 127 indicating the continued

dissolution of differences between northern Georgia and eastern Tennessee decorative traditions. In addition to the increase similarity among the two localities, overall network integration and cohesiveness increases at this time as well. While the previous period had a maximum geodesic distance of 21 and an average of 7.71, the network during the final period exhibits a maximum distance of only 9 nodes and an average of only 4.51 indicating the opening up of network relationships and interactions and a lower degree of control and potential exclusivity within the network. The number of central nodes also continues to drop into this final time period, with no nodes exhibiting heightened degree or eigenvector centralities and only a single node exhibiting a heightened betweenness centrality. Interestingly, this increased network cohesiveness, likely reflecting a shift in patterns of social signaling towards one that emphasizes region wide participation in some loose or situational organization, occurs during the period within which the Coosa Chiefdom would have emerged and existed across the region.

In sum, there seems to be a general trend towards decreasing distinction between the decorative traditions used by northern Georgia and eastern Tennessee populations through time. At the same time, like the networks based on temper, there seems to be a significant shift in relational structure during the second time period, AD 1050-1325, which allowed actors to assume central locations within their regional networks. Lastly, it is important to note that this increased similarity between the decorative traditions used in each region seems to be a one way process. That is, this pattern is likely the product of an increase

in plain, incised, and cordmarked sherds across northern Georgia. These decorative traditions are very much historically centered in eastern Tennessee, while few distinctly northern Georgia traditions such as stamping seem to have found their way into Tennessee assemblages. This may indicate that after AD 1325, the foci of sociopolitical gravity may have shifted from northern Georgia, specifically Etowah, up towards eastern Tennessee, possibly to Little Egypt as has been suggested. Either way, it remains interesting that while northern Georgia decorative traditions seems to have been altered to be more similar to Tennessee traditions, sand/grit tempering remained the standard across northern Georgia, barring a few communities in extreme northern Georgia located nearest to eastern Tennessee communities.

A Note on Southern Appalachian Geo-Linguistics

Before proceeding to a discussion of social capital and network structures I would be remiss to not provide a brief discussion of the Southern Appalachian sociolinguistic landscape. As others have demonstrated, both linguistics and geographic propinquity play critical roles in material culture patterns (e.g., Gosselain 2000; Terrell 2010; Welsch et al. 1992). On the Sepik coast of Papua New Guinea, Terrell (2010) has shown that geographic proximity, over linguistic similarity, has had the most profound effect on material culture similarities among linguistically diverse populations. Gosselain (2000) on the other hand, has

proposed a number of hypotheses related to the articulation between linguistics, social groups, and ceramic manufacture that are relevant to the current study.

Working across central Africa, with data points for over 350 communities, Gosselain (2000) has demonstrated that different choices in the production of ceramic materials are related to different kinds of interactions and social boundaries. In his case, he finds that the distribution of decorative practices was widespread, cross-cutting ethnographically known social groups or boundaries, arguing that these patterns were the result of 'technical diffusion' (Gosselain 2000:200). Because decorative styles are easily reproduced and copied, their distributional patterns reflect networks of occasional interaction based on geographic closeness. That is, the widespread, cross-cutting nature of these practices is likely the result of potters living near one another or frequenting the same sites of social interaction, situations in which goods/information could be exchanged without engagement in close or regular relationships. On the other hand, Gosselain (2000) found a strong correlation between social boundaries (especially linguistic groups) and the more technical attribute of fashioning techniques. Unlike decorative practices, these fashioning techniques mapped onto preexisting social boundaries. These practices would have required interaction with knowledgeable potters for other individuals to learn the technique or even to recognize the efficiencies of different techniques (Gosselain 2000:202). Thus the social relations through which these distributional patterns emerged might have included marriage or co-residence practices that cross-cut linguistic boundaries (e.g., Adande and Metinhoue 1984; Culwick 1935; David

and Hennig 1972; Delneuf 1991). Whatever the relations may be, there seems to have been a clear connection between the spread and use of technological practices and linguistic divisions (Arnold 1981; Gosselain 2000).

Coming back to Southern Appalachia, information on linguistic divisions and the distribution of linguistic groups before the 17th century is scarce. Knight (1994), among others (e.g., Wesson 2011), have pointed out that by the 17th century, the term Creek was used to reference a diverse group of people spanning from northern Georgia, through central Alabama, and down the Chattahoochee River. These groups were social, politically, and linguistically diverse (Bartram 1958; Knight 1994; Swanton 1922; Wesson 2011). One of these subgroups are referred to by Knight (1994) as the Coosa subgroup and were primarily located in northwestern Georgia down through northeastern and north central Alabama. While little is known about the language groups spoken by these Coosa Creeks, the ethnohistoric record can provide some insight (e.g., Booker et al. 1992; Hudson 1990). Based on place names recorded by the Pardo expedition (Hudson 1990), it seems that peoples inhabiting northern Georgia, including the Coosa, were speaking Eastern Muskogean dialects (Smith 2000). Northward, in eastern Tennessee, especially along the Little Tennessee River, town names were closely related to the Koasati language, a distinct Muskogean dialect from the Eastern Muskogean dialects.

Despite this information, the relationships between pre-17th century archaeological phases and post-17th century tribal groups remain unclear (Hally 1994; Schroedl 1998; Sullivan 1995; Sullivan and Rodning 2011, 2001). Even

while we know that 18th century Overhill Cherokee towns were located at previously occupied Mississippian mound center across eastern Tennessee (Polhemus 1987; Schroedl 1986; Sullivan and Rodning 2001:112), the associations of these occupations, and these ethnographically known ethnic groups, with previous occupants remain ambiguous. While some have argued that the Late Mississippian Dallas phase was indeed ancestral to later Overhill Cherokee groups (e.g., Dickens 1976), such evidence for these connections are lacking. This is in contrast to the eastern side of the Appalachians where the archaeological ancestry for Cherokee groups has been well established back into the 11th century (e.g., Dickens 1976, Sullivan and Rodning 2011, 2001; Ward and Davis 1999). Either way, while the distribution of linguistic traditions across Southern Appalachia remains murky, populations living in northwestern Georgia seem to have spoken a Muskogean dialect defined by relationships with neighboring northeastern and central Alabama groups, consistent with the 17th century Coosa subgroup. In contrast, people living in eastern Tennessee likely spoke Koasati, a distinct Muskogean dialect, and may have been more engaged in linguistic and cultural exchanges with ancestral Cherokee groups in the Appalachians to the east.

Given these linguistic patterns, the network results presented here are consistent with Gosselain's (2000) expectations. More specifically, the lack of distinct sub-groups in the networks based on surface decoration is consistent with Gosselain's hypothesis that decorative practices, and networks of occasional interaction defined by geographic propinquity, will cross-cut linguistic

boundaries. In contrast, the easily identifiable sub-groups in the network based on temper, a technological practice, are consistent with Gosselain's (2000) prediction that technological practices are likely to correlate with linguistic differences. With this linguistic context outlined, the substantive implications of network structure on social and political processes are described below.

Articulating Network Structures and Social Capital

Two types of social capital are used to structure the following discussion and interpretations. The first, tightly knit and cohesive networks are referred to as bonding networks (Crowe 2007; Putnam 1993). The second type of networks can be referred to as bridging networks and are characterized by patterns of loose, expansive ties (Crowe 2007; Woollock and Narayan 2000). In essence, these two types of networks represent different kinds of social capital (Crowe 2007; Putnam 2000; Woollock and Narayan 2000). Bonding social capital is constituted through dense relationships and networks within communities or groups (Taylor 2004). In these kinds of networks, members are directly tied to many other members within tightly woven networks (Crowe 2007:471). Bridging social capital can be defined by weaker relationships and more loosely connected networks that span across social groups via weak ties (e.g. Grannovetter 1986) (Crowe 2007:471). In the context of modern economic development studies, it has been argued that bonding networks and their cohesive structures can defend against poverty (e.g. Woollock and Narayan 2000) while bridging networks can be used to facilitate real economic shifts as looser ties allow for more individual action and strategy

within the network structure (Crowe 2007:471). As Putnam (2000) explains, again in the context of economic development, bonding networks are appropriate for “getting by” while bridging networks are necessary for “getting ahead.” One of the main factors contributing to these assessments is the ability for individuals engaged in bridging networks to access and mobilize resources that lie outside of the organization of their particular community (Crowe 2007:472; Woollock and Narayan 2000). In other words, bonding, or highly cohesive networks, do not allow the social flexibility needed to engage with a wider pool of social capital. Thus, each type of network has different implications for understanding collective responses to sociopolitical uncertainty.

Each of the two types of networks described above can be further split into two distinctions, resulting in four different types of networks considered here (Crowe 2007:472) (Figure 7.5). Bonding capital can be split into complete network structures and factional network structures while bridging capital can be split into coalitional networks and bridging networks. Networks with complete structures are defined by density measures at the upper limit as almost all actors within the network are connected to all other actors. Factional networks are characterized by two or more groups (or components) that are not connected to one another through any ties. Coalitional networks are comprised of dense networks connected to one another through weak ties between groups. Finally, bridging networks are characterized by patterns of weak, loosely organized connections between actors.

Of particular importance to the current study are the ways that these different network structures might facilitate, in a general sense, societal transformations. As briefly noted above, dense, cohesive structures are more likely to facilitate cooperation among members for mutual benefit (Putnam 2000:173). Essentially, these cohesive networks, including complete network structures, are more effective than looser networks with weaker ties in lowering the risks associated with cooperation as the frequency and quality of interactions produce more trust and facilitate social norms (Crowe 2007:474). These types of bonding networks may affect processes of social change in the sense that they may inhibit development or action at the level of the individual actor (Crowe 2007:474; Portes and Landolt 1996). That is, demanding group obligations may prevent a group and its members from participating in broader networks that connect members to members outside of their group.

In sum, it would be expected that more resources, energy, time, and capital would be allocated towards the organization of the groups and the relationships that constitute the group rather than on external relationships and or sources of development (Crowe 2007:474). Coalitional networks provide somewhat different relational environments than complete structures. While network density is high at the small scale, densely connected groups are connected to other dense groups through long, weak ties. This pattern allows for trust and norms to develop within groups while still facilitating engagement with external relationships as group obligations may not be as overpowering (Crowe

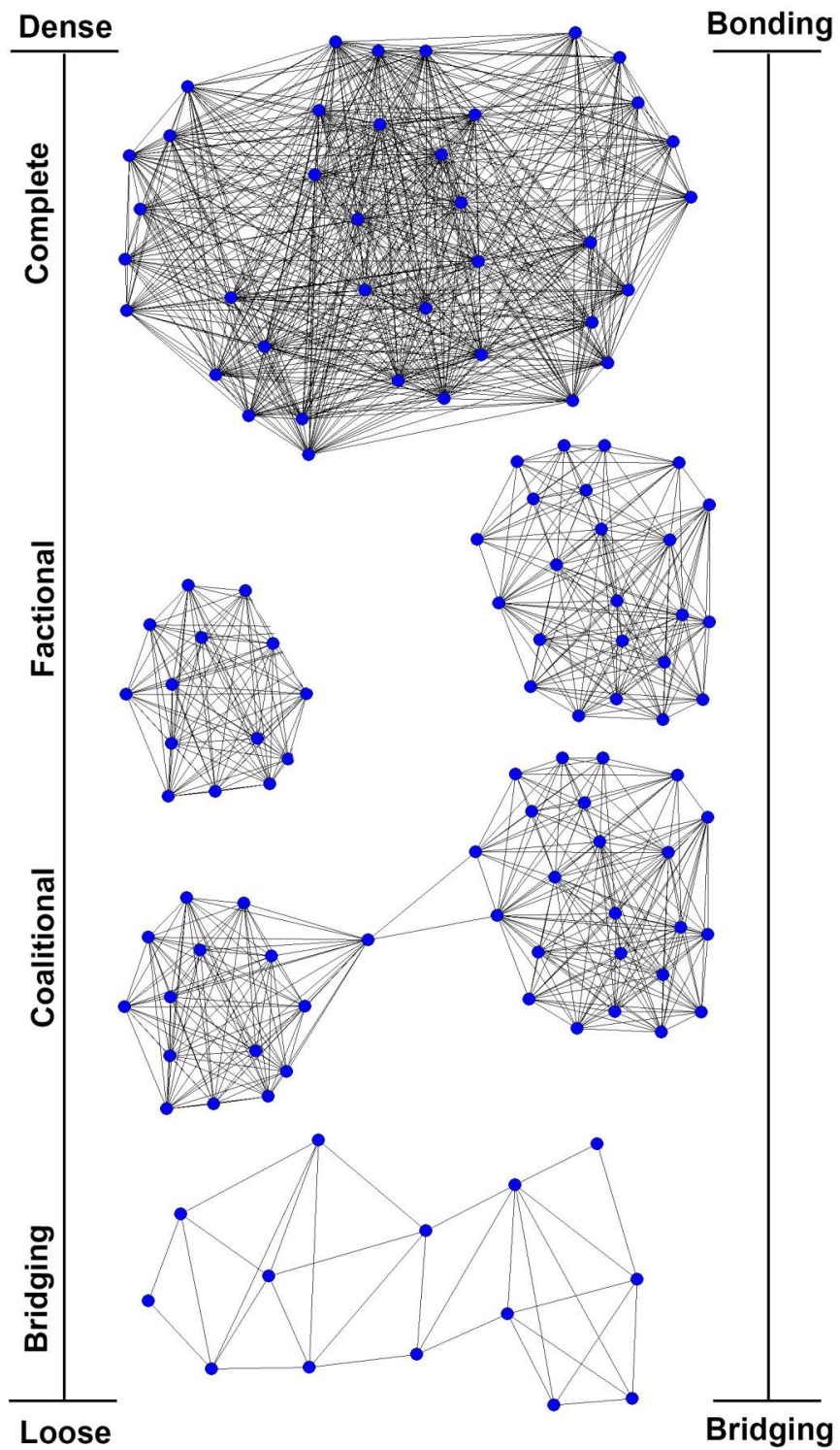


Figure 7.5. Types of social capital associated with particular structural characteristics of social networks (adapted from Crowe 2007).

2007:474). Bridging networks allow for the heaviest flow of information, resources, and capital between individual actors. While information and capital are easily accessed, mobilized, and transmitted, the weak ties through which actors are connected do not produce obligations for actors to contribute to, or participate in, every project or movement that is hosted or adopted by other groups or their members (Crowe 2007:474).

The kinds of social capital constituted by each of the networks analyzed here are reported in Table 7.4. All three of the networks based on the use of temper are defined by bonding ties within subgraphs and weak, bridging ties between subgraphs. All three of the networks based on surface decorations are defined by both strong and weak ties, linking nodes in strung out, long networks, indicative of bridging structures and capital. As Adger (2003:392) points out, bridging ties tend to rely not on the rule of enforcement or informal collective actions like bonding ties would, but instead likely depend on more formalized institutions such as legal or religious organizations. What this may indicate is the presence of formal institutions situated at the regional scale that served to integrate populations from eastern Tennessee and northern Georgia as evidenced by the distribution of decorative traditions across each locality. Further, bridging capital is argued to emerge from weak ties across society in which individuals and organizational behavior are embedded (Granovetter 1985), but which is nevertheless held together through diverse group memberships and the sharing of some common values (van Staveren and Knorringa 2007:115). In general, weak ties like those constituting the signaling networks presented here

exist among members of social groups that are heterogeneous, having different social identities (van Staveren and Korrington 2007:115). Just as Adger (2003) points out, van Staveren and Knorrington (2007:115) also highlight that these relationships are more open compared to bonding networks and rely on earned trust among loosely connected peoples rather than on ascribed trust among a homogenous, strongly related group. The networks presented here based on surface decorations and patterns of signaling are all consistent with these characteristics of bridging networks and thus are likely good indicators of sets of loose relationships, interactions, and exchanges through which generalized trust among northern Georgia and eastern Tennessee groups were established. And as is clear, these patterns of generalized trust, and the regional institutions maintaining and generating these patterns, seem to have remained stable, or at least to an extent successfully regenerated and transformed, for at least the 1,000 years considered here, even in the face of heightened sociopolitical uncertainty and a shifting geopolitical landscape.

In contrast to bridging capital, bonding capital emerges from strong social ties which are based on social identities such as family, kinship, gender, ethnicity, religion, or organizational culture (van Staveren and Knorrington 2007:114). As such, as a consequence of cohesion, bonding capital generates a type of trust that is prescribed to the members of the group. Such groups tend to generate high levels of trust, cooperation, and organization, facilitating collective action and learning. As Repetti (2002) has found through his work with African communities, modes of production are often based on cohesive, and bonding,

family ties, which include patterns of subordination and paternalism as well as practices of sharing resources and redistributing profits. As networks based on temper exhibit many of the structural characteristics defining cohesive, bonding capital, they are likely good referents for intimate networks of kin or other strong relationships generating high levels of trust and reciprocity within society and guarded against the production of these kinds of relationships between discrete social groups living across Southern Appalachia. In this way, the scale and structure of such intimate relationships as kin ties, lineage affiliations, and modes of intergenerational enculturation seem to have remained intact in the context of major sociopolitical transformations. While at some level the very relationships constituting the social, political, and economic form of society were redefined as new sociopolitical institutions and practices, at the most basic, foundational level of societal form, the most intimate ties and relationships among members of Southern Appalachian societies seem to have been successfully enacted and regenerated over at least a millennium. This suggests the durability of some very basic social institutions including the regional organizations of kinship groups, patterns of marriage exchange, and continued face-to-face interaction through communal events. These practices would have survived the very critical transitions, including major political reorganization and then the collapse of a major regional power. Indeed, the stability of these institutions likely worked to mediate different realms of uncertainty that these transformational processes had the potential to generate. While a more in depth study of technological attributes and ceramic manufacture may reveal subtle differences throughout this period,

potentially indicating a limited response to shifting sociopolitics, the long-term relationships and traditions binding Southern Appalachian societies together seem to have served as foundational connections through which new sociopolitical forms, institutions, rules, and norms were mediated and negotiated.

What is clear is that Southern Appalachian societies were defined by both bridging and bonding forms of capital and would have had both at their disposal to facilitate sociopolitical development and the mediation of social uncertainties introduced by institutional change. In the context of modern economic studies, it has been argued that economies need both types of social capital (van Staveren and Knorringa 2007). It is necessary for a minimum amount of bonding capital to be present for bridging capital to emerge. That is, bridging capital builds on the social capabilities generated by bonding capital and networks. While bridging capital is undoubtedly more beneficial to economic and sociopolitical development, as it connects broader, more diverse groups to one another, bonding capital provides the fertile ground upon which bridging capital can develop (van Staveren and Knorringa 2007:116). While sociopolitical institutions were substantially transformed at roughly AD 1150 and again at roughly AD 1325, access to both bonding and bridging capital remained constant across Southern Appalachian populations as tools by which collective action could be facilitated in the face of sociopolitical uncertainty.

CHAPTER 8: CONCLUSIONS

This chapter brings together the results from the previous chapters to present historical narratives of Southern Appalachian social networks and political transformation. In the introduction to this study I set out three major goals: 1) to illuminate the structural characteristics of social networks that defined Southern Appalachian societies between AD 600 and 1600; 2) to evaluate how these networks articulated with critical historical junctures defined by major alteration to sociopolitical landscapes; and 3) to explore the institutions and mechanisms through which people managed (or buffered against) social, political, and economic uncertainty generated at these historical turning points. In this final chapter I summarize the most significant outcomes of this study, present new bottom-up narratives for critical turning points in Southern Appalachian history informed by social networks and collective action perspectives, and outline the contributions of these narratives to issues of social networks and collective action and to the study of social change and political organization in Southeastern chiefdoms and small-scale, non-state societies more generally. I conclude with a discussion of potential research trajectories and future directions.

Summary of Results

The goals for the first part of this study were to revisit and refine regional and community scale chronologies that could be leveraged towards understanding the timing and tempo of sociopolitical transformations across the Southern Appalachian region between AD 600 and 1600. In Chapters 4 and 5, using ca. 350,000 ceramic sherds from ca. 300 assemblages across 100 archaeological components, I presented new ceramic seriations for both eastern Tennessee and northern Georgia. In lieu of using essentialized ceramic types, combinations of temper and surface treatment were used to seriate assemblages from eastern Tennessee while only surface treatments were used to seriate northern Georgia assemblages. The formal seriations presented in Chapter 4, and the absolute chronologies for these seriations presented in Chapter 5, yielded two major contributions. The first was the demonstration that, in contrast to extant narratives that essentialize and order ceramic phases, there is actually significant, clinal overlap between ceramic decorative and technological traditions. Rather than ceramic traditions abutting one another in time, with one ending just as another begins, the seriations presented here highlight the gradual nature of these changes and, in some cases, the complete contemporaneity of ceramic traditions across the region.

The second yet related contribution of these seriations is the revision of the absolute chronologies for particular ceramic traditions. The most significant alteration to extant chronologies is the chronological placement of the Etowah

and Wilbanks ceramic traditions. While extant narratives pose an AD 1000-1200 range for Etowah ceramics followed by a 50 year abandonment leading into the adoption of Wilbanks stylistic traditions between roughly AD 1250 and 1375 (e.g. King 2003), the absolute chronologies presented in Chapter 5 significantly revise these dates. Using the seriations presented in Chapter 4 in combination with roughly 180 radiocarbon dates (68 newly presented here), Bayesian models we constructed that located the Etowah ceramic tradition roughly 125 years forward in time (AD 1125-1300) and made the latter half of this tradition coeval with the Wilbanks tradition (AD 1250-1350), which was shortened by roughly 25 years. Of note, the models presented in Chapter 5 show now evidence for a gap between the use of Etowah and Wilbanks ceramics.

The results of this chronology building evidence negate extant arguments that propose cycles of abandonment as mechanisms driving sociopolitical change across northern Georgia, particularly at Etowah (e.g. Cobb and King 2005). The more fine-resolution platform mound chronologies presented in Chapter 6 continue to add to this new narrative. The twelve new dates from Etowah's Mound C, combined with extant dates associated with the mound's use, point towards an end to mound building activities at Mound C by roughly AD 1315. This is nearly 60 years, roughly three generations, earlier than extant narratives proposed (e.g. AD 1375). If major processes of political hierarchization, agricultural intensification, and social stratification indeed began coeval with the introduction of Wilbanks style pottery (ca. AD 1250), then Etowah's fluorescence as a major social, political, economic, and religious center

(as well as the political strategies and institutions contributing to this growth), likely only persisted for ca. 65 years, not 175 years as the extant timeline suggests. This drastic reduction in the lifespan of Etowah as a political capital begins to point towards the instability of political institutions, actors, and traditions associated with its height.

As outlined in Chapter 6, at the same time that Etowah seems to be faltering in its sociopolitical prominence, central places across both northern Georgia and eastern Tennessee also begin to falter. By 1325, the platform mounds at almost all of the communities established after AD 1150 seem to have fallen out of use or were abandoned, pointing towards a major reorganization of the regional political landscape. The political landscape that emerged in the middle of the 14th century AD was markedly different from its predecessor. In Chapter 6 we see that at the same time we are witnessing a shift in the use of platform mounds across the region, new mortuary traditions are being adopted and architectural traditions, particularly wall-trench architecture, are being abandoned, pointing towards major reorganizations of sociopolitical institutions.

In Chapter 7, using the same database of roughly 350,000 ceramics from across 100 archaeological components, I reconstructed two kinds of social networks, one produced through communities of practices related to pottery production and one based on signaling practices. The major outcomes from the investigation of social networks were twofold. The first major finding was that both kinds of networks exhibited remarkable stability over the 1,000 year study period, even across major historical junctures. The second major outcome was

the demonstration that Southern Appalachian societies likely relied on multiple sources of social capital in managing social change and accessing collective action. The diversity of these network resources and the institutions underlying the production of Southern Appalachian network capital are the focus of the following narratives.

AD 1150: A Structural Turning Point

By roughly AD 1150, Southern Appalachian societies were undergoing major sociostructural changes that would rewrite the trajectory of organizational development, sociopolitical evolution, and history. At this time, intensive maize agriculture was being adopted (Markin 2007), platform mounds and public spaces were being integrated into communities (King 2003; Schroedl et al. 1985; Sullivan 2007) and populations became more sedentary as diverse groups began to occupy large, aggregate settlements (King 2003; Schroedl 1998; Schroedl et al. 1990; Sullivan 1998). Along with these developments came major alterations to the social, political, and economic organization of society as decision making was centralized (Hally 1996; King 2003), social inequalities produced and highlighted (King 2003), and the scale of social interactions and exchange, indeed the scale at which societies were reproduced (*sensu* Cobb and Nassaney 1991), increased tenfold. A new system of ideology, iconography, religion, and ritual practice contextualized and legitimized many of these new institutional practices (King 2007).

While these changes undoubtedly altered, transformed, and supplanted the traditional norms and rules structuring the maintenance and generation of Southern Appalachian societies, particular social organizations, networks, and relationships seem to have concomitantly shifted as components of, and responses to, a new sociopolitical landscape. In terms of networks rooted in the intimate relations of kinship and close ties, overall structural characteristics remained the same as northern Georgia and eastern Tennessee societies continued to represent discrete spheres of local relationships and interactions. While this general characteristic remained the same, key differences pre- and post-AD 1150 can be identified. A number of central places emerged after AD 1150, consistent with the argument that leadership and decision making practices became centralized activities, both within communities and at the regional scale (e.g., King 2003). As outlined in Chapter 7 and in Table 7.4, a number of communities held privileged central positions in the post-AD 1150 network while none held such positions previously. This emergence of central places was also accompanied by the clear restriction of relationships and connections throughout Southern Appalachian networks. Indeed, the longest geodesic distances between nodes jumps dramatically between pre- and post-AD 1150 networks as does the percentage of nodes included in the maximum complete subgraphs (k-cores) within the two networks. While only 68% of nodes were previously completely linked to one another, just 38% of communities post-AD 1150 were included in a complete subgroup. This indicates a dramatic

restriction in the openness of social networks and would have manifested on the ground as restricted access to information and resources throughout the region.

In contrast to these networks, those based on signaling behaviors as evidenced by decorative treatments of ceramic vessels seem to have grown stronger. That is, the institutions and relationships producing patterns of shared regional traditions seem to have remained unaltered, indeed reinforced, in the context of critical social change and new institutional forms. Indeed both networks show an increase in the strength and quantity of connections between northern Georgia and eastern Tennessee during this time, guided by similar social processes including newly shared political economic structures based on agricultural production (Markin 2007; Muller 1997) and streamlined and politicized ritual procedures and practices (King 2007; Knight 1984)

Overall, changes are most materially apparent at both the regional and community scales, while more local relationships, interactions, and connections, those situated between individual communities and pan-Southern Appalachian institutions, remained mostly unaltered. That is, the local social structures resultant of the long-term durable histories of both northern Georgia and eastern Tennessee societies weathered well. Evidence for the durability of these local organizational structures is most apparent in eastern Tennessee, where communal burial mounds continued to be used in spite of major changes to the sociopolitical landscape (Schroedl 1978; Schroedl et al. 1990). Indeed, this tradition likely served as a buffer against the heightened development of socioeconomic inequality and the emergence of central places compared to

northern Georgia. That is, no integrative mechanisms, beyond the maintenance of close-knit networks seems to have existed across northern Georgia. However, it is important to note that despite evidence for such integrative institutions, the general durability of ceramic traditions across northern Georgia, especially the continued use of complicated stamping over 1000 years, likely reflects the durability and stability of local interactions and social organizations more broadly.

While the communal burial tradition in eastern Tennessee continued to provide a source of trust and reciprocity among groups living across eastern Tennessee, and thus a way of mediating the uncertainty of future conditions and relationships, no such spaces for negotiation were available to the societies of northern Georgia, resulting in the development of a highly heterogeneous political landscape characterized by increased sociopolitical inequality. Importantly however, as indicated by the increased connections between the two localities, populations of northern Georgia likely mediated the heightened social uncertainty resultant from sociopolitical reorganization not through local relationships as was accomplished in eastern Tennessee, but by the strengthening of ties with eastern Tennessee and the institutions that bound Southern Appalachian societies to one another. These pan-Southern Appalachian ties seem to have been the very relationships leveraged and enacted towards social, political, and economic control by those living at the major centers that emerged across northern Georgia including the communities at Etowah, Sixtoe Field, and Bell Field. Not coincidentally, these three communities held the most central roles within these regional Southern

Appalachian networks and likely served as locations where regionally integrative events predicated on social, political, and religious ties were hosted.

Similarly, Mizoguchi (2009) has demonstrated that in the context of state formation and hierarchisation in ancient Japan, centrality was derived from actors' positions as mediators of interactions between other actors. It was the topological location, rather than the character or content of the regional polities, Mizoguchi (2009) argues, that significantly influenced their hierarchisation. In the case study presented here, one of the most significant insights to be offered is that Etowah, the largest, most profound politico-religious center in the Southern Appalachian region, established this topological centrality at the regional scale, beyond its local geopolitical community in northern Georgia. That is, the emergence of Etowah as a central place cannot be understood from the scale of the individual polity or river valley as has previously been attempted (e.g. King 2003). Instead, the important connections leveraged by political actors at Etowah were beyond the local polity. Indeed, King (2003) has argued that these extralocal relationships were indicative of network-based political strategies enacted by elites and leaders (*sensu* Blanton et al. 1996). What I have shown here however, is that these relationships were established across broader social contexts. That is, the networks presented here are based on ceramic materials, not ritual or exotic paraphernalia often tied to the relationships between political leaders and elites. Instead, the networks presented in this study, based on the distribution of ceramic attributes, indicate that relationships were forged between entire social groups and likely involved the movement of peoples across the

Southern Appalachian landscape. Political change and development was not happening at specific places, it was happening through the connections between places. This is not to say that political leaders or elites did not play crucial roles in fostering these regional networks. As Mizoguchi (2009) points out for ancient Japan, those polities that eventually became central actors were also the first to enact elaborate changes to mortuary practices and monumentality. As presented in Chapter 6, two of the most prominent communities in the Southern Appalachian region, Etowah and Hiwassee Island, were two of the earliest adopters of iconographic paraphernalia, new architectural traditions, and the use of public structures built on platform mounds ca. AD 1150.

AD 1325: Collapse and Coalescence

Between roughly AD 1325 and 1350, the Southern Appalachian sociopolitical terrain was once again undergoing a major transformation. By this time, Etowah, along with a number of other communities, ceased to represent central places of social, political, and economic importance to the structure of Southern Appalachian sociopolitics. Major institutional changes are evidenced by disjunctures in sociomaterial practices including the collapse of the communal burial mound tradition in eastern Tennessee, the emergence of compact, palisaded villages across Southern Appalachia, and the continued increase in similarities between the ceramic traditions of eastern Tennessee and northern Georgia indicating a continued tendency towards the regional coalescence of

tradition and potentially identity. While platform mounds continued to be used across the region, they became restricted to use at fewer sites as the number of contemporary platform mounds across the region decreased significantly. While socioeconomic inequalities and centralized leadership positions, or decision making practices, continued to persist, communities became more dispersed, with the emergence of a more heterogeneous settlement landscape that included densely settled, compact villages as well as small farmsteads and homesteads across the region. While this was always the case for eastern Tennessee, populations in northern Georgia were liberated from residence in large aggregate communities.

Social networks based on the distribution of tempering practices suggest that avenues for the exchange and flow of information and resources were opened, as restrictive network structures were replaced with structures facilitating such flows. Concomitant with this change is the continued overall increase in the strength of network ties indicating a growing similarity between practices characterizing ceramic assemblages from northern Georgia and eastern Tennessee, both in terms of temper usage and decorative practices. In addition, while the previous network was characterized the presence of central actors (including Etowah), presumably controlling and restricting flows of resources and information, no such nodes seem to have influenced the structure of networks after roughly AD 1325. Indeed the longest geodesic distances between nodes in the network evidenced by surface decoration decreased from 21 to 9, representing a major decline in the exclusivity of network ties. At the same time,

the inclusion of nodes in the maximum complete subgraph of the network, in which information and resources could flow freely between pairs of nodes, rose from 23% of nodes in the pre-AD 1325 network to over 50% after AD 1325.

Overall, there seems to have been regional coalescence of practices, traditions, and histories among Southern Appalachian societies after AD 1325. Individual communities likely became more diverse, with populations ancestral to previous northern Georgia and eastern Tennessee communities now living together in communities across the region. A number of internal and external pressures are noted to contextualize this proposed coalescence. The first is the formation of the Coosa Chiefdom, occurring sometime after AD 1325, and likely after AD 1400 (Smith 2000). The Coosa Chiefdom is argued to have expanded from northeastern Tennessee, down parallel to the Appalachian summit through northwestern Georgia and into northeastern Alabama and was centered at the community of Little Egypt in extreme northwestern Georgia (Hudson 1990; Hudson et al. 1985; Smith 2000). While material, archaeological evidence for such a political formation has been lacking, the data presented here provides a solid footing for such an organization, specifically evidence for the opening of networks across the region, increased settlement at and around Little Egypt in northern Georgia, and the trend towards the homogenization of ceramic traditions spanning from eastern Tennessee through northern Georgia. Indeed, after AD 1325 ceramic decorative traditions were generally homogenized across Southern Appalachia, the usage of temper types indicates a substantial increase in interaction among Southern Appalachian populations, and the tradition of

compact villages seems to have been adopted by populations in both eastern Tennessee and northern Georgia. Additionally, it would seem that the contemporaneity of central places that characterized the preceding periods was replaced by more stable sociopolitical practices that resulted in fewer, but longer lived, central places as evidenced by the lifespans of associated platform mounds. Given the stability of network structures presented here, the constellation of pan-regional relationships that constituted the Coosa political entity emerged from a long tradition of relationships and interactions that cross-cut the social groups traditionally confined to either eastern Tennessee or northern Georgia. This long history of pan-regional social organization served as the base upon which such an integrated polity could be successfully established.

The second factor possibly contributing to the pan-regional integration of Southern Appalachian societies, and possibly the impetus for the formation of a pan-regional political organization, may be a regional response to heightened social and environmental uncertainties. After AD 1325 a number of major central places were abandoned. This would have generated significant uncertainty across the sociopolitical landscape. An additional source of uncertainty would have been climatic or environmental, as a major period of drought, and a period of cooling, commenced during the latter half of the 13th century (Benson et al. 2009, 2007; Douglas 1929; Gunn 1994; Little 2003). While the agricultural cycles of the Southern Appalachian region, with favorable climatic conditions unaffected by this major drought episode (Benson et al. 2007, Figure 1), likely would not have been as affected by such fluctuations as other places across the Southeast

and Midwest (e.g., Benson et al. 2009, 2007), the uncertainty produced by such climatic change would have possibly come in the form of migration and population movements from regions where the effects were more pronounced. Such an influx in non-local migrants would have provided an opportunity for a pan-Southern Appalachian identity to be useful to Southern Appalachian societies in mediating the relationships between local and non-local groups both across the region and within the spaces of communities. At present however, the movement of migrants from central and western Tennessee into the Southern Appalachian region remains a hypothesis, as little work has been undertaken in exploring these potential events.

In any case, it is important here to reiterate that although I have provided evidence for the formation of such a pan-regional political formation, at their cores the network structures characterizing this post-AD 1325 period are very much the product of a historical trajectory of organizational development during the preceding 700 years. That is, the structural characteristics of these late networks, including the bonds between northern Georgia and Tennessee societies, accompanied by the tight-knit local structures began to emerge as early as AD 600 and continued to become more or less pronounced over time.

Social Networks, Social Capital, and Collective Action

By exploring Southern Appalachian histories through the lens of collective action and from the perspective of social networks, I have been able to provide a view of social change rooted in the bottom-up processes, or the underlying

relationships, through which society was actually generated, transformed, maintained, and adapted. What I have demonstrated is that the most foundational institutions of Southern Appalachian societies, including such potential patterns of relations as kinship, clanship, shared ideologies, and the constant potential for loose, regional political affiliations to emerge when needed, remained unaltered in the face of shifting political landscapes, emerging economies, and external pressures, for at least 1,000 years.

One of the most important insights I can offer is on the multiplex nature of social relationships across the region. These communities and actors were accessing diverse pools of social capital and resources; they maintained relationships across a number of social dimensions and geographic scales, all of which could be leveraged towards collective means. This study has highlighted the different avenues through which collective actions could be accessed and organized; and even here, I have only touched on two of these networks which likely represent but two among dozens of different kinds of networks and relationships across which communities were engaged.

The bonding capital that characterized the intimate relations between potters and among communities of practice is related most closely to bonds of family, kinship, or locality (Adger 2003:392). The networks constituting this type of capital are dense, horizontal networks, that, in the context of trust and reciprocity, are able to efficiently transmit information across the network contributing to an environment rich in trust and reciprocity among its members (Ostrom and Kahn 2007:10). Bonding capital emerges primarily from strong

social ties, based commonly on identities, including kinship, family, gender, ethnicity, religion, etc..., forming a degree of social cohesion within which heightened levels of trust, cooperation, and organization are fostered and through which higher levels of collective action and learning are accomplished (van Staveren and Knorringa 2007:114-115). Indeed, the fact that communities of practice are producing such bonding capital signifies the strong, yet closed, networks of kinship, likely driven by interactions (especially related to teaching and learning) among women potters across northern Georgia and across eastern Tennessee. Given the coalition structures of networks based on communities of practice, while modes of intergenerational enculturation were clearly stable across each region, modes of interregional transmission of practices and technological tradition were never fully established, although they do seem to have become strengthened after AD 1325.

While the communal burial mound tradition in eastern Tennessee likely served to bind communities together, the abandonment of this tradition likely contributed to the increased interactions between Georgia and Tennessee populations as commitments and obligations to such bonding relationships across eastern Tennessee were loosened and flexibility in established more interregional connections was heightened. This increase in the exchange of technological information after AD 1325, indicating a potential increase in intermarriage and the entanglement of kin relations across disparate Southern Appalachian groups, may have been occurring at the same time as large-scale immigration events, as foreign people moved into Southern Appalachia from the

west. Thus, with the introduction of new groups from outside of Southern Appalachia, the decision to actively shorten social and political distances between northern Georgia and eastern Tennessee by way of intermarriage and the consolidation of uniformly Southern Appalachian kin groups and lineages may have served as a strategy to generate increased amounts of bonding capital to leverage in a new political landscape characterized by social, political, and cultural heterogeneity. Indeed these actions would have produced the patterns indicated by the communities of practice networks.

The signaling network presented here reference primarily external ties between disparate networks, formed through weaker bonds of trust and reciprocity (Adger 2003:392). In Adger's (2003:392) study, he found that these ties tend to rely not necessarily on informal norms and rules of enforcement and sanctioning but more on formal institutions that provide the framework and structures for interaction among participating members of a network. This type of capital is generated more often than not between individuals who are not part of the same communities and do not necessarily establish face-to-face connections with one another (Ostrom and Kahn 2007:11) as bridging capital emerges from weak ties across heterogeneous societies, creating networks between loosely connected individuals, organizations, and groups (van Staveren and Knorringa 2007:115). These ties remain much more open compared to those constituting bonding capital, as they rely on earned trust among loosely connected entities rather than on ascribed trust among a homogeneous, strongly related group (van Staveren and Knorringa 2007:115).

In the Southern Appalachian case, bridging capital has a long history. Indeed, the type of bridging network structure that characterized the entire 1,000 year period investigated here likely extends back into, and may have even been conditioned by, ancestral Swift Creek traditions defined by wide, extensive networks of interaction and exchange (e.g. Wallis 2013). While completely speculative, the relationships conditioning these wide, interregional bridging ties may be structured through an extensive, eastern North American clan system that could potentially span as far back as 3,000 years. While there is no way to prove this, ethnohistoric accounts have illustrated the similarity in clan names across the Southeast in historic times and indeed ethnographic studies have demonstrated the potential for clan membership to cross cut communities, regions, and even linguistic boundaries. If clan membership is indeed conditioning these interregional networks, in combination with shared systems of ideology, religion, and ritual procedures, it would not be unfounded to expect shared symbolic vocabularies and decorative practices, especially as the ceramic decorations resulting from these practices would be deployed in multicultural contexts, conveying information to members of socially distant communities across Southern Appalachia.

These two types of capital that would have been available to Southern Appalachian societies would not have been mutually exclusive. Indeed, in ethnographic studies from contemporary India, it has been shown that communities rely on both bonding and bridging forms of capital (Baker 2005; Krishna 2002). For instance, by linking the bonding relationships within a local

community to external groups who have additional knowledge and resources, larger stores of financial capital, and political connections, communities were more effective in solving problems than those with only networks of close or loose connections (Baker 2005; Krishna 2002; Ostrom and Kahn 2007). As van Staveren and Knorringa (2007:115-116) point out, an economy needs both types of capital. There must be a minimum level of bonding capital for bridging capital to emerge. While bonding capital generates social capabilities including adherence to social norms including mutual help, trustworthiness, solidarity, loyalty, and knowledge sharing, bridging capital builds on these capabilities, it cannot arise by itself within a social group without the experiences of close bonds between people (van Staveren and Knorringa 2007:116). Thus, on the one hand, while bridging capital is more beneficial in terms of economic development, as generalized trust connects a broader, more diverse group of people, without bonding capital there is no basis for these loose networks to develop. Conversely, too much bonding capital, networks that are too tight and closed, can produce constraints, as actors may become 'locked into' a limited social, political, and economic realm that is neither innovative or efficient (van Staveren and Knorringa 2007:116).

The Structure, Scale, and Stability of Southeastern Chiefdoms

The political histories of chiefs and their political strategies don't necessarily reflect the wider social histories of Southern Appalachian peoples. By

accessing the underlying relationships through which Southern Appalachian society and politics were enacted, this study provides insight on how we might reconceptualize our archaeological narratives of sociopolitical organization and change, especially in terms of the scale, structure, and stability of Southeastern chiefdoms.

First, it is clear that Etowah established its regional prominence at least in part through its relationships that spanned beyond local contexts, on the regional and continental scales, leveraging relationships forged between groups living across both eastern Tennessee and northern Georgia. As such, in considering the geographic container and social boundaries within which we situate our narratives of political systems, we must look beyond more traditional scales of analysis such as the individual “polity” or the individual river valley. Further, we cannot assume that long ties between regions are the exclusive realm of elite interactions of alliance building. Indeed, the ceramic datasets I have employed here point towards these elite interactions being underlain by wider networks of intimate relationships that were likely in place before new political institutions were ever built.

The bottom-up, network approach to political organization and activity employed here allows for a finer-resolution interrogation of the heterogeneity of social and political structures through time. For example, when the Spanish encountered Southern Appalachian societies in the 16th century, the political landscape was composed of autonomous communities linked together through loose political ties, with the chief of the most powerful town at Coosa wielding

significant influence over these communities. Through the study I have just presented, we know that this 16th century landscape was characterized by loose, open networks of information and resource flows. While ethnohistoric accounts of political structure are often extended into the past, what I have shown here is that the political landscape 200 years before the crystallization of 16th century political relationships seems to have been markedly different, characterized by restricted network flows, numerous central actors, and the potential monopolization of social and political relationships. Even as the kinds of social capital available to Southern Appalachian communities remained stable over 1,000 years, it is clear that these pools of capital were leveraged in unique ways and in unique sociohistorical contexts. Hernando de Soto and Juan Pardo would not have encountered the same political landscape had they arrived 200 years earlier.

The final dimension of Southeastern chiefdoms to which this study contributes is stability. Extant narratives pose that chiefdom political structures, and the relationships that defined them, were generally unstable institutions. What I have shown however is that the networks underlying political strategies, figures, and institutions were some of the most enduring, stable features of Southern Appalachian societies. As such, it would seem that it was specific practices and behaviors that were unstable, not the structures of relationships through which these behaviors were enacted.

Future Directions

An issue in any network analysis is the definition of network boundaries. The boundaries for the networks presented here were generally defined by traditional culture areas, one in eastern Tennessee and one in northern Georgia. These distinctions however are not “hard” boundaries, as ceramic styles and material traditions bled into neighboring regions and relationships were surely established beyond the bounds of the two regions considered here. As such, the current study provides a foundation from which these boundaries can be expanded. The data and analyses have been generalized to form a framework within which new ceramic assemblages can be added to the analysis with ease as I have not used local ceramic type names to organize my data. All ceramic artifacts have are tempered in a particular way and all can be sorted into generalized classifications based on surface treatments. With this in mind, the most productive avenues for expanding these networks, in my opinion, are as follows: From northern Georgia, network analyses could be expanded east to include the Savannah River populations, southwest towards central Alabama and Moundville, and directly south following the Chattahoochee River down towards west-central Georgia. Each of these regions exhibit their own local trajectories of sociopolitical development but would likely benefit from being linked into a wider picture of macro-regional trends as recent studies in each region have produced timelines consistent with the sociopolitical timelines presented here (e.g. Brannan 2018; Stephenson et al. 2016; Steponaitis and Scarry 2016). From eastern

Tennessee, similar expansions could be made into middle Tennessee and northeastern Alabama. The inclusion of these regions would move us towards an integrated understanding of processes traditionally referred to as “Mississippianization” and would provide insights onto the actual relationships through which new practices were spread, transformed, integrated, or rejected across the entirety of the southeastern United States.

A more specific suggestion for future work is an investigation of potential migratory events during the 14th century in the context of significant drought episodes. Such events have only been hypothesized based on recognized ceramic similarities with middle Tennessee communities after AD 1325 (Sullivan, personal communication) and the introduction of beans during the late 14th and 15th centuries into eastern Tennessee from the west and from the Ohio River valley. While the expansion of the network analyses into middle Tennessee and even northward to include Fort Ancient communities, from which beans were likely introduced (Baumann and Althizer 2017), would provide insight into the network structures through which population movements and migrations may have been facilitated, more explicit analyses must include ceramic geochemical sourcing studies, studies of biological affinity, and finer-scale community archaeologies to 1) assess whether or not migrations actually occurred, 2) the scale of these population movements, 3) and the mechanisms by which they were incorporated into preexisting communities (or not). To date, no geochemical sourcing analyses have been attempted in the Southern Appalachian region. Given the networks and patterns presented here, such studies could contribute

invaluably to deciphering further the qualities of these networks. Biological affinity studies by way of biometrics have been successfully applied to eastern Tennessee populations (Harle 2010; McCarthy 2011). An expansion of these kinds of non-destructive studies using skeletal populations from northern Georgia and middle Tennessee would undoubtedly contribute to contextualizing the network structures presented here and investigating the potential for population exchanges and movements among the three regions. Such work with human remains however cannot be accomplished without engaging descendant communities through meaningful collaboration and mutual benefit.

The final call for future work is for renewed fieldwork across the Southern Appalachian region. Datasets on intra-community settlement patterns for Southern Appalachia are severely lacking. Complete, full coverage community-scale surveys that associate architectural features, spatial layouts, and the distribution of artifacts types is virtually absent. Two of the best candidates for such renewed work are Hiwassee Island in eastern Tennessee and Etowah in northern Georgia. Both have now been subject to full-coverage geophysical surveys and have been completely mapped and interpreted (Patch et al. 2017; Walker 2012). While we now know the locations and layouts of settlement features, including the organizations and locations of houses, palisades, and potential features, neither dataset has been temporally resolved and neither has been linked into broader distributions of artifacts across the site. While close interval shovel testing would provide invaluable insight into the organization of these two communities through time, including how space was reorganized

across the thresholds of social uncertainty described in this dissertation, a less destructive coring survey targeting geophysical anomalies and AMS dating of recovered organics would at least help to identify features and begin to resolve occupational histories. In addition to community-scale surveys, while hundreds of houses have been mapped across the region, very few household assemblages have been described or available for study. This has led to a dearth of information on household scale social, political, and economic organization across the region, let alone information on changes to the household organization of such realms. While a few sites have been excavated in more recent times that could yield extant data to be studied, mostly in eastern Tennessee and including Toqua, Martin Farm, and Bat Creek, a number of sites have been subject to complete geophysical surveys (Etowah (GA), Hiwassee Island (TN), the Bell site (TN), and Long Island (TN)) and would provide new datasets on household economies and sociopolitics. No matter the direction, this dissertation, especially the datasets and analyses presented herein, provides a solid foundation from which renewed work into the organization and transformation of Southern Appalachian societies, and indeed the societies of the southeastern United State more broadly, might be investigated.

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APPENDIX A: SERIATION DATA AND RESULTS

Key to Abbreviations:

CSSw Complicated Stamped Swift Creek
CSNap Complicated Stamped Napier
CSWoo Complicated Stamped Woodstock
CSEto Complicated Stamped Etowah
CSWil Complicated Stamped Wilbanks
CS Complicated Stamped
P Plain
FI Fabric Impressed
SS Simple Stamped
ChS Check Stamped
Crd Cordmarked
Br Brushed
In Incised
Pt Painted
Sp Slipped
Pu Punctated
Net Net Impressed
Cob Corncob Impressed
PB Polished Black
NP Negative Painted

SGT (Prefix) Sand/Grit Tempered
ShT (Prefix) Shell Tempered
LT (Prefix) Limestone Tempered
QT (Prefix) Quartz Tempered

Table A.1. Ceramic data and results of correspondence analyses for northern Georgia seriations.

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2
234	9MU103	Feature 83	UGA-14550	0.00255	2.169772	0.012007	1.689847	-1.523552
235	9MU103	Feature 89A		0.002509	2.169772	0.011813	1.689847	-1.523552
151	9GW70	DA-3, Trench		0.046935	2.139844	0.214914	1.659245	-1.511231
236	9MU103	Feature 122	UGA-14549	0.003085	2.134758	0.01406	1.654035	-1.509133
237	9MU103	Feature 133	UGA-55	0.008186	2.116975	0.036686	1.64486	-1.491868
110	9CK9	Northern Locus	Beta-94644; Beta-94649; Beta-98605; Beta-98606; UGA-14545; UGA-14546; Beta-94647; UGA-14547	0.008638	2.401183	0.049806	1.605701	-1.414821
84	9CK2	Surface		0.014027	1.949781	0.053326	1.60393	-1.286046
109	9CK85	Feature 12		0.005348	1.998454	0.021357	1.54847	-1.276558
86	9CK2	Humus		0.050761	1.887866	0.180914	1.582724	-1.206245
87	9CK2	Trench		0.005882	1.882517	0.020846	1.582497	-1.178058
85	9CK2	Gully		0.031016	1.75549	0.095584	1.482028	-1.096852
152	9GW70	DA-3, Feature 12		0.002345	1.982076	0.009212	1.486075	-1.052788
997	9CK85	Palisade	UGAMS-29085	0.001687	1.759405	0.005221	0.97625	-0.825741
139	9FL193	Block A Midden	Beta-52427	0.002221	1.52974	0.005198	1.429273	-0.620976
99	9CK5	Mound, Under Stage 2		0.013122	1.260912	0.020863	-0.995454	-0.441879
98	9CK5	Mound, Under Stage 1	UGAMS-25390	0.007158	1.266786	0.011486	-0.995878	-0.4418
100	9CK5	Mound, Stage 1 Summit		0.006006	1.238381	0.00921	-0.994746	-0.441617
8	9BR1	Pre-Mound C Feature 19	M-1064	0.001687	1.23221	0.002561	-0.993264	-0.441068
17	9BR1	Top levels of clay core mound	UGAMS-29226	0.003167	1.242992	0.004894	-0.993714	-0.438023
89	9CK4	Premound, Level 1		0.014109	1.394888	0.027453	-0.985381	-0.429054
58	9BR1	Saucer 2	Beta-144162	0.007816	2.740513	0.058699	-0.979954	-0.428886
79	9CK1	Area 1, Features		0.043521	1.191852	0.061822	-0.965981	-0.425357
59	9BR1	Saucer 3	Beta-144164; Beta-145491	0.016495	1.966943	0.063818	-0.990293	-0.42497
81	9CK1	Structure 3 Pits		0.017112	1.144274	0.022406	-0.971429	-0.423196
77	9CK1	Feature 41		0.021719	1.151421	0.028795	-0.961671	-0.421635
78	9CK1	Feature 883		0.033978	1.120488	0.042659	-0.913177	-0.419785
80	9CK1	Area 2, Features	Beta-260068; Beta-260069; Beta-257893; Beta-260070	0.083011	1.097227	0.099938	-0.906522	-0.41954
991	9MU100	Feature 64	UGAMS-29088	0.008762	1.242053	0.013517	-0.942213	-0.419008

Table A.1. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2
6	9BR1	Pre-Mound C Feature 17		0.001687	1.207466	0.002459	-0.959497	-0.415923
57	9BR1	Saucer 1	Beta-144161; Beta-145489	0.002962	1.130687	0.003786	-0.91262	-0.414788
82	9CK1	Structure 3	Beta-257895; Beta-257894	0.072069	1.102016	0.087524	-0.924855	-0.407674
11	9BR1	Pre-Mound C Structure 3	UGAMS-29227	0.002016	1.080108	0.002352	-0.885637	-0.398196
60	9BR1	Saucer 4	Beta-144163; Beta-145490	0.00399	3.312319	0.043778	-0.964358	-0.383816
162	9MU100	Mound (XU-H) Surface		0.007692	1.180296	0.010716	-0.930723	-0.373011
171	9MU101	Structure #8B	UGA-213; UGA-224	0.002221	1.88936	0.007929	0.069605	-0.367065
61	9BR1	Black Midden	Beta-144811	0.012793	2.58274	0.085337	-0.945966	-0.366394
3	9BR1	Pre-Mound C Feature 6	UGAMS-29228	0.002016	1.196403	0.002885	-0.939263	-0.363767
21	9BR1	Core mound	UGAMS-29229	0.002427	1.111964	0.003001	-0.948196	-0.334704
140	9FL193	Block B Feature 2	Beta-53013; Beta-52428; Beta-52429	0.002386	1.500161	0.005369	1.322518	-0.32699
23	9BR1	Mantle 4 to Core Mound		0.003743	1.024339	0.003928	-0.941081	-0.312994
155	9LU7	Midden Zone	UM-1675	0.034677	3.654586	0.463147	0.164371	-0.269241
33	9BR1	Mantle 3 to Mantle 4		0.012916	1.041959	0.014023	-0.912733	-0.242782
95	9CK4	Mound, Level 5		0.002386	1.205393	0.003467	-0.926781	-0.241285
998	9BR139		UGAMS-29082	0.001974	1.098101	0.002381	-0.848461	-0.186478
134	9DO2	Level I	GX-2825; GX2826	0.003867	5.667582	0.124205	-0.586141	-0.14607
992	9MU101	Structure 19	UGAMS-29091	0.000494	1.352836	0.000903	-0.763494	-0.125425
26	9BR1	Mantle C, Final Mantle	UGAMS-29234	0.008309	1.356273	0.015285	-0.830587	-0.001807
51	9BR1	Mound D, 44-55"		0.002386	1.679246	0.006728	-0.837815	0.047669
28	9BR1	Mound 3		0.002756	1.673829	0.007722	-0.781906	0.111441
38	9BR1	Zone C		0.002386	2.108117	0.010603	-0.791792	0.172397
31	9BR1	Mantle 2, W and N	M-1060	0.002386	2.095858	0.01048	-0.743012	0.222197
101	9CK5	Midden over Stage 2		0.009461	1.732897	0.028411	-0.720882	0.222598
50	9BR1	Mound D, 38-44"		0.00543	2.196716	0.026202	-0.763358	0.226454
62	9BR1	Mound B, Structure 1		0.001974	2.364148	0.011036	-0.727502	0.273355
127	9CO55	Area B		0.002592	4.5339	0.053272	0.317043	0.302413
994	9MU101	Structure 12	UGA-509	0.000617	2.368931	0.003463	-0.437914	0.31792
96	9CK46	Area A		0.001933	6.097839	0.071889	0.54225	0.333245
102	9CK5	Outer mound slope deposits		0.018305	1.763878	0.056952	-0.62889	0.349392
52	9BR1	Mound D, Feature 1		0.006088	2.355183	0.03377	-0.683902	0.358896
24	9BR1	Refuse below Final Mantle slope		0.004278	2.813252	0.033858	-0.737902	0.359852

Table A.1. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2
996	9MU101	Structure 14	UGA-504	0.003044	2.395313	0.017465	-0.042548	0.413547
71	9BR60A	Feature 13		0.003414	3.101938	0.032852	-0.68152	0.421446
56	9BR1	Inside Ditch		0.003826	2.740936	0.028741	-0.67995	0.422796
159	9MU100	Features 49, 50, 51, 52, 53		0.007692	3.069705	0.072485	-0.708738	0.431851
48	9BR1	Mound D, 26-32"		0.002016	3.066296	0.018951	-0.704931	0.434504
55	9BR1	Palisade	Beta-134792; Beta-134793	0.005882	2.832227	0.047185	-0.670133	0.436721
36	9BR1	Zone B		0.007528	2.142713	0.034562	-0.594056	0.44362
126	9CO52	Area B		0.002304	3.028025	0.021121	-0.668474	0.451305
144	9FL3	Structure 3	UGAMS-29086; UGA-143	0.00362	2.992282	0.032412	-0.658513	0.47209
142	9FL3	Structure 2		0.003332	2.939539	0.028791	-0.634633	0.477519
54	9BR1	Ditch		0.001851	2.774881	0.014253	-0.608509	0.488837
37	9BR1	Zone A		0.003332	1.212491	0.004898	-0.410762	0.520323
35	9BR1	Zone F	UGAMS-29233	0.002139	2.119012	0.009605	-0.481589	0.604112
65	9BR1	Mound B, Floor		0.002756	2.207972	0.013436	-0.20972	0.692414
69	9BR1	Lamar Bone Bed	UGAMS-29094	0.004731	2.069093	0.020252	-0.002469	0.799296
63	9BR1	Mound B, Midden 2		0.004895	5.162862	0.13048	-0.09259	0.823279
995	9MU101	Structure 8C	UGA-510; UGA-215	0.001152	3.918327	0.017684	-0.031383	0.853522
70	9BR26	Surface		0.001892	2.213234	0.009269	-0.274451	0.855749
46	9BR1	Mound D, 14-20"		0.001769	2.018282	0.007205	-0.187108	0.962356
68	9BR1	Dark Clay		0.002345	1.957686	0.008986	0.046231	1.004311
66	9BR1	Orange Layer	Beta-67942; Beta-67943; Beta-67944	0.00181	2.575193	0.012003	0.257328	1.028987
993	9MU101	Structure 2	UGAMS-29092	0.003414	4.990055	0.085017	0.219054	1.206866
224	9MU102	N585 W809, Lot 452		0.002592	2.500121	0.016199	0.688586	1.236506
209	9MU102	N530 W800, Level 3		0.002715	1.687384	0.00773	0.760753	1.344503
161	9MU100	XU-A 6-8in		0.018634	2.080935	0.080692	0.667842	1.364332
218	9MU102	N583 W805, Lot 406		0.002386	1.724824	0.007098	0.743328	1.478229
157	9MU100	Structure #1 Floor		0.002962	1.817446	0.009783	0.665902	1.478452
208	9MU102	N530 W800, Level 2		0.002797	1.688368	0.007974	0.763998	1.481019
160	9MU100	XU-A 0-6in		0.028342	1.744743	0.086277	0.71922	1.522134
223	9MU102	N585 W809, Lot 440		0.005677	2.649156	0.039839	0.659113	1.537865
186	9MU102	N300 W400, Level 3		0.003085	2.062575	0.013125	0.682477	1.538142
216	9MU102	N580 W800, Lot 387		0.004607	2.759009	0.03507	0.602392	1.555664

Table A.1. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2
210	9MU102	N530 W800, Level 4		0.00218	2.666051	0.015496	0.612193	1.567002
184	9MU102	N300 W400, Level 1		0.002838	1.756764	0.00876	0.782172	1.577469
219	9MU102	N583 W805, Lot 407		0.001892	2.070146	0.008109	0.684329	1.585392
217	9MU102	N583 W805, Lot 405		0.002386	2.334265	0.013	0.682538	1.589043
215	9MU102	N580 W800, Lot 383		0.002304	2.029532	0.009488	0.612038	1.589452
222	9MU102	N585 W809, Lot 434		0.004607	1.990834	0.01826	0.702768	1.592358
149	9GO4	Plowzone		0.028178	2.313503	0.150815	0.777454	1.600988
174	9MU102	N240 W400, Level 2		0.002715	8.998275	0.219825	0.662282	1.602947
158	9MU100	Structure #2 Floor		0.002921	1.846393	0.009957	0.707986	1.604607
214	9MU102	N580 W800, Lot 382		0.00325	1.894541	0.011664	0.674149	1.610928
150	9GO4	Level 2/2a		0.011271	2.033206	0.046594	0.75661	1.631096
187	9MU102	N300 W400, Level 4		0.002756	3.011314	0.024992	0.566895	1.642843
213	9MU102	N580 W800, Lot 377		0.002304	1.74317	0.007	0.72723	1.65439
185	9MU102	N300 W400, Level 2		0.002962	1.760703	0.009182	0.684955	1.660975
197	9MU102	N320 W610, Trench		0.002633	1.765854	0.008209	0.728079	1.662023
201	9MU102	N220 W610, Trench		0.003167	1.835518	0.010671	0.754248	1.679017
192	9MU102	Trench N360 W400		0.002674	2.073885	0.0115	0.661022	1.681352
199	9MU102	N280-260 W610, Trench		0.004936	1.85068	0.016907	0.743547	1.692242
204	9MU102	N320 W800, Trench		0.002592	1.89281	0.009285	0.732559	1.693799
178	9MU102	N270 W400, Level 3		0.002057	1.801118	0.006672	0.697471	1.70227
202	9MU102	N200 W610, Trench		0.00399	1.937058	0.014972	0.756826	1.703804
231	9MU103	Structure 1	UGAMS-29095	0.012382	1.807411	0.040448	0.724003	1.720901
189	9MU102	N360 W400, Lot 2		0.00436	1.889594	0.015569	0.720246	1.734782
232	9MU103	Structure 2	UGA-56	0.008309	1.927479	0.030871	0.749607	1.735183
233	9MU103	Structure 3		0.003209	1.942773	0.01211	0.746307	1.749532
45	9BR1	Mound D, 8-14"		0.004114	2.560222	0.026963	0.563924	1.749605
191	9MU102	N360 W400, Lot 6		0.002262	2.335686	0.012343	0.684586	1.771074
206	9MU102	N500 W800, Trench		0.002098	1.998688	0.008381	0.740494	1.774801
44	9BR1	Mound D, 0-8"		0.004484	2.56877	0.029586	0.626207	1.785507
153	9HM2	Refuse Pit 1		0.007075	2.694153	0.051356	0.687531	1.826883
74	9BR60B	Burned House Floor		0.001933	2.496859	0.012053	0.718062	1.872317
154	9HM2	Refuse Pit 2		0.00255	3.022849	0.023304	0.702255	1.941033

Table A.1. (Cont.)

ID	Site	Provenience	CSSw	CSNap	CSWoo	CSEto	CSWil	CSLam	SS	ChS	Crd
234	9MU103	Feature 83	0	0	62	0	0	0	0	0	0
235	9MU103	Feature 89A	0	0	61	0	0	0	0	0	0
151	9GW70	DA-3, Trench	0	0	1128	13	0	0	0	0	0
236	9MU103	Feature 122	0	0	74	1	0	0	0	0	0
237	9MU103	Feature 133	0	0	195	3	0	0	0	0	0
110	9CK9	Northern Locus	13	0	189	0	0	0	2	5	0
84	9CK2	Surface	3	0	308	0	0	0	2	0	0
109	9CK85	Feature 12	0	0	115	0	0	0	0	15	0
86	9CK2	Humus	7	0	1087	0	0	0	3	10	0
87	9CK2	Trench	0	0	126	0	0	0	0	1	0
85	9CK2	Gully	5	0	611	0	0	0	37	3	0
152	9GW70	DA-3, Feature 12	0	0	48	0	0	0	0	0	9
997	9CK85	Palisade	0	0	25	5	2	0	0	9	0
139	9FL193	Block A Midden	0	0	39	0	0	7	0	0	0
99	9CK5	Mound, Under Stage 2	0	0	0	314	0	0	0	0	0
98	9CK5	Mound, Under Stage 1	0	0	0	172	0	0	0	0	0
100	9CK5	Mound, Stage 1 Summit	0	0	0	141	0	0	0	0	0
8	9BR1	Pre-Mound C Feature 19	0	0	0	38	0	0	0	0	0
17	9BR1	Top levels of clay core mound	0	0	0	65	0	0	0	0	0
89	9CK4	Premound, Level 1	0	0	0	284	3	0	0	0	0
58	9BR1	Saucer 2	0	0	1	118	0	0	0	0	0
79	9CK1	Area 1, Features	0	20	1	982	0	1	11	1	3
59	9BR1	Saucer 3	0	0	0	262	2	0	0	0	0
81	9CK1	Structure 3 Pits	0	5	0	372	1	0	4	0	0
77	9CK1	Feature 41	0	6	0	469	0	0	10	0	4
78	9CK1	Feature 883	0	7	5	743	0	0	38	2	4
80	9CK1	Area 2, Features	0	21	1	1698	0	0	149	1	2
991	9MU100	Feature 64	2	0	0	206	0	0	2	0	0

Table A.1. (Cont.)

ID	Site	Provenience	CSSw	CSNap	CSWoo	CSEto	CSWil	CSLam	SS	ChS	Crd
6	9BR1	Pre-Mound C Feature 17	0	0	0	39	0	0	0	1	0
57	9BR1	Saucer 1	0	0	1	65	1	0	0	2	0
82	9CK1	Structure 3	0	14	6	1556	2	0	55	1	1
11	9BR1	Pre-Mound C Structure 3	0	0	0	42	1	0	4	1	0
60	9BR1	Saucer 4	0	0	0	49	0	0	0	0	0
162	9MU100	Mound (XU-H) Surface	0	0	0	161	0	0	1	1	4
171	9MU101	Structure #8B	0	0	14	14	0	0	1	7	5
61	9BR1	Black Midden	0	0	0	175	4	0	0	0	0
3	9BR1	Pre-Mound C Feature 6	0	0	0	46	0	0	0	0	2
21	9BR1	Core mound	0	0	0	53	5	0	0	0	1
140	9FL193	Block B Feature 2	0	0	35	0	0	0	0	1	1
23	9BR1	Mantle 4 to Core Mound	0	0	0	75	12	0	0	1	0
155	9LU7	Midden Zone	4	0	58	6	0	0	590	168	0
33	9BR1	Mantle 3 to Mantle 4	0	0	0	240	58	0	0	1	2
95	9CK4	Mound, Level 5	0	0	0	37	13	0	0	0	0
998	9BR139		0	0	1	29	15	0	0	0	0
134	9DO2	Level I	2	28	0	0	0	0	3	5	0
992	9MU101	Structure 19	0	0	0	10	0	0	0	0	2
26	9BR1	Mantle C, Final Mantle	0	0	0	106	88	0	0	0	4
51	9BR1	Mound D, 44-55"	0	0	0	25	32	0	0	0	0
28	9BR1	Mound 3	0	0	0	27	36	0	0	0	1
38	9BR1	Zone C	0	0	0	18	39	0	0	0	0
31	9BR1	Mantle 2, W and N	0	0	0	16	40	0	0	1	0
101	9CK5	Midden over Stage 2	0	0	0	81	133	13	0	0	1
50	9BR1	Mound D, 38-44"	0	0	0	35	95	0	0	0	0
62	9BR1	Mound B, Structure 1	0	0	0	6	35	0	0	1	0
127	9CO55	Area B	1	0	0	0	0	0	18	44	0
994	9MU101	Structure 12	0	0	0	9	0	0	0	0	6
96	9CK46	Area A	7	0	0	0	0	0	2	38	0
102	9CK5	Outer mound slope deposits	0	0	0	126	263	42	0	1	2
52	9BR1	Mound D, Feature 1	0	0	0	24	114	4	0	0	1
24	9BR1	Refuse below Final Mantle slope	0	0	0	10	94	0	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	CSSw	CSNap	CSWoo	CSEto	CSWil	CSLam	SS	ChS	Crd
996	9MU101	Structure 14	0	0	6	27	3	0	1	4	31
71	9BR60A	Feature 13	0	0	1	0	82	0	0	0	0
56	9BR1	Inside Ditch	0	0	0	7	82	0	0	0	3
159	9MU100	Features 49, 50, 51, 52, 53	0	0	0	3	183	0	0	1	0
48	9BR1	Mound D, 26-32"	0	0	0	1	47	0	0	0	0
55	9BR1	Palisade	0	0	0	7	130	3	0	3	0
36	9BR1	Zone B	0	0	0	29	129	10	0	1	5
126	9CO52	Area B	0	0	0	0	54	0	0	2	0
144	9FL3	Structure 3	0	0	0	0	84	0	0	2	2
142	9FL3	Structure 2	0	0	0	0	76	0	0	3	1
54	9BR1	Ditch	0	0	0	1	40	1	0	2	1
37	9BR1	Zone A	0	0	0	25	32	17	0	3	1
35	9BR1	Zone F	0	0	0	6	36	7	0	0	2
65	9BR1	Mound B, Floor	0	0	0	5	33	0	0	11	10
69	9BR1	Lamar Bone Bed	0	0	0	14	26	0	0	10	10
63	9BR1	Mound B, Midden 2	0	0	0	4	12	0	0	4	58
995	9MU101	Structure 8C	0	0	0	6	2	0	1	0	16
70	9BR26	Surface	0	0	0	1	30	10	0	0	0
46	9BR1	Mound D, 14-20"	0	0	0	1	26	14	0	0	0
68	9BR1	Dark Clay	0	0	0	1	20	0	0	1	14
66	9BR1	Orange Layer	0	0	0	0	11	0	0	11	6
993	9MU101	Structure 2	0	0	0	9	1	0	0	1	71
224	9MU102	N585 W809, Lot 452	0	0	8	0	0	28	2	0	24
209	9MU102	N530 W800, Level 3	0	0	6	0	0	19	0	1	14
161	9MU100	XU-A 6-8in	0	0	0	3	0	131	0	123	2
218	9MU102	N583 W805, Lot 406	0	0	4	0	0	24	0	0	11
157	9MU100	Structure #1 Floor	0	0	0	3	0	16	0	5	2
208	9MU102	N530 W800, Level 2	0	0	3	0	0	19	0	2	6
160	9MU100	XU-A 0-6in	0	0	4	4	0	263	0	64	3
223	9MU102	N585 W809, Lot 440	0	0	7	0	0	65	0	2	46
186	9MU102	N300 W400, Level 3	0	0	4	0	0	39	1	0	19
216	9MU102	N580 W800, Lot 387	0	0	4	0	0	54	1	2	47

Table A.1. (Cont.)

ID	Site	Provenience	CSSw	CSNap	CSWoo	CSEto	CSWil	CSLam	SS	ChS	Crd
210	9MU102	N530 W800, Level 4	0	0	1	0	0	16	0	0	23
184	9MU102	N300 W400, Level 1	0	0	3	0	0	30	0	0	2
219	9MU102	N583 W805, Lot 407	0	0	2	0	0	23	0	0	12
217	9MU102	N583 W805, Lot 405	0	0	1	0	0	21	0	2	12
215	9MU102	N580 W800, Lot 383	0	0	0	0	0	22	1	3	16
222	9MU102	N585 W809, Lot 434	0	0	5	0	0	70	0	6	16
149	9GO4	Plowzone	0	0	0	0	0	109	0	0	5
174	9MU102	N240 W400, Level 2	0	0	3	0	0	29	0	0	1
158	9MU100	Structure #2 Floor	0	0	0	1	1	24	0	2	0
214	9MU102	N580 W800, Lot 382	0	0	1	0	0	28	0	1	19
150	9GO4	Level 2/2a	0	0	0	0	0	70	1	0	8
187	9MU102	N300 W400, Level 4	0	0	0	0	0	24	0	0	33
213	9MU102	N580 W800, Lot 377	0	0	1	0	0	25	0	0	6
185	9MU102	N300 W400, Level 2	0	0	0	0	0	29	1	0	11
197	9MU102	N320 W610, Trench	0	0	0	0	0	27	0	3	2
201	9MU102	N220 W610, Trench	0	0	1	0	0	35	0	0	2
192	9MU102	Trench N360 W400	0	0	1	0	0	36	0	1	15
199	9MU102	N280-260 W610, Trench	0	0	0	0	0	51	0	2	2
204	9MU102	N320 W800, Trench	0	0	0	0	0	29	1	0	0
178	9MU102	N270 W400, Level 3	0	0	0	0	0	26	1	0	4
202	9MU102	N200 W610, Trench	0	0	0	0	0	40	0	0	0
231	9MU103	Structure 1	0	0	0	0	0	141	0	0	21
189	9MU102	N360 W400, Lot 2	0	0	1	0	0	61	0	0	8
232	9MU103	Structure 2	0	0	0	0	0	99	0	0	0
233	9MU103	Structure 3	0	0	0	0	0	41	0	0	0
45	9BR1	Mound D, 8-14"	0	0	0	3	6	86	0	1	1
191	9MU102	N360 W400, Lot 6	0	0	1	0	0	41	0	0	8
206	9MU102	N500 W800, Trench	0	0	0	0	0	30	0	0	0
44	9BR1	Mound D, 0-8"	0	0	0	5	0	94	0	1	1
153	9HM2	Refuse Pit 1	0	0	0	0	0	153	0	13	0
74	9BR60B	Burned House Floor	0	0	0	0	0	39	0	0	0
154	9HM2	Refuse Pit 2	0	0	0	0	0	62	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	Br	In	Pt	Sp	Pu	Net	Cob	PB	NP
234	9MU103	Feature 83	0	0	0	0	0	0	0	0	0
235	9MU103	Feature 89A	0	0	0	0	0	0	0	0	0
151	9GW70	DA-3, Trench	0	0	0	0	0	0	0	0	0
236	9MU103	Feature 122	0	0	0	0	0	0	0	0	0
237	9MU103	Feature 133	0	1	0	0	0	0	0	0	0
110	9CK9	Northern Locus	0	1	0	0	0	0	0	0	0
84	9CK2	Surface	0	23	0	0	5	0	0	0	0
109	9CK85	Feature 12	0	0	0	0	0	0	0	0	0
86	9CK2	Humus	0	112	0	0	15	0	0	0	0
87	9CK2	Trench	0	15	0	0	1	0	0	0	0
85	9CK2	Gully	0	81	0	0	17	0	0	0	0
152	9GW70	DA-3, Feature 12	0	0	0	0	0	0	0	0	0
997	9CK85	Palisade	0	0	0	0	0	0	0	0	0
139	9FL193	Block A Midden	0	8	0	0	0	0	0	0	0
99	9CK5	Mound, Under Stage 2	0	0	0	5	0	0	0	0	0
98	9CK5	Mound, Under Stage 1	0	0	0	1	0	0	0	1	0
100	9CK5	Mound, Stage 1 Summit	0	0	0	5	0	0	0	0	0
8	9BR1	Pre-Mound C Feature 19	0	0	0	3	0	0	0	0	0
17	9BR1	Top levels of clay core mound	0	0	0	6	0	0	0	6	0
89	9CK4	Premound, Level 1	0	0	1	55	0	0	0	0	0
58	9BR1	Saucer 2	0	0	1	5	0	0	0	65	0
79	9CK1	Area 1, Features	0	4	0	31	1	0	0	3	0
59	9BR1	Saucer 3	0	0	1	47	0	1	0	88	0
81	9CK1	Structure 3 Pits	0	3	0	18	0	0	0	13	0
77	9CK1	Feature 41	0	1	0	34	0	0	0	4	0
78	9CK1	Feature 883	0	6	0	21	0	0	0	0	0
80	9CK1	Area 2, Features	0	16	0	119	2	0	0	9	0
991	9MU100	Feature 64	0	3	0	0	0	0	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	Br	In	Pt	Sp	Pu	Net	Cob	PB	NP
6	9BR1	Pre-Mound C Feature 17	0	0	0	1	0	0	0	0	0
57	9BR1	Saucer 1	0	0	0	3	0	0	0	0	0
82	9CK1	Structure 3	0	29	0	66	0	0	0	22	0
11	9BR1	Pre-Mound C Structure 3	0	0	0	1	0	0	0	0	0
60	9BR1	Saucer 4	0	1	2	5	0	0	0	40	0
162	9MU100	Mound (XU-H) Surface	0	2	0	18	0	0	0	0	0
171	9MU101	Structure #8B	0	0	2	11	0	0	0	0	0
61	9BR1	Black Midden	0	8	0	24	0	0	0	100	0
3	9BR1	Pre-Mound C Feature 6	0	0	0	0	0	0	0	1	0
21	9BR1	Core mound	0	0	0	0	0	0	0	0	0
140	9FL193	Block B Feature 2	0	21	0	0	0	0	0	0	0
23	9BR1	Mantle 4 to Core Mound	0	0	0	3	0	0	0	0	0
155	9LU7	Midden Zone	0	0	0	0	17	0	0	0	0
33	9BR1	Mantle 3 to Mantle 4	0	3	0	2	0	1	0	7	0
95	9CK4	Mound, Level 5	0	0	0	8	0	0	0	0	0
998	9BR139		0	0	0	3	0	0	0	0	0
134	9DO2	Level I	5	8	0	42	1	0	0	0	0
992	9MU101	Structure 19	0	0	0	0	0	0	0	0	0
26	9BR1	Mantle C, Final Mantle	1	1	0	2	0	0	0	0	0
51	9BR1	Mound D, 44-55"	0	0	0	1	0	0	0	0	0
28	9BR1	Mound 3	1	1	0	1	0	0	0	0	0
38	9BR1	Zone C	0	0	1	0	0	0	0	0	0
31	9BR1	Mantle 2, W and N	0	1	0	0	0	0	0	0	0
101	9CK5	Midden over Stage 2	0	1	0	1	0	0	0	0	0
50	9BR1	Mound D, 38-44"	0	2	0	0	0	0	0	0	0
62	9BR1	Mound B, Structure 1	0	0	0	1	0	0	1	4	0
127	9CO55	Area B	0	0	0	0	0	0	0	0	0
994	9MU101	Structure 12	0	0	0	0	0	0	0	0	0
96	9CK46	Area A	0	0	0	0	0	0	0	0	0
102	9CK5	Outer mound slope deposits	0	7	0	4	0	0	0	0	0
52	9BR1	Mound D, Feature 1	0	3	0	2	0	0	0	0	0
24	9BR1	Refuse below Final Mantle slope	0	0	0	0	0	0	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	Br	In	Pt	Sp	Pu	Net	Cob	PB	NP
996	9MU101	Structure 14	0	2	0	0	0	0	0	0	0
71	9BR60A	Feature 13	0	0	0	0	0	0	0	0	0
56	9BR1	Inside Ditch	0	1	0	0	0	0	0	0	0
159	9MU100	Features 49, 50, 51, 52, 53	0	0	0	0	0	0	0	0	0
48	9BR1	Mound D, 26-32"	1	0	0	0	0	0	0	0	0
55	9BR1	Palisade	0	0	0	0	0	0	0	0	0
36	9BR1	Zone B	1	5	0	2	0	0	1	0	0
126	9CO52	Area B	0	0	0	0	0	0	0	0	0
144	9FL3	Structure 3	0	0	0	0	0	0	0	0	0
142	9FL3	Structure 2	0	1	0	0	0	0	0	0	0
54	9BR1	Ditch	0	0	0	0	0	0	0	0	0
37	9BR1	Zone A	0	2	0	1	0	0	0	0	0
35	9BR1	Zone F	0	1	0	0	0	0	0	0	0
65	9BR1	Mound B, Floor	0	5	0	0	0	0	3	0	0
69	9BR1	Lamar Bone Bed	6	38	1	5	0	0	3	2	0
63	9BR1	Mound B, Midden 2	5	1	16	3	0	0	0	16	0
995	9MU101	Structure 8C	0	1	2	0	0	0	0	0	0
70	9BR26	Surface	1	3	0	0	0	0	1	0	0
46	9BR1	Mound D, 14-20"	0	2	0	0	0	0	0	0	0
68	9BR1	Dark Clay	1	17	0	0	0	0	1	2	0
66	9BR1	Orange Layer	0	13	0	0	0	0	3	0	0
993	9MU101	Structure 2	0	0	0	1	0	0	0	0	0
224	9MU102	N585 W809, Lot 452	0	1	0	0	0	0	0	0	0
209	9MU102	N530 W800, Level 3	0	26	0	0	0	0	0	0	0
161	9MU100	XU-A 6-8in	0	187	0	0	7	0	0	0	0
218	9MU102	N583 W805, Lot 406	0	19	0	0	0	0	0	0	0
157	9MU100	Structure #1 Floor	0	46	0	0	0	0	0	0	0
208	9MU102	N530 W800, Level 2	0	38	0	0	0	0	0	0	0
160	9MU100	XU-A 0-6in	4	327	0	1	19	0	0	0	0
223	9MU102	N585 W809, Lot 440	0	16	0	0	0	0	0	0	2
186	9MU102	N300 W400, Level 3	0	12	0	0	0	0	0	0	0
216	9MU102	N580 W800, Lot 387	0	4	0	0	0	0	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	Br	In	Pt	Sp	Pu	Net	Cob	PB	NP
210	9MU102	N530 W800, Level 4	0	13	0	0	0	0	0	0	0
184	9MU102	N300 W400, Level 1	0	34	0	0	0	0	0	0	0
219	9MU102	N583 W805, Lot 407	0	9	0	0	0	0	0	0	0
217	9MU102	N583 W805, Lot 405	0	21	0	0	0	0	0	0	1
215	9MU102	N580 W800, Lot 383	0	14	0	0	0	0	0	0	0
222	9MU102	N585 W809, Lot 434	0	15	0	0	0	0	0	0	0
149	9GO4	Plowzone	0	571	0	0	0	0	0	0	0
174	9MU102	N240 W400, Level 2	0	10	0	0	0	0	23	0	0
158	9MU100	Structure #2 Floor	0	43	0	0	0	0	0	0	0
214	9MU102	N580 W800, Lot 382	0	30	0	0	0	0	0	0	0
150	9GO4	Level 2/2a	0	195	0	0	0	0	0	0	0
187	9MU102	N300 W400, Level 4	0	10	0	0	0	0	0	0	0
213	9MU102	N580 W800, Lot 377	0	24	0	0	0	0	0	0	0
185	9MU102	N300 W400, Level 2	0	31	0	0	0	0	0	0	0
197	9MU102	N320 W610, Trench	0	32	0	0	0	0	0	0	0
201	9MU102	N220 W610, Trench	0	39	0	0	0	0	0	0	0
192	9MU102	Trench N360 W400	0	12	0	0	0	0	0	0	0
199	9MU102	N280-260 W610, Trench	0	65	0	0	0	0	0	0	0
204	9MU102	N320 W800, Trench	0	32	0	0	0	0	1	0	0
178	9MU102	N270 W400, Level 3	0	19	0	0	0	0	0	0	0
202	9MU102	N200 W610, Trench	0	57	0	0	0	0	0	0	0
231	9MU103	Structure 1	0	139	0	0	0	0	0	0	0
189	9MU102	N360 W400, Lot 2	0	36	0	0	0	0	0	0	0
232	9MU103	Structure 2	0	103	0	0	0	0	0	0	0
233	9MU103	Structure 3	0	37	0	0	0	0	0	0	0
45	9BR1	Mound D, 8-14"	0	3	0	0	0	0	0	0	0
191	9MU102	N360 W400, Lot 6	0	5	0	0	0	0	0	0	0
206	9MU102	N500 W800, Trench	0	21	0	0	0	0	0	0	0
44	9BR1	Mound D, 0-8"	0	8	0	0	0	0	0	0	0
153	9HM2	Refuse Pit 1	0	6	0	0	0	0	0	0	0
74	9BR60B	Burned House Floor	0	8	0	0	0	0	0	0	0
154	9HM2	Refuse Pit 2	0	0	0	0	0	0	0	0	0

Table A.1. (Cont.)

ID	Site	Provenience	Reference
234	9MU103	Feature 83	Hally 1970
235	9MU103	Feature 89A	Hally 1970
151	9GW70	DA-3, Trench	Markin 2007
236	9MU103	Feature 122	Hally 1970
237	9MU103	Feature 133	Hally 1970
110	9CK9	Northern Locus	Markin 2007
84	9CK2	Surface	Caldwell 2011
109	9CK85	Feature 12	Caldwell 2011; This dissertation
86	9CK2	Humus	Caldwell 2011; This dissertation
87	9CK2	Trench	Caldwell 2011; This dissertation
85	9CK2	Gully	Caldwell 2011; This dissertation
152	9GW70	DA-3, Feature 12	Markin 2007
997	9CK85	Palisade	Caldwell 2011; This dissertation
139	9FL193	Block A Midden	Chamblee et al. 1996
99	9CK5	Mound, Under Stage 2	King 1996
98	9CK5	Mound, Under Stage 1	King 1996
100	9CK5	Mound, Stage 1 Summit	King 1996
8	9BR1	Pre-Mound C Feature 19	King 1996
17	9BR1	Top levels of clay core mound	King 1996
89	9CK4	Premound, Level 1	King 1996
58	9BR1	Saucer 2	King 2001
79	9CK1	Area 1, Features	Lewis et al. 2012
59	9BR1	Saucer 3	King 2001
81	9CK1	Structure 3 Pits	King 2001
77	9CK1	Feature 41	Lewis et al. 2012
78	9CK1	Feature 883	Lewis et al. 2012
80	9CK1	Area 2, Features	Lewis et al. 2012
991	9MU100	Feature 64	Kelly et al. 1966

Table A.1. (Cont.)

ID	Site	Provenience	Reference
6	9BR1	Pre-Mound C Feature 17	King 1996
57	9BR1	Saucer 1	King 2001
82	9CK1	Structure 3	Lewis et al. 2012
11	9BR1	Pre-Mound C Structure 3	King 1996
60	9BR1	Saucer 4	King 2001
162	9MU100	Mound (XU-H) Surface	Kelly et al. 1966
171	9MU101	Structure #8B	Kelly 1968
61	9BR1	Black Midden	King 2001
3	9BR1	Pre-Mound C Feature 6	King 1996
21	9BR1	Core mound	King 1996
140	9FL193	Block B Feature 2	Chamblee et al. 1996
23	9BR1	Mantle 4 to Core Mound	King 1996
155	9LU7	Midden Zone	Cook 1982
33	9BR1	Mantle 3 to Mantle 4	King 1996
95	9CK4	Mound, Level 5	King 1996
998	9BR139		Caldwell 2011
134	9DO2	Level I	Williams 2014
992	9MU101	Structure 19	Kelly 1968
26	9BR1	Mantle C, Final Mantle	King 1996
51	9BR1	Mound D, 44-55"	King 1996
28	9BR1	Mound 3	King 1996
38	9BR1	Zone C	King 1996
31	9BR1	Mantle 2, W and N	King 1996
101	9CK5	Midden over Stage 2	King 1996
50	9BR1	Mound D, 38-44"	King 1996
62	9BR1	Mound B, Structure 1	King 1996
127	9CO55	Area B	Caldwell 2011
994	9MU101	Structure 12	Kelly 1968
96	9CK46	Area A	Caldwell 2011
102	9CK5	Outer mound slope deposits	King 1996
52	9BR1	Mound D, Feature 1	King 1996
24	9BR1	Refuse below Final Mantle slope	King 1996

Table A.1. (Cont.)

ID	Site	Provenience	Reference
996	9MU101	Structure 14	Kelly 1968
71	9BR60A	Feature 13	Caldwell 2011
56	9BR1	Inside Ditch	King 1996
159	9MU100	Features 49, 50, 51, 52, 53	Kelly et al. 1966
48	9BR1	Mound D, 26-32"	King 1996
55	9BR1	Palisade	King 1996
36	9BR1	Zone B	King 1996
126	9CO52	Area B	Caldwell 2011
144	9FL3	Structure 3	Chamblee et al. 1996
142	9FL3	Structure 2	Chamblee et al. 1996
54	9BR1	Ditch	King 1996
37	9BR1	Zone A	King 1996
35	9BR1	Zone F	King 1996
65	9BR1	Mound B, Floor	King 1996
69	9BR1	Lamar Bone Bed	King 2001
63	9BR1	Mound B, Midden 2	King 1996
995	9MU101	Structure 8C	Kelly 1968
70	9BR26	Surface	Caldwell 2011
46	9BR1	Mound D, 14-20"	King 1996
68	9BR1	Dark Clay	King 2001
66	9BR1	Orange Layer	King 2001
993	9MU101	Structure 2	Kelly 1968
224	9MU102	N585 W809, Lot 452	Hally 1980
209	9MU102	N530 W800, Level 3	Hally 1980
161	9MU100	XU-A 6-8in	Kelly et al. 1966
218	9MU102	N583 W805, Lot 406	Hally 1980
157	9MU100	Structure #1 Floor	Kelly et al. 1966
208	9MU102	N530 W800, Level 2	Hally 1980
160	9MU100	XU-A 0-6in	Kelly et al. 1966
223	9MU102	N585 W809, Lot 440	Hally 1980
186	9MU102	N300 W400, Level 3	Hally 1980
216	9MU102	N580 W800, Lot 387	Hally 1980

Table A.1. (Cont.)

ID	Site	Provenience	Reference
210	9MU102	N530 W800, Level 4	Hally 1980
184	9MU102	N300 W400, Level 1	Hally 1980
219	9MU102	N583 W805, Lot 407	Hally 1980
217	9MU102	N583 W805, Lot 405	Hally 1980
215	9MU102	N580 W800, Lot 383	Hally 1980
222	9MU102	N585 W809, Lot 434	Hally 1980
149	9GO4	Plowzone	Maclin 2009
174	9MU102	N240 W400, Level 2	Hally 1980
158	9MU100	Structure #2 Floor	Kelly et al. 1966
214	9MU102	N580 W800, Lot 382	Hally 1980
150	9GO4	Level 2/2a	Maclin 2009
187	9MU102	N300 W400, Level 4	Hally 1980
213	9MU102	N580 W800, Lot 377	Hally 1980
185	9MU102	N300 W400, Level 2	Hally 1980
197	9MU102	N320 W610, Trench	Hally 1980
201	9MU102	N220 W610, Trench	Hally 1980
192	9MU102	Trench N360 W400	Hally 1980
199	9MU102	N280-260 W610, Trench	Hally 1980
204	9MU102	N320 W800, Trench	Hally 1980
178	9MU102	N270 W400, Level 3	Hally 1980
202	9MU102	N200 W610, Trench	Hally 1980
231	9MU103	Structure 1	Hally 1970
189	9MU102	N360 W400, Lot 2	Hally 1980
232	9MU103	Structure 2	Hally 1970
233	9MU103	Structure 3	Hally 1970
45	9BR1	Mound D, 8-14"	King 1996
191	9MU102	N360 W400, Lot 6	Hally 1980
206	9MU102	N500 W800, Trench	Hally 1980
44	9BR1	Mound D, 0-8"	King 1996
153	9HM2	Refuse Pit 1	Caldwell 2011
74	9BR60B	Burned House Floor	Caldwell 2011
154	9HM2	Refuse Pit 2	Caldwell 2011

Table A.2. Ceramic data and results of correspondence analyses for eastern Tennessee seriations.

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd
154	40Mr40	Block B, Assemblage 8		0.017332	1.702374	0.050229	-1.154469	-1.377595	14	16
153	40Mr40	Block B, Assemblage 7		0.006057	1.674214	0.016977	-1.14797	-1.355313	11	10
142	40Mr40	Block A, Assemblage 3		0.045592	1.607022	0.117742	-1.136552	-1.337118	120	28
146	40Mr40	Block A, Assemblage 7		0.001872	1.662032	0.005171	-1.12833	-1.317544	5	2
71	40Mr41	Feature 97		0.000412	1.611616	0.00107	-1.127201	-1.301542	3	0
143	40Mr40	Block A, Assemblage 4		0.025969	1.611391	0.067431	-1.127154	-1.320603	79	20
82	40Mi11	Feature 43		0.000188	1.62666	0.000497	-1.125896	-1.241264	3	0
75	40Mr41	Feature 189		0.000614	1.56766	0.00151	-1.122743	-1.278702	6	0
141	40Mr40	Block A, Assemblage 2		0.071998	1.5005	0.162104	-1.102062	-1.192825	707	150
147	40Mr40	Block A, Assemblage 8		0.000285	1.687157	0.000813	-1.089849	-1.215285	1	2
145	40Mr40	Block A, Assemblage 6		0.00399	2.423394	0.023431	-1.069613	-1.246307	7	4
76	40Mr41	Feature 190		0.000557	2.059663	0.002361	-1.052437	-1.092187	12	0
144	40Mr40	Block A, Assemblage 5		0.002071	2.977614	0.018359	-1.044913	-1.204911	3	2
140	40Mr40	Block A, Assemblage 1		0.065627	1.385794	0.126032	-1.042277	-0.980517	1184	346
148	40Mr40	Block B, Assemblage 1		0.000578	1.711654	0.001694	-1.036478	-0.986138	8	6
78	40Lo45	Level 2		0.004929	1.297428	0.008298	-1.028857	-0.888344	191	28
81	40Mi11	Feature 42		0.00026	1.390602	0.000503	-1.025667	-0.804008	15	0
70	40Mr41	Feature 27		0.000654	3.430355	0.007697	-1.018148	-1.014716	15	1
69	40Mr41	Feature 22		0.001633	1.303286	0.002775	-1.01578	-0.839052	82	0
73	40Mr41	Feature 170		0.000311	1.990835	0.001232	-1.013162	-0.916392	11	1
152	40Mr40	Block B, Assemblage 6		0.00124	1.980959	0.004864	-1.000114	-0.810161	13	12
114	40Mr25	Watts Bar Level		0.004647	6.504587	0.196629	-0.963393	-1.096596	1	0
111	40Mr20	Feature 25		0.000249	9.17029	0.020969	-0.949428	-1.107313	0	0
54	40Mr20	Feature 25		0.000253	9.17221	0.021282	-0.949416	-1.107307	0	0
77	40Lo45	Level 1		0.018604	1.138371	0.024109	-0.943836	-0.612231	1165	131
74	40Mr41	Feature 171		0.001583	1.059767	0.001778	-0.927149	-0.454407	92	46
149	40Mr40	Block B, Assemblage 3		0.001334	1.897788	0.004803	-0.903838	-0.437909	47	23
131	40Mr21	Strat 3		0.005482	1.308897	0.009392	-0.881173	-0.280181	526	19
150	40Mr40	Block B, Assemblage 4		0.002038	2.920976	0.01739	-0.84091	-0.205894	80	33
151	40Mr40	Block B, Assemblage 5		0.001843	3.269185	0.019698	-0.820806	-0.129985	72	32
130	40Mr21	Strat 2		0.010668	1.093336	0.012752	-0.717113	0.454952	1646	108
72	40Mr41	Feature 130		0.0015	1.069014	0.001714	-0.711579	0.514206	240	33

Table A.2. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd	LTBr
160	40Ha10	Unit 10 Woodland		0.019489	1.690743	0.055713	-0.598034	0.924033	1095	3012	0
156	40Ha63	Area C, T.P. 15		0.001644	2.363994	0.009189	-0.589023	1.058443	302	8	0
129	40Mr21	Strat 1		0.007018	1.377854	0.013324	-0.575156	1.092828	1445	171	0
155	40Ha63	Area A		0.001131	2.967143	0.009958	-0.565948	1.219595	226	3	0
10	40Re108	Area 1		0.000867	13.311013	0.153674	-0.563878	1.212498	117	15	0
88	40Mi11	Total Units		0.032763	1.580092	0.081799	-0.563034	1.098678	6905	126	100
139	40Mr23	Unit B, Level 6		0.000387	5.699581	0.012561	-0.547676	0.774269	11	4	0
3	40Mi20	Feature 21		0.000423	1.8092	0.001384	-0.544178	1.211875	95	0	0
1	40Mi20	Feature 5		0.000148	2.995874	0.00133	-0.536317	1.064202	22	0	0
83	40Mi11	Feature 50	GX-573	0.005511	1.766413	0.017196	-0.521802	1.439506	1342	15	115
2	40Mi20	Feature 17		0.000799	2.060669	0.003391	-0.512832	1.546471	171	0	41
84	40Mi11	Feature 56	UGAMS-28821	0.000629	1.815401	0.002072	-0.512004	1.435785	163	1	4
86	40Mi11	Feature 101		0.000152	1.800803	0.000492	-0.508552	1.452347	39	1	1
11	40Re108	Area 2		0.000791	1.765798	0.002468	-0.50847	1.304706	160	13	0
85	40Mi11	Feature 100		0.000296	1.877085	0.001044	-0.506763	1.551413	68	3	11
87	40Mi11	Feature 102		0.000278	1.810355	0.000912	-0.505747	1.515936	69	2	6
157	40Ha63	Area D, F. 69		0.10986	1.571989	0.271481	-0.504167	1.499016	23046	3598	2431
137	40Mr23	Unit B, Level 4		0.001785	5.796086	0.059974	-0.503702	0.980299	49	31	0
14	40Mr23	Feature 597	UGAMS-28824	0.000177	1.908948	0.000645	-0.502343	1.272415	24	10	0
164	40Pk3	F. 402	UGAMS-28818; UGAMS-28819	0.004315	4.090625	0.072202	-0.497597	1.408714	1020	16	2
15	40Mr23	Feature 607		0.000387	2.464508	0.002349	-0.4903	1.271445	44	24	0
158	40Ha1	Woodland		0.022377	2.436543	0.132845	-0.481079	1.622871	1246	3361	1418
133	40Mr23	Unit A, Level 3		0.00623	3.693266	0.084982	-0.479507	1.015674	532	98	0
162	40Ha10	Unit 64/65 Woodland		0.002327	1.507231	0.005287	-0.478345	1.504973	428	207	0
134	40Mr23	Unit A, Level 4		0.001062	4.247908	0.019172	-0.47425	0.884458	71	10	0
136	40Mr23	Unit B, Level 3		0.001511	5.026552	0.038167	-0.471502	0.956989	57	23	0
9	40Rh7	Mound E		0.000419	1.542775	0.000998	-0.468275	1.487057	65	43	0
138	40Mr23	Unit B, Level 5		0.001164	6.141912	0.043897	-0.450361	0.976141	31	20	0
37	40Mg31	Hamilton Component		0.039951	2.090575	0.174605	-0.445928	1.575867	3671	7323	0
4	40Rh6	Premound 1		0.001334	6.929739	0.064036	-0.440875	1.080837	65	0	0
161	40Ha10	Unit 62 Woodland		0.007	2.446023	0.041881	-0.43741	1.57634	374	1518	0

Table A.2. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd	LTBr
115	40Mr25	Rest of Site		0.005215	1.68274	0.014766	-0.431932	0.632796	727	144	0
132	40Mr23	Unit A, Level 2		0.011167	2.607496	0.075923	-0.423659	1.09919	1442	217	0
8	40Rh7	Mound C		0.000278	1.870117	0.000973	-0.404256	1.521843	30	45	0
106	40Mr5	Feature 269		0.000961	2.878618	0.007966	-0.377922	1.546016	48	206	0
135	40Mr23	Unit B, Level 2		0.000752	5.267181	0.020854	-0.352466	0.933528	28	23	0
79	40Ha2	Mound	Beta-127866	0.005312	3.585893	0.068309	-0.299165	0.96885	464	96	0
66	40Mr20	Feature 68		0.000661	1.225485	0.000993	-0.171762	1.172885	87	62	0
48	40Mr20	Feature 7	UGAMS-28816; UGAMS-28817; GX-4213	0.019229	1.111777	0.023768	-0.110211	0.982848	2080	1769	7
47	40Mr20	Feature 3		0.000267	2.139278	0.001224	0.106273	-0.073644	5	15	0
57	40Mr20	Feature 36		0.000484	1.615364	0.001264	0.238155	0.399253	20	38	0
113	40MR20	House I Wall Trenches		0.000311	1.944123	0.001175	0.27979	-0.077878	11	10	0
58	40Mr20	Feature 39		0.000235	2.248882	0.001188	0.349263	0.257543	9	11	0
61	40Mr20	Feature 47		0.000173	0.776132	0.000104	0.362496	0.502499	17	6	0
36	40Mg31	Original Humus		0.002793	1.029027	0.002958	0.371285	0.587084	402	0	0
41	40Mr20	Structure 8 (1975)		0.001626	0.884028	0.001271	0.425169	0.520033	120	90	0
46	40Mr20	Structure 3 (1975)		0.003473	0.838936	0.002444	0.44978	0.365604	251	140	0
53	40Mr20	Feature 23		0.000517	0.957055	0.000473	0.516522	0.216311	27	20	0
39	40Mr20	Structure 1 (1967)		0.000607	1.347978	0.001103	0.521851	0.020645	24	19	0
110	40MR20	Feature 23		0.000546	1.001445	0.000547	0.542703	0.17147	27	20	0
5	40Rh6	Premound 3		0.002262	3.82159	0.033039	0.543423	0.040772	137	0	0
40	40Mr20	Structure 7 (1975)		0.001547	0.854908	0.00113	0.604625	0.35256	93	70	0
60	40Mr20	Feature 46		0.00026	0.88471	0.000204	0.663926	0.247078	14	10	0

Table A.2. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd	LTBr
80	40Ha3	Mound	UGAMS-28805; UGAMS-28806; UGAMS-28807; UGAMS-28808; Beta-128375	0.005348	1.323714	0.009372	0.767564	0.228606	231	216	17
43	40Mr20	Structure 12 (1975)		0.000809	1.142075	0.001056	0.789778	0.185359	39	26	0
67	40Mr20	Feature 69	GX-4212	0.000846	1.030068	0.000897	0.795137	0.136795	29	34	0
7	40Rh6	Stage 2	UGAMS-28823	0.000231	6.724366	0.010458	0.811666	-0.064964	8	0	0
112	40MR20	House I Floor		0.000311	1.787806	0.000993	0.831573	0.094797	11	8	0
125	40Ld24	Premound Midden		0.005869	0.894608	0.004697	0.847923	0.032498	236	112	0
51	40Mr20	Feature 19		0.000181	1.28763	0.0003	0.873082	-0.217669	2	4	0
65	40Mr20	Feature 67		0.000289	1.036373	0.000311	0.895368	0.082708	13	6	0
49	40Mr20	Feature 12		0.000228	1.326489	0.000401	0.974749	-0.201023	4	3	0
104	40Mr5	Feature 194		0.000459	3.139755	0.004524	0.984528	-0.241621	0	0	0
91	40Mr5	Feature 18		0.000282	1.568693	0.000694	1.003217	-0.00466	4	11	0
126	40Ld24	Area B		0.005934	1.109468	0.007304	1.024285	-0.174548	116	48	0
13	40Re124	Post Mound	GX-4135; GX-4136	0.000549	1.137082	0.00071	1.029079	-0.058884	18	7	0
123	40Mr50	Structure #660	UGAMS-28827; UGA-1245	0.000282	3.595229	0.003643	1.039761	-0.134745	9	0	0
52	40Mr20	Feature 22		0.000351	1.371121	0.000659	1.058784	-0.24108	2	6	0
109	40MR20	Feature 22		0.000351	1.371121	0.000659	1.058784	-0.24108	2	6	0
6	40Rh6	Stage 1		0.000206	3.924411	0.003172	1.070184	-0.244137	2	0	0
56	40Mr20	Feature 33		0.000455	1.275886	0.000741	1.074757	-0.124085	9	6	1
64	40Mr20	Feature 66	GX-4211	0.00069	1.28694	0.001143	1.086889	-0.121642	14	9	1
22	40Re12	Mound Phase G-1	UGAMS-28814	0.003122	1.206175	0.004543	1.104559	-0.149286	30	49	0
42	40Mr20	Structure 9 (1975)		0.00064	1.225485	0.000961	1.105181	-0.170365	15	4	0
101	40Mr5	Feature 149		0.000275	1.545819	0.000656	1.115148	-0.206971	2	3	0
124	40Ld24	Mound Fill		0.016793	1.170211	0.022997	1.139258	-0.242155	217	111	0

Table A.2. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd	LTBr
68	40Mr20	Feature 1		0.000289	1.216907	0.000428	1.14866	-0.218564	4	3	0
20	40Re12	Mound Phase E		0.013436	1.32451	0.023572	1.148812	-0.19479	118	174	0
128	40Ld24	Area D		0.001247	1.246994	0.001939	1.150849	-0.360718	7	2	0
24	40Re12	Mound Phase H		0.000791	1.163829	0.001072	1.153464	-0.195624	3	13	0
18	40Re12	Mound Phase C		0.002472	1.287365	0.004097	1.163045	-0.205255	29	25	0
45	40Mr20	Structure 11 (1975)		0.004351	1.226302	0.006543	1.170035	-0.21909	77	21	0
100	40Mr5	Feature 148		0.000311	1.850366	0.001064	1.174425	-0.227517	1	5	0
19	40Re12	Mound Phase D	UGAMS-28811	0.007658	1.277726	0.012502	1.17477	-0.224547	68	81	0
50	40Mr20	Feature 13	UGAMS-28815	0.000257	1.341365	0.000462	1.189562	-0.275717	4	0	0
120	40Mr32	Feature 1		0.000199	1.608032	0.000514	1.191902	-0.236371	4	0	0
23	40Re12	Mound Phase G		0.004232	1.339068	0.007588	1.192089	-0.237454	34	38	0
21	40Re12	Mound Phase F	UGAMS-28813	0.005497	1.496237	0.012305	1.192489	-0.250988	29	59	0
62	40Mr20	Feature 57	GX-4209	0.000744	1.376534	0.001411	1.199839	-0.239923	12	2	0
63	40Mr20	Feature 64	GX-4210	0.003664	1.465981	0.007875	1.214853	-0.275581	36	14	0
55	40Mr20	Feature 32		0.003975	1.243367	0.006146	1.22123	-0.278043	26	21	0
122	40Ha210	Daub Layer		0.000307	2.018105	0.001251	1.231945	-0.300647	2	0	0
35	40Mg31	Village under Mound	ID??	0.012406	1.399638	0.024304	1.23242	-0.274924	168	0	0
127	40Ld24	Area C	UGAMS-28825	0.024205	1.34573	0.043836	1.236068	-0.288331	248	36	0
59	40Mr20	Feature 43		0.000177	1.645934	0.00048	1.246341	-0.2841	1	1	0
12	40Re108	Area 3		0.000336	1.365775	0.000627	1.251804	-0.311429	2	0	0
17	40Re12	Mound Phase B	UGAMS-28809; UGAMS-28810	0.033937	1.287822	0.056285	1.257381	-0.306038	84	204	0
97	40Mr5	Feature 71		0.000658	1.773337	0.002068	1.278638	-0.353158	0	0	0
103	40Mr5	Feature 187		0.000195	2.700756	0.001423	1.28117	-0.341851	1	0	0
44	40Mr20	Structure 10 (1975)		0.000155	1.526409	0.000362	1.282351	-0.319018	0	1	0
105	40Mr5	Feature 234		0.000322	1.655532	0.000882	1.284106	-0.340338	1	0	0
107	40Mr7	Area A		0.027284	1.354917	0.050089	1.290522	-0.349737	100	6	0
102	40Mr5	Feature 175		0.004387	1.576496	0.010904	1.291262	-0.348874	6	7	0
90	40Mr5	Feature 6		0.000361	1.816283	0.001192	1.291622	-0.346589	1	0	0
121	40Mr32	Feature 2		0.000744	1.601355	0.001909	1.296351	-0.340146	3	0	0
116	40Mr26	Whole Site		0.003101	1.731723	0.009298	1.297555	-0.362469	9	1	0
93	40Mr5	Feature 27		0.001778	1.696712	0.005119	1.298954	-0.352218	2	1	0

Table A.2. (Cont.)

ID	Site	Provenience	Dates	Mass	ChiDist	Inertia	Dim.1	Dim.2	LTP	LTCrd	LTBr
92	40Mr5	Feature 21		0.000275	1.650664	0.000748	1.300493	-0.358888	0	0	0
16	40Re12	Mound Phase A		0.000481	1.543147	0.001145	1.30163	-0.342673	1	1	0
108	40Mr7	Area B		0.014672	1.3852	0.028153	1.304247	-0.37062	10	2	0
98	40Mr5	Feature 104		0.00034	1.682428	0.000962	1.30687	-0.363002	0	0	0
25	40MR6	Structure 34		0.000322	3.017906	0.002929	1.314699	-0.376324	0	0	0
117	40Mr27	Feature 1		0.003954	1.575292	0.009811	1.316924	-0.361984	1	0	0
99	40Mr5	Feature 111		0.006548	1.671933	0.018305	1.31816	-0.367938	0	1	0
118	40Mr27	Feature 3		0.001417	1.545593	0.003384	1.319997	-0.36567	0	0	0
34	40Mg31	Mound Phase G	UGAMS-28802; UGAMS-28803	0.001174	1.453583	0.002482	1.323104	-0.365593	0	0	0
119	40Mr27	Feature 8 Pit B		0.000484	1.509656	0.001104	1.323315	-0.366201	0	0	0
163	40Ha10	Mississippian		0.029821	1.557814	0.07237	1.324415	-0.367631	0	0	0
89	40Mr5	Feature 5		0.000242	1.574513	0.0006	1.325911	-0.369128	0	0	0
38	40LD208	All	GX-14934	0.000737	1.465531	0.001583	1.326161	-0.368754	0	0	0
33	40Mg31	Mound Phase F		0.00387	1.382449	0.007397	1.328672	-0.370913	0	0	0
95	40Mr5	Feature 62		0.00034	2.112335	0.001516	1.330635	-0.37457	0	0	0
96	40Mr5	Feature 67		0.000372	1.960674	0.001431	1.333186	-0.378354	0	0	0
27	40Mg31	Mound Phase A		0.004839	1.416612	0.009711	1.333671	-0.377058	0	0	0
32	40Mg31	Mound Phase E-2		0.001886	2.001346	0.007556	1.333837	-0.376777	0	0	0
31	40Mg31	Mound Phase E-1	Beta-181800	0.001044	2.865659	0.008577	1.337044	-0.380573	0	0	0
159	40Ha1	Mississippian	Beta-127867; Beta-128660	0.072714	1.426327	0.14793	1.33811	-0.379281	0	0	0
29	40Mg31	Mound Phase C	UGAMS-28804	0.007961	1.825526	0.026531	1.33823	-0.380041	0	0	0
28	40Mg31	Mound Phase B		0.004973	1.711146	0.01456	1.339304	-0.380614	0	0	0
94	40Mr5	Feature 56		0.003404	7.479427	0.190439	1.340462	-0.403196	1	0	0
26	40MR6	Structure 61	UGAMS-28822	0.000148	1.597038	0.000378	1.341963	-0.382435	0	0	0
30	40Mg31	Mound Phase D	ID??	0.002728	3.563924	0.034655	1.345817	-0.396283	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
154	40Mr40	Block B, Assemblage 8	15	4677	1	0	0	0	0	0	0	0	0	0	0	0
153	40Mr40	Block B, Assemblage 7	8	1610	0	0	0	0	0	0	0	0	0	0	0	0
142	40Mr40	Block A, Assemblage 3	62	11459	9	13	0	0	0	0	0	2	0	0	1	0
146	40Mr40	Block A, Assemblage 7	1	445	0	2	0	0	0	0	0	0	0	0	0	0
71	40Mr41	Feature 97	0	99	0	0	0	0	0	0	0	0	0	0	0	0
143	40Mr40	Block A, Assemblage 4	15	6174	5	8	0	0	0	0	0	1	0	0	0	0
82	40Mi11	Feature 43	0	49	0	0	0	0	0	0	0	0	0	0	0	0
75	40Mr41	Feature 189	0	149	0	0	0	0	0	0	0	0	0	0	0	0
141	40Mr40	Block A, Assemblage 2	378	17384	188	85	0	0	0	0	0	23	1	2	0	0
147	40Mr40	Block A, Assemblage 8	1	61	0	0	0	0	0	0	0	0	0	0	0	0
145	40Mr40	Block A, Assemblage 6	1	668	0	2	0	0	0	1	0	2	0	0	0	0
76	40Mr41	Feature 190	0	103	0	0	0	0	0	0	0	0	0	0	0	0
144	40Mr40	Block A, Assemblage 5	1	285	1	0	0	0	0	0	0	0	0	0	0	0
140	40Mr40	Block A, Assemblage 1	553	14110	290	213	0	0	0	1	0	21	15	5	2	5
148	40Mr40	Block B, Assemblage 1	6	117	1	0	0	0	0	0	0	0	0	0	0	0
78	40Lo45	Level 2	22	1070	0	5	0	0	1	0	0	5	0	0	0	0
81	40Mi11	Feature 42	0	56	0	0	0	0	0	0	0	0	0	0	0	0
70	40Mr41	Feature 27	0	87	0	0	0	0	0	0	0	0	0	0	0	0
69	40Mr41	Feature 22	0	312	0	0	0	0	0	0	0	0	0	0	0	0
73	40Mr41	Feature 170	0	53	0	0	0	0	0	0	0	0	0	0	0	0
152	40Mr40	Block B, Assemblage 6	52	223	12	2	0	0	0	0	0	0	0	0	0	0
114	40Mr25	Watts Bar Level	0	2	0	0	0	0	0	0	0	0	0	0	0	0
111	40MR20	Feature 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	40Mr20	Feature 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	40Lo45	Level 1	2	3536	0	7	0	0	6	0	0	66	1	0	0	0
74	40Mr41	Feature 171	0	259	0	0	0	0	0	0	0	0	0	0	0	0
149	40Mr40	Block B, Assemblage 3	66	188	10	4	0	0	0	0	0	0	0	0	0	0
131	40Mr21	Strat 3	12	682	0	6	0	0	0	0	0	0	0	0	0	0
150	40Mr40	Block B, Assemblage 4	162	205	26	4	0	0	0	0	0	0	0	0	0	0
151	40Mr40	Block B, Assemblage 5	159	161	28	3	0	0	0	0	0	0	0	0	0	0
130	40Mr21	Strat 2	37	806	0	111	0	0	0	0	0	0	0	0	0	0
72	40Mr41	Feature 130	0	118	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
160	40Ha10	Unit 10 Woodland	109	1150	0	27	0	0	0	0	0	0	0	0	0	0
156	40Ha63	Area C, T.P. 15	54	14	59	3	0	0	0	0	0	0	0	0	0	0
129	40Mr21	Strat 1	4	188	0	46	0	0	0	0	0	0	0	0	0	0
155	40Ha63	Area A	18	0	60	4	0	0	0	0	0	0	0	0	0	0
10	40Re108	Area 1	1	6	4	3	0	0	0	0	0	0	0	0	0	0
88	40Mi11	Total Units	712	762	5	386	0	0	7	0	0	48	1	0	0	0
139	40Mr23	Unit B, Level 6	3	2	0	14	0	0	0	0	0	1	0	0	0	0
3	40Mi20	Feature 21	12	4	0	6	0	0	0	0	0	0	0	0	0	0
1	40Mi20	Feature 5	4	2	0	13	0	0	0	0	0	0	0	0	0	0
83	40Mi11	Feature 50	16	30	0	7	0	0	0	0	0	0	0	0	0	0
2	40Mi20	Feature 17	3	0	0	6	0	0	0	0	0	0	0	0	0	0
84	40Mi11	Feature 56	3	1	0	2	0	0	0	0	0	0	0	0	0	0
86	40Mi11	Feature 101	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	40Re108	Area 2	16	0	0	24	0	0	0	0	0	0	0	0	0	0
85	40Mi11	Feature 100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	40Mi11	Feature 102	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157	40Ha63	Area D, F. 69	221	31	663	316	0	0	94	0	0	0	0	0	0	0
137	40Mr23	Unit B, Level 4	9	1	6	108	0	2	0	0	0	6	0	0	0	0
14	40Mr23	Feature 597	2	0	0	6	0	0	0	0	0	0	0	0	0	0
164	40Pk3	F. 402	0	1	26	0	0	0	0	0	84	2	0	0	6	0
15	40Mr23	Feature 607	0	0	0	22	0	0	0	0	0	0	0	0	0	0
158	40Ha1	Woodland	0	162	5	0	0	0	0	0	0	0	0	0	0	0
133	40Mr23	Unit A, Level 3	15	1	5	351	0	0	0	0	0	42	0	0	0	0
162	40Ha10	Unit 64/65 Woodland	0	3	0	6	0	0	0	0	0	0	0	0	0	0
134	40Mr23	Unit A, Level 4	6	1	0	48	0	0	0	0	0	12	0	0	0	0
136	40Mr23	Unit B, Level 3	8	0	7	108	0	1	0	0	0	12	0	0	0	0
9	40Rh7	Mound E	0	0	0	7	0	0	0	0	0	0	0	0	0	0
138	40Mr23	Unit B, Level 5	3	1	2	59	0	2	1	0	0	13	0	0	0	0
37	40Mg31	Hamilton Component	37	9	11	0	0	4	0	0	0	0	0	0	0	0
4	40Rh6	Premound 1	0	0	0	293	0	0	0	0	0	4	0	0	0	0
161	40Ha10	Unit 62 Woodland	39	1	0	5	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
115	40Mr25	Rest of Site	7	14	4	0	0	0	2	0	0	123	11	7	0	0
132	40Mr23	Unit A, Level 2	36	2	4	372	0	0	0	0	0	154	0	0	0	0
8	40Rh7	Mound C	0	0	0	0	0	0	0	0	0	2	0	0	0	0
106	40Mr5	Feature 269	0	0	0	0	0	3	0	0	0	8	0	0	0	0
135	40Mr23	Unit B, Level 2	1	1	7	19	0	0	0	0	0	19	0	1	0	0
79	40Ha2	Mound	149	0	0	589	0	0	0	0	0	129	13	15	0	0
66	40Mr20	Feature 68	0	0	0	0	0	0	0	0	0	30	0	0	1	0
48	40Mr20	Feature 7	0	31	0	0	0	0	1	0	10	1121	8	4	1	0
47	40Mr20	Feature 3	0	0	0	0	0	0	0	0	0	30	0	0	0	0
57	40Mr20	Feature 36	0	2	0	0	0	1	0	0	0	57	0	0	0	0
113	40MR20	House I Wall Trenches	0	1	0	0	0	0	0	0	0	35	0	6	0	0
58	40Mr20	Feature 39	0	0	0	0	0	0	0	0	0	30	1	0	0	0
61	40Mr20	Feature 47	0	0	0	0	0	0	0	0	0	20	1	2	0	0
36	40Mg31	Original Humus	0	0	0	0	0	0	0	0	0	326	11	28	0	0
41	40Mr20	Structure 8 (1975)	0	0	0	0	0	1	0	0	0	201	6	14	0	0
46	40Mr20	Structure 3 (1975)	0	2	0	0	0	0	0	0	0	463	8	15	3	0
53	40Mr20	Feature 23	0	0	0	0	0	0	0	0	1	76	5	1	0	0
39	40Mr20	Structure 1 (1967)	0	2	0	0	0	0	0	0	0	85	0	9	0	0
110	40MR20	Feature 23	0	0	0	0	0	0	0	0	1	83	5	1	0	0
5	40Rh6	Premound 3	0	0	0	20	19	0	0	0	0	342	13	1	0	0
40	40Mr20	Structure 7 (1975)	0	0	0	0	0	0	0	0	0	241	6	9	0	0
60	40Mr20	Feature 46	0	0	0	0	0	0	0	0	0	36	6	2	0	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
80	40Ha3	Mound	10	0	0	0	0	0	0	0	0	415	550	41	0	0
43	40Mr20	Structure 12 (1975)	0	0	0	0	0	0	0	0	0	144	2	4	0	0
67	40Mr20	Feature 69	0	0	0	0	0	0	0	0	0	161	5	0	0	0
7	40Rh6	Stage 2	0	0	0	3	4	0	0	0	0	44	0	0	0	0
112	40MR20	House I Floor	0	0	0	0	0	0	0	0	2	57	0	2	0	0
125	40Ld24	Premound Midden	7	20	0	13	0	0	2	0	0	945	145	103	0	0
51	40Mr20	Feature 19	0	2	0	0	0	0	0	0	0	36	0	1	0	0
65	40Mr20	Feature 67	0	0	0	0	0	0	0	0	0	56	2	3	0	0
49	40Mr20	Feature 12	0	0	0	0	0	0	0	0	0	49	0	3	0	0
104	40Mr5	Feature 194	0	0	0	0	0	0	0	0	0	70	19	0	0	0
91	40Mr5	Feature 18	0	0	0	0	0	0	0	0	0	25	31	7	0	0
126	40Ld24	Area B	7	28	0	31	0	0	3	1	0	1096	153	120	0	0
13	40Re124	Post Mound	0	0	0	0	0	0	0	0	0	116	11	0	0	0
123	40Mr50	Structure #660	0	0	0	0	0	0	0	0	0	33	1	32	0	0
52	40Mr20	Feature 22	0	0	0	0	0	0	0	0	0	83	0	1	0	0
109	40MR20	Feature 22	0	0	0	0	0	0	0	0	0	83	0	1	0	0
6	40Rh6	Stage 1	0	0	0	2	2	0	0	0	0	45	3	0	0	0
56	40Mr20	Feature 33	0	0	0	0	0	0	0	0	0	103	1	3	0	0
64	40Mr20	Feature 66	1	0	0	0	0	0	0	0	0	161	5	0	0	0
22	40Re12	Mound Phase G-1	4	0	0	25	0	0	0	0	0	523	144	56	0	0
42	40Mr20	Structure 9 (1975)	0	0	0	0	0	0	0	0	0	137	9	7	0	0
101	40Mr5	Feature 149	0	0	0	0	0	0	0	0	0	57	6	0	0	0
124	40Ld24	Mound Fill	9	49	0	21	0	0	3	0	0	3312	525	291	0	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
68	40Mr20	Feature 1	0	0	0	0	0	0	0	0	0	53	19	0	0	0
20	40Re12	Mound Phase E	30	0	0	60	0	0	1	0	0	1942	919	350	0	0
128	40Ld24	Area D	0	11	0	1	0	0	0	0	0	229	52	31	0	0
24	40Re12	Mound Phase H	0	0	1	4	0	0	0	0	0	140	42	13	0	0
18	40Re12	Mound Phase C	3	0	0	9	0	0	0	0	0	376	189	32	1	0
45	40Mr20	Structure 11 (1975)	0	0	0	0	0	0	0	0	0	828	176	58	5	0
100	40Mr5	Feature 148	0	0	0	0	0	0	0	0	0	54	16	0	0	0
19	40Re12	Mound Phase D	20	0	1	13	0	0	2	0	0	1195	535	161	0	0
50	40Mr20	Feature 13	0	0	0	0	0	0	0	0	0	61	5	0	0	0
120	40Mr32	Feature 1	0	0	0	0	0	0	0	0	0	49	0	0	1	0
23	40Re12	Mound Phase G	7	0	1	10	0	0	0	0	0	689	226	129	0	0
21	40Re12	Mound Phase F	21	0	3	6	0	0	0	0	0	722	482	123	0	0
62	40Mr20	Feature 57	0	0	0	0	0	0	0	0	0	182	7	3	0	0
63	40Mr20	Feature 64	0	0	0	0	0	0	0	0	0	937	11	6	1	0
55	40Mr20	Feature 32	0	0	0	0	0	0	0	0	0	848	148	23	0	0
122	40Ha210	Daub Layer	0	0	2	0	0	0	0	0	0	78	1	0	0	0
35	40Mg31	Village under Mound	0	0	0	0	0	0	0	0	0	2831	120	277	0	0
127	40Ld24	Area C	42	3	0	3	0	0	2	0	0	4280	1274	706	0	0
59	40Mr20	Feature 43	0	0	0	0	0	0	0	0	0	45	0	0	0	0
12	40Re108	Area 3	0	0	0	0	0	0	0	0	0	72	15	0	0	0
17	40Re12	Mound Phase B	61	0	7	43	0	0	0	0	0	6046	2187	474	9	0
97	40Mr5	Feature 71	0	0	0	0	0	0	0	0	0	157	7	0	0	0
103	40Mr5	Feature 187	0	0	0	0	0	0	0	0	0	48	3	0	0	1
44	40Mr20	Structure 10 (1975)	0	0	0	0	0	0	0	0	0	41	1	0	0	0
105	40Mr5	Feature 234	0	0	0	0	0	0	0	0	0	83	0	0	0	0
107	40Mr7	Area A	2	0	0	0	0	0	0	0	0	5914	1224	24	2	5
102	40Mr5	Feature 175	0	0	0	0	0	0	0	0	0	1120	28	0	0	0
90	40Mr5	Feature 6	0	0	0	0	0	0	0	0	0	90	1	0	0	0
121	40Mr32	Feature 2	0	0	0	0	0	0	0	0	0	200	0	0	1	0
116	40Mr26	Whole Site	0	1	0	0	0	0	1	0	0	536	300	0	0	0
93	40Mr5	Feature 27	0	0	0	0	0	0	0	0	0	466	1	0	6	0

Table A.2. (Cont.)

ID	Site	Provenience	LTChS	LTFI	LTCS	LTSS	LTPt	LTPu	LTIn	LTSp	LShTP	ShTP	ShTCrd	ShTFI	ShTCS	ShTSS
92	40Mr5	Feature 21	0	0	0	0	0	0	0	0	0	72	0	0	0	0
16	40Re12	Mound Phase A	0	0	0	0	0	0	0	0	0	116	7	2	0	0
108	40Mr7	Area B	0	1	0	0	0	0	0	0	0	3223	647	8	2	1
98	40Mr5	Feature 104	0	0	0	0	0	0	0	0	0	88	0	0	0	0
25	40MR6	Structure 34	0	0	0	0	0	0	0	0	0	78	6	0	0	0
117	40Mr27	Feature 1	0	0	0	0	0	0	0	0	0	1018	14	24	0	0
99	40Mr5	Feature 111	0	0	0	0	0	0	0	0	0	1770	3	0	0	6
118	40Mr27	Feature 3	0	0	0	0	0	0	0	0	0	365	17	2	0	0
34	40Mg31	Mound Phase G	0	0	0	0	0	0	0	0	0	273	22	24	0	0
119	40Mr27	Feature 8 Pit B	0	0	0	0	0	0	0	0	0	126	6	1	0	0
163	40Ha10	Mississippian	0	0	0	0	0	0	0	0	0	7621	77	285	6	0
89	40Mr5	Feature 5	0	0	0	0	0	0	0	0	0	63	2	0	0	0
38	40LD208	All	0	0	0	0	0	0	0	0	0	186	18	0	0	0
33	40Mg31	Mound Phase F	0	0	0	0	0	0	0	0	0	815	150	77	12	0
95	40Mr5	Feature 62	0	0	0	0	0	0	0	0	0	85	0	0	0	0
96	40Mr5	Feature 67	0	0	0	0	0	0	0	0	0	89	6	0	0	0
27	40Mg31	Mound Phase A	0	0	0	0	0	0	0	0	0	911	320	63	19	0
32	40Mg31	Mound Phase E-2	0	0	0	0	0	0	0	0	0	349	94	30	24	0
31	40Mg31	Mound Phase E-1	0	0	0	0	0	0	0	0	0	167	57	27	23	0
159	40Ha1	Mississippian	0	0	0	0	0	0	0	0	0	13548	6048	324	12	0
29	40Mg31	Mound Phase C	0	0	0	0	0	0	0	0	0	1275	614	130	65	0
28	40Mg31	Mound Phase B	0	0	0	0	0	0	0	0	0	793	407	94	27	0
94	40Mr5	Feature 56	0	0	0	0	0	0	0	0	0	713	2	0	7	0
26	40MR6	Structure 61	0	0	0	0	0	0	0	0	0	24	16	1	0	0
30	40Mg31	Mound Phase D	0	0	0	0	0	0	0	0	0	166	373	99	67	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
154	40Mr40	Block B, Assemblage 8	0	0	0	0	0	0	0	0	0	0	1	0
153	40Mr40	Block B, Assemblage 7	0	0	0	0	0	0	0	0	0	0	0	0
142	40Mr40	Block A, Assemblage 3	0	0	0	0	0	0	0	0	0	0	9	5
146	40Mr40	Block A, Assemblage 7	0	0	0	0	0	0	0	0	0	0	1	0
71	40Mr41	Feature 97	0	0	0	0	0	0	0	0	0	0	0	0
143	40Mr40	Block A, Assemblage 4	0	0	0	0	0	0	0	0	0	1	3	2
82	40Mi11	Feature 43	0	0	0	0	0	0	0	0	0	0	0	0
75	40Mr41	Feature 189	0	0	0	0	0	0	0	0	0	0	0	0
141	40Mr40	Block A, Assemblage 2	0	0	0	0	0	0	0	1	0	2	83	54
147	40Mr40	Block A, Assemblage 8	0	0	0	0	0	0	0	0	0	0	0	0
145	40Mr40	Block A, Assemblage 6	0	0	0	0	0	0	0	0	0	0	1	0
76	40Mr41	Feature 190	0	0	0	0	0	0	0	0	0	0	0	0
144	40Mr40	Block A, Assemblage 5	0	0	0	0	0	0	0	0	0	0	2	0
140	40Mr40	Block A, Assemblage 1	0	0	0	4	0	0	0	1	0	4	308	111
148	40Mr40	Block B, Assemblage 1	0	0	0	0	0	0	0	0	0	0	4	2
78	40Lo45	Level 2	0	0	0	0	0	0	0	0	0	0	3	0
81	40Mi11	Feature 42	0	0	0	0	0	0	0	0	0	0	0	0
70	40Mr41	Feature 27	0	0	0	0	0	0	0	0	0	0	0	0
69	40Mr41	Feature 22	0	0	0	0	0	0	0	0	0	0	1	0
73	40Mr41	Feature 170	0	0	0	0	0	0	0	0	0	0	0	0
152	40Mr40	Block B, Assemblage 6	0	0	0	0	0	0	0	0	0	0	4	0
114	40Mr25	Watts Bar Level	0	0	0	0	0	0	0	0	0	0	1	0
111	40MR20	Feature 25	0	0	0	0	0	0	0	0	0	0	0	0
54	40Mr20	Feature 25	0	0	0	0	0	0	0	0	0	0	0	0
77	40Lo45	Level 1	0	0	0	0	0	0	1	0	6	1	70	0
74	40Mr41	Feature 171	0	0	0	0	0	0	0	0	0	0	0	0
149	40Mr40	Block B, Assemblage 3	0	0	0	0	0	0	0	0	0	0	4	0
131	40Mr21	Strat 3	0	0	0	0	0	0	0	0	0	0	7	0
150	40Mr40	Block B, Assemblage 4	0	0	0	0	0	0	0	0	0	0	3	3
151	40Mr40	Block B, Assemblage 5	0	0	0	0	0	0	0	0	0	1	8	2
130	40Mr21	Strat 2	0	0	0	0	0	0	0	0	0	0	12	0
72	40Mr41	Feature 130	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
160	40Ha10	Unit 10 Woodland	0	0	0	0	0	0	0	0	0	0	0	0
156	40Ha63	Area C, T.P. 15	0	0	0	0	0	0	0	0	0	0	7	0
129	40Mr21	Strat 1	0	0	0	0	0	0	0	0	0	0	18	0
155	40Ha63	Area A	0	0	0	0	0	0	0	0	0	0	2	0
10	40Re108	Area 1	0	0	0	0	0	0	0	0	0	0	3	0
88	40Mi11	Total Units	0	0	0	0	0	0	0	0	0	0	1	0
139	40Mr23	Unit B, Level 6	0	0	0	0	0	0	0	0	28	0	28	1
3	40Mi20	Feature 21	0	0	0	0	0	0	0	0	0	0	0	0
1	40Mi20	Feature 5	0	0	0	0	0	0	0	0	0	0	0	0
83	40Mi11	Feature 50	0	0	0	0	0	0	0	0	0	0	0	0
2	40Mi20	Feature 17	0	0	0	0	0	0	0	0	0	0	0	0
84	40Mi11	Feature 56	0	0	0	0	0	0	0	0	0	0	0	0
86	40Mi11	Feature 101	0	0	0	0	0	0	0	0	0	0	0	0
11	40Re108	Area 2	0	0	0	0	0	0	0	0	0	0	6	0
85	40Mi11	Feature 100	0	0	0	0	0	0	0	0	0	0	0	0
87	40Mi11	Feature 102	0	0	0	0	0	0	0	0	0	0	0	0
157	40Ha63	Area D, F. 69	0	0	0	0	0	0	0	0	0	0	0	0
137	40Mr23	Unit B, Level 4	0	0	0	0	0	0	0	0	153	0	82	4
14	40Mr23	Feature 597	0	0	0	0	0	0	0	0	3	0	1	0
164	40Pk3	F. 402	0	0	0	0	0	0	0	0	7	0	9	12
15	40Mr23	Feature 607	0	0	0	0	0	0	0	0	2	0	7	0
158	40Ha1	Woodland	0	0	0	0	0	0	0	0	0	0	0	0
133	40Mr23	Unit A, Level 3	0	0	0	0	0	0	0	0	262	0	211	8
162	40Ha10	Unit 64/65 Woodland	0	0	0	0	0	0	0	0	0	0	0	0
134	40Mr23	Unit A, Level 4	0	0	0	0	0	0	0	0	55	0	40	1
136	40Mr23	Unit B, Level 3	0	0	0	0	0	0	0	0	107	0	53	6
9	40Rh7	Mound E	0	0	0	0	0	0	0	0	0	0	0	1
138	40Mr23	Unit B, Level 5	0	0	0	0	0	0	0	0	110	0	49	0
37	40Mg31	Hamilton Component	0	0	0	0	0	0	0	0	0	0	0	0
4	40Rh6	Premound 1	0	0	0	0	0	0	0	0	0	0	0	0
161	40Ha10	Unit 62 Woodland	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
115	40Mr25	Rest of Site	0	0	0	0	0	0	0	0	0	0	36	4
132	40Mr23	Unit A, Level 2	0	0	0	0	0	0	0	0	317	0	346	13
8	40Rh7	Mound C	0	0	0	0	0	0	0	0	0	0	0	0
106	40Mr5	Feature 269	0	0	0	0	0	0	0	0	0	0	1	0
135	40Mr23	Unit B, Level 2	0	0	0	0	0	0	0	0	63	0	29	2
79	40Ha2	Mound	0	0	0	0	0	0	0	0	0	0	12	0
66	40Mr20	Feature 68	0	0	0	0	0	0	0	0	0	0	0	0
48	40Mr20	Feature 7	0	0	0	4	0	0	1	0	0	1	5	2
47	40Mr20	Feature 3	0	0	0	0	0	0	0	0	0	0	0	1
57	40Mr20	Feature 36	0	0	0	0	0	0	0	0	0	0	1	0
113	40MR20	House I Wall Trenches	0	0	0	1	0	0	0	0	0	0	1	0
58	40Mr20	Feature 39	0	0	0	0	0	0	0	0	0	0	7	0
61	40Mr20	Feature 47	0	0	0	0	0	0	0	0	0	0	0	0
36	40Mg31	Original Humus	0	0	0	6	0	0	0	0	0	0	0	0
41	40Mr20	Structure 8 (1975)	0	0	0	6	0	0	0	0	0	0	3	0
46	40Mr20	Structure 3 (1975)	2	0	0	17	0	0	1	0	0	0	0	1
53	40Mr20	Feature 23	0	0	0	0	0	0	0	0	0	0	0	0
39	40Mr20	Structure 1 (1967)	0	0	0	6	0	0	0	0	0	0	1	0
110	40MR20	Feature 23	0	0	0	0	0	0	0	0	0	0	0	0
5	40Rh6	Premound 3	0	0	0	2	0	0	0	0	0	0	10	0
40	40Mr20	Structure 7 (1975)	0	0	0	2	0	0	0	0	0	0	1	0
60	40Mr20	Feature 46	0	0	0	2	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
80	40Ha3	Mound	0	0	0	0	0	0	0	0	0	0	0	0
43	40Mr20	Structure 12 (1975)	0	0	0	8	0	0	0	0	0	0	0	0
67	40Mr20	Feature 69	0	0	0	0	0	0	0	0	0	0	0	0
7	40Rh6	Stage 2	0	0	0	0	0	0	0	0	0	0	1	0
112	40MR20	House I Floor	0	0	0	4	0	0	0	0	0	0	0	0
125	40Ld24	Premound Midden	1	0	0	12	0	0	1	0	0	0	4	0
51	40Mr20	Feature 19	1	0	0	1	0	0	0	0	0	0	0	0
65	40Mr20	Feature 67	0	0	0	0	0	0	0	0	0	0	0	0
49	40Mr20	Feature 12	0	0	0	0	0	0	0	0	0	0	0	0
104	40Mr5	Feature 194	0	0	0	0	0	0	14	0	0	0	24	0
91	40Mr5	Feature 18	0	0	0	0	0	0	0	0	0	0	0	0
126	40Ld24	Area B	1	0	0	14	0	0	0	0	0	0	1	0
13	40Re124	Post Mound	0	0	0	0	0	0	0	0	0	0	0	0
123	40Mr50	Structure #660	0	0	0	0	0	0	0	0	0	1	1	0
52	40Mr20	Feature 22	0	0	0	0	0	0	0	0	0	0	0	0
109	40MR20	Feature 22	0	0	0	0	0	0	0	0	0	0	0	0
6	40Rh6	Stage 1	0	0	0	0	0	0	0	0	0	0	1	0
56	40Mr20	Feature 33	0	0	0	2	0	0	0	0	0	0	0	0
64	40Mr20	Feature 66	0	0	0	0	0	0	0	0	0	0	0	0
22	40Re12	Mound Phase G-1	7	0	0	21	3	0	1	0	0	0	1	0
42	40Mr20	Structure 9 (1975)	0	0	0	3	0	0	0	0	0	0	0	0
101	40Mr5	Feature 149	0	0	0	0	0	0	4	0	0	0	4	0
124	40Ld24	Mound Fill	8	0	0	56	0	0	1	0	0	0	4	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
68	40Mr20	Feature 1	0	0	0	0	0	0	0	0	0	0	0	0
20	40Re12	Mound Phase E	31	3	1	80	2	0	7	0	0	0	0	0
128	40Ld24	Area D	0	0	0	5	0	0	0	0	0	0	1	0
24	40Re12	Mound Phase H	0	0	0	0	0	0	2	0	0	0	1	0
18	40Re12	Mound Phase C	7	0	0	9	3	0	1	0	0	0	0	0
45	40Mr20	Structure 11 (1975)	0	0	0	32	0	0	1	0	0	0	1	0
100	40Mr5	Feature 148	0	0	0	0	0	0	8	0	0	0	2	0
19	40Re12	Mound Phase D	5	4	0	17	9	0	6	0	0	0	0	0
50	40Mr20	Feature 13	0	0	0	0	0	0	0	0	0	0	0	0
120	40Mr32	Feature 1	0	0	0	0	0	0	0	1	0	0	0	0
23	40Re12	Mound Phase G	5	3	0	22	2	0	5	0	0	0	0	0
21	40Re12	Mound Phase F	20	2	0	37	7	0	7	0	0	0	1	0
62	40Mr20	Feature 57	0	0	0	0	0	0	0	0	0	0	0	0
63	40Mr20	Feature 64	0	0	0	0	0	0	0	0	0	0	1	0
55	40Mr20	Feature 32	1	0	0	9	0	0	6	0	0	0	17	0
122	40Ha210	Daub Layer	0	2	0	0	0	0	0	0	0	0	0	0
35	40Mg31	Village under Mound	2	0	0	35	0	0	0	0	0	0	0	0
127	40Ld24	Area C	5	0	0	94	0	0	0	0	0	0	3	0
59	40Mr20	Feature 43	0	0	0	2	0	0	0	0	0	0	0	0
12	40Re108	Area 3	0	0	0	0	0	0	2	0	0	0	1	0
17	40Re12	Mound Phase B	25	24	4	44	33	0	139	0	0	0	0	1
97	40Mr5	Feature 71	0	1	0	0	0	0	12	0	0	0	5	0
103	40Mr5	Feature 187	0	0	0	0	0	0	1	0	0	0	0	0
44	40Mr20	Structure 10 (1975)	0	0	0	0	0	0	0	0	0	0	0	0
105	40Mr5	Feature 234	0	0	0	0	0	0	4	0	0	0	1	0
107	40Mr7	Area A	1	6	0	10	0	0	195	0	0	0	14	24
102	40Mr5	Feature 175	0	0	0	0	0	0	43	0	0	0	2	7
90	40Mr5	Feature 6	0	0	0	0	0	0	7	0	0	0	1	0
121	40Mr32	Feature 2	0	0	0	0	0	0	0	2	0	0	0	0
116	40Mr26	Whole Site	0	0	0	0	0	0	1	0	0	6	1	0
93	40Mr5	Feature 27	0	0	0	0	0	0	2	10	0	0	4	0

Table A.2. (Cont.)

ID	Site	Provenience	ShTPt	ShTPu	ShTNP	ShTSp	ShTEf	ShTCob	ShTIn	ShChS	SGTBr	SGTIn	SGTP	SGTCS
92	40Mr5	Feature 21	0	0	0	0	0	0	3	0	0	0	1	0
16	40Re12	Mound Phase A	0	0	0	0	0	0	6	0	0	0	0	0
108	40Mr7	Area B	0	0	0	2	0	0	117	1	0	0	14	10
98	40Mr5	Feature 104	0	0	0	0	0	0	4	1	0	0	1	0
25	40MR6	Structure 34	0	0	1	0	0	0	3	0	0	1	0	0
117	40Mr27	Feature 1	16	0	0	19	0	0	0	0	0	0	2	0
99	40Mr5	Feature 111	0	0	0	0	0	0	10	20	0	0	0	0
118	40Mr27	Feature 3	6	0	0	1	0	0	0	0	0	0	1	0
34	40Mg31	Mound Phase G	0	0	0	6	0	0	0	0	0	0	0	0
119	40Mr27	Feature 8 Pit B	0	0	0	1	0	0	0	0	0	0	0	0
163	40Ha10	Mississippian	1	6	0	12	0	0	244	0	0	0	0	0
89	40Mr5	Feature 5	0	0	0	0	0	0	2	0	0	0	0	0
38	40LD208	All	0	0	0	0	0	0	0	0	0	0	0	0
33	40Mg31	Mound Phase F	7	0	0	10	0	0	0	0	0	0	0	0
95	40Mr5	Feature 62	0	0	0	0	0	0	9	0	0	0	0	0
96	40Mr5	Feature 67	0	0	0	0	0	0	4	4	0	0	0	0
27	40Mg31	Mound Phase A	17	0	0	8	0	0	0	0	0	0	0	1
32	40Mg31	Mound Phase E-2	14	0	0	11	0	0	0	0	0	0	0	0
31	40Mg31	Mound Phase E-1	10	0	0	5	0	0	0	0	0	0	0	0
159	40Ha1	Mississippian	4	30	0	12	0	0	143	0	0	0	0	0
29	40Mg31	Mound Phase C	65	0	1	53	0	0	0	0	0	0	0	0
28	40Mg31	Mound Phase B	41	0	0	14	0	0	0	0	0	0	0	0
94	40Mr5	Feature 56	0	0	0	0	0	0	5	210	0	0	1	2
26	40MR6	Structure 61	0	0	0	0	0	0	0	0	0	0	0	0
30	40Mg31	Mound Phase D	32	0	0	15	0	0	0	0	0	0	0	3

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
154	40Mr40	Block B, Assemblage 8	1	0	0	0	0	0	0	7	0	43	21	0
153	40Mr40	Block B, Assemblage 7	0	0	0	0	0	0	1	3	0	29	4	0
142	40Mr40	Block A, Assemblage 3	2	2	0	0	0	0	4	56	3	508	321	5
146	40Mr40	Block A, Assemblage 7	0	0	0	0	0	0	1	3	0	12	44	2
71	40Mr41	Feature 97	0	0	0	0	0	0	0	0	0	5	7	0
143	40Mr40	Block A, Assemblage 4	5	1	1	0	0	0	5	46	1	413	393	12
82	40Mi11	Feature 43	0	0	0	0	0	0	0	0	0	0	0	0
75	40Mr41	Feature 189	0	0	0	0	0	0	0	1	0	7	7	0
141	40Mr40	Block A, Assemblage 2	66	19	4	0	0	0	58	112	8	283	223	35
147	40Mr40	Block A, Assemblage 8	0	0	0	0	0	0	0	3	0	6	4	1
145	40Mr40	Block A, Assemblage 6	2	0	1	0	0	0	1	43	0	190	172	9
76	40Mr41	Feature 190	0	0	0	0	0	0	0	11	0	5	23	0
144	40Mr40	Block A, Assemblage 5	1	0	0	0	0	0	1	44	0	123	110	0
140	40Mr40	Block A, Assemblage 1	199	39	4	0	0	0	84	206	27	150	119	80
148	40Mr40	Block B, Assemblage 1	0	0	0	0	0	0	0	6	0	5	1	0
78	40Lo45	Level 2	0	0	0	0	0	0	4	5	0	24	6	0
81	40Mi11	Feature 42	0	0	0	0	0	0	1	0	0	0	0	0
70	40Mr41	Feature 27	0	0	0	0	0	0	0	12	0	4	62	0
69	40Mr41	Feature 22	1	0	0	0	0	0	0	6	0	26	24	0
73	40Mr41	Feature 170	0	0	0	0	0	0	0	6	0	2	13	0
152	40Mr40	Block B, Assemblage 6	1	1	1	0	0	0	1	6	1	6	0	0
114	40Mr25	Watts Bar Level	0	0	0	0	0	0	1	119	0	381	781	0
111	40MR20	Feature 25	0	0	0	0	0	0	0	0	0	68	1	0
54	40Mr20	Feature 25	0	0	0	0	0	0	0	0	0	69	1	0
77	40Lo45	Level 1	0	0	15	0	0	0	27	35	8	37	33	0
74	40Mr41	Feature 171	0	0	0	0	0	0	0	3	0	23	15	0
149	40Mr40	Block B, Assemblage 3	0	0	0	0	0	0	0	13	0	10	0	0
131	40Mr21	Strat 3	0	0	7	0	0	0	0	16	0	86	156	0
150	40Mr40	Block B, Assemblage 4	2	1	0	0	0	0	0	22	1	3	3	1
151	40Mr40	Block B, Assemblage 5	1	0	0	0	0	0	0	14	0	7	1	2
130	40Mr21	Strat 2	9	0	2	0	0	0	0	22	0	61	138	0
72	40Mr41	Feature 130	0	0	0	0	0	0	0	2	0	10	12	0

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
160	40Ha10	Unit 10 Woodland	0	0	0	0	0	0	0	0	0	0	0	0
156	40Ha63	Area C, T.P. 15	2	0	0	0	0	0	0	0	0	0	6	0
129	40Mr21	Strat 1	4	0	1	0	0	0	0	16	0	16	33	0
155	40Ha63	Area A	0	0	0	0	0	0	0	0	0	0	0	0
10	40Re108	Area 1	0	0	90	0	0	0	1	0	0	0	0	0
88	40Mi11	Total Units	1	0	0	0	0	0	7	0	0	0	5	0
139	40Mr23	Unit B, Level 6	9	0	2	0	0	0	0	0	0	3	1	0
3	40Mi20	Feature 21	0	0	0	0	0	0	0	0	0	0	0	0
1	40Mi20	Feature 5	0	0	0	0	0	0	0	0	0	0	0	0
83	40Mi11	Feature 50	0	0	0	0	0	0	0	0	0	0	0	0
2	40Mi20	Feature 17	0	0	0	0	0	0	0	0	0	0	0	0
84	40Mi11	Feature 56	0	0	0	0	0	0	0	0	0	0	0	0
86	40Mi11	Feature 101	0	0	0	0	0	0	0	0	0	0	0	0
11	40Re108	Area 2	0	0	0	0	0	0	0	0	0	0	0	0
85	40Mi11	Feature 100	0	0	0	0	0	0	0	0	0	0	0	0
87	40Mi11	Feature 102	0	0	0	0	0	0	0	0	0	0	0	0
157	40Ha63	Area D, F. 69	0	0	0	0	0	0	0	0	0	0	0	0
137	40Mr23	Unit B, Level 4	32	0	5	0	0	0	4	0	0	0	2	0
14	40Mr23	Feature 597	2	0	0	0	0	0	0	1	0	0	0	0
164	40Pk3	F. 402	0	0	0	0	0	0	0	8	0	0	0	1
15	40Mr23	Feature 607	6	0	2	0	0	0	0	0	0	0	0	0
158	40Ha1	Woodland	0	0	0	0	0	0	0	0	0	0	0	0
133	40Mr23	Unit A, Level 3	134	3	23	0	0	0	0	28	5	5	1	0
162	40Ha10	Unit 64/65 Woodland	0	0	0	0	0	0	0	0	0	0	0	0
134	40Mr23	Unit A, Level 4	27	0	10	0	0	0	0	4	1	1	7	0
136	40Mr23	Unit B, Level 3	23	0	4	0	0	0	6	3	0	0	0	0
9	40Rh7	Mound E	0	0	0	0	0	0	0	0	0	0	0	0
138	40Mr23	Unit B, Level 5	24	0	3	0	0	0	2	2	0	0	0	0
37	40Mg31	Hamilton Component	0	0	0	0	0	0	0	0	0	0	0	0
4	40Rh6	Premound 1	0	0	3	0	0	0	0	2	1	1	0	0
161	40Ha10	Unit 62 Woodland	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
115	40Mr25	Rest of Site	30	3	10	0	0	0	0	25	1	195	100	0
132	40Mr23	Unit A, Level 2	129	6	27	0	0	0	2	15	2	4	2	0
8	40Rh7	Mound C	0	0	0	0	0	0	0	0	0	0	0	0
106	40Mr5	Feature 269	0	0	0	0	0	0	0	0	0	0	0	0
135	40Mr23	Unit B, Level 2	12	0	2	0	0	0	1	0	0	0	0	0
79	40Ha2	Mound	3	0	0	0	0	0	0	0	0	0	0	0
66	40Mr20	Feature 68	0	0	0	0	0	0	0	0	0	3	0	0
48	40Mr20	Feature 7	1	0	0	0	0	0	0	25	0	147	102	0
47	40Mr20	Feature 3	0	0	0	0	0	0	0	0	0	11	12	0
57	40Mr20	Feature 36	0	0	0	0	0	0	0	0	0	13	2	0
113	40MR20	House I Wall Trenches	0	0	0	0	0	0	0	1	0	17	3	0
58	40Mr20	Feature 39	0	0	0	0	0	0	0	7	0	0	0	0
61	40Mr20	Feature 47	0	0	0	0	0	0	0	0	0	1	1	0
36	40Mg31	Original Humus	0	0	0	0	0	0	0	0	0	0	0	0
41	40Mr20	Structure 8 (1975)	0	0	0	0	0	0	0	0	0	9	0	0
46	40Mr20	Structure 3 (1975)	2	1	0	0	0	0	0	15	0	25	15	0
53	40Mr20	Feature 23	1	0	0	0	0	0	0	0	0	7	5	0
39	40Mr20	Structure 1 (1967)	0	0	0	0	0	0	0	0	0	17	5	0
110	40MR20	Feature 23	0	0	0	0	0	0	0	0	0	9	5	0
5	40Rh6	Premound 3	0	0	0	0	0	0	0	78	3	1	0	0
40	40Mr20	Structure 7 (1975)	0	0	0	0	0	0	0	0	0	5	1	0
60	40Mr20	Feature 46	0	0	0	0	0	0	0	0	0	1	1	0

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
80	40Ha3	Mound	0	0	0	0	0	0	0	0	0	0	0	0
43	40Mr20	Structure 12 (1975)	0	0	0	0	0	0	0	0	0	0	1	0
67	40Mr20	Feature 69	0	0	0	0	0	0	0	0	0	3	2	0
7	40Rh6	Stage 2	0	0	0	0	0	0	0	4	0	0	0	0
112	40MR20	House I Floor	0	0	0	0	0	0	0	1	0	1	0	0
125	40Ld24	Premound Midden	1	0	0	0	0	0	0	3	0	11	8	0
51	40Mr20	Feature 19	0	0	0	0	0	0	0	0	0	2	1	0
65	40Mr20	Feature 67	0	0	0	0	0	0	0	0	0	0	0	0
49	40Mr20	Feature 12	0	0	0	0	0	0	0	0	0	0	4	0
104	40Mr5	Feature 194	0	0	0	0	0	0	0	0	0	0	0	0
91	40Mr5	Feature 18	0	0	0	0	0	0	0	0	0	0	0	0
126	40Ld24	Area B	0	0	0	0	0	0	0	5	0	11	7	0
13	40Re124	Post Mound	0	0	0	0	0	0	0	0	0	0	0	0
123	40Mr50	Structure #660	1	0	0	0	0	0	0	0	0	0	0	0
52	40Mr20	Feature 22	0	0	0	0	0	0	0	0	0	4	1	0
109	40MR20	Feature 22	0	0	0	0	0	0	0	0	0	4	1	0
6	40Rh6	Stage 1	0	0	0	0	0	0	0	2	0	0	0	0
56	40Mr20	Feature 33	0	0	0	0	0	0	0	0	0	1	0	0
64	40Mr20	Feature 66	0	0	0	0	0	0	0	0	0	0	0	0
22	40Re12	Mound Phase G-1	0	0	0	0	0	0	0	0	0	0	0	0
42	40Mr20	Structure 9 (1975)	0	0	0	0	0	0	0	2	0	0	0	0
101	40Mr5	Feature 149	0	0	0	0	0	0	0	0	0	0	0	0
124	40Ld24	Mound Fill	1	0	1	0	0	0	0	4	0	24	10	0

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
68	40Mr20	Feature 1	0	0	0	0	0	0	0	0	0	0	1	0
20	40Re12	Mound Phase E	0	0	0	0	0	0	0	0	0	0	0	0
128	40Ld24	Area D	0	0	0	0	0	0	0	0	0	4	2	0
24	40Re12	Mound Phase H	0	0	0	0	0	0	0	0	0	0	0	0
18	40Re12	Mound Phase C	0	0	0	0	0	0	0	0	0	0	0	0
45	40Mr20	Structure 11 (1975)	0	2	0	0	0	0	0	3	0	0	0	0
100	40Mr5	Feature 148	0	0	0	0	0	0	0	0	0	0	0	0
19	40Re12	Mound Phase D	0	1	0	0	0	0	0	0	0	1	0	0
50	40Mr20	Feature 13	0	0	0	0	0	0	0	0	0	0	1	0
120	40Mr32	Feature 1	0	0	0	0	0	0	0	0	0	0	0	0
23	40Re12	Mound Phase G	0	0	0	0	0	0	0	0	0	0	0	0
21	40Re12	Mound Phase F	0	0	0	0	0	0	0	1	0	1	0	0
62	40Mr20	Feature 57	0	0	0	0	0	0	0	0	0	0	0	0
63	40Mr20	Feature 64	0	2	0	0	0	0	0	6	0	0	0	0
55	40Mr20	Feature 32	0	0	0	0	0	0	0	1	0	0	0	0
122	40Ha210	Daub Layer	0	0	0	0	0	0	0	0	0	0	0	0
35	40Mg31	Village under Mound	0	0	0	0	0	0	0	0	0	0	0	0
127	40Ld24	Area C	0	0	0	0	0	0	0	1	0	1	0	0
59	40Mr20	Feature 43	0	0	0	0	0	0	0	0	0	0	0	0
12	40Re108	Area 3	0	0	1	0	0	0	0	0	0	0	0	0
17	40Re12	Mound Phase B	0	1	0	1	0	2	0	2	0	0	0	0
97	40Mr5	Feature 71	0	0	0	0	0	0	0	0	0	0	0	0
103	40Mr5	Feature 187	0	0	0	0	0	0	0	0	0	0	0	0
44	40Mr20	Structure 10 (1975)	0	0	0	0	0	0	0	0	0	0	0	0
105	40Mr5	Feature 234	0	0	0	0	0	0	0	0	0	0	0	0
107	40Mr7	Area A	2	0	1	1	0	0	0	14	0	0	1	3
102	40Mr5	Feature 175	1	0	0	0	0	0	0	0	0	0	0	0
90	40Mr5	Feature 6	0	0	0	0	0	0	0	0	0	0	0	0
121	40Mr32	Feature 2	0	0	0	0	0	0	0	0	0	0	0	0
116	40Mr26	Whole Site	0	0	0	0	0	0	0	0	0	1	0	1
93	40Mr5	Feature 27	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	SGTSS	SGTChS	SGTCrd	SGTPt	SGTSp	SGTPNp	SGTFI	QTP	QTSS	QTCrd	QTFI	QTChS
92	40Mr5	Feature 21	0	0	0	0	0	0	0	0	0	0	0	0
16	40Re12	Mound Phase A	0	0	0	0	0	0	0	0	0	0	0	0
108	40Mr7	Area B	1	0	0	0	0	0	0	14	0	3	3	0
98	40Mr5	Feature 104	0	0	0	0	0	0	0	0	0	0	0	0
25	40MR6	Structure 34	0	0	0	0	0	0	0	0	0	0	0	0
117	40Mr27	Feature 1	0	0	0	0	0	0	0	0	0	0	0	0
99	40Mr5	Feature 111	0	2	0	0	0	0	0	0	0	0	0	0
118	40Mr27	Feature 3	0	0	0	0	0	0	0	0	0	0	0	0
34	40Mg31	Mound Phase G	0	0	0	0	0	0	0	0	0	0	0	0
119	40Mr27	Feature 8 Pit B	0	0	0	0	0	0	0	0	0	0	0	0
163	40Ha10	Mississippian	0	0	0	0	0	0	0	0	0	0	0	0
89	40Mr5	Feature 5	0	0	0	0	0	0	0	0	0	0	0	0
38	40LD208	All	0	0	0	0	0	0	0	0	0	0	0	0
33	40Mg31	Mound Phase F	0	0	0	0	0	0	0	0	0	0	0	0
95	40Mr5	Feature 62	0	0	0	0	0	0	0	0	0	0	0	0
96	40Mr5	Feature 67	0	0	0	0	0	0	0	0	0	0	0	0
27	40Mg31	Mound Phase A	0	0	0	0	0	0	0	0	0	0	0	0
32	40Mg31	Mound Phase E-2	0	0	0	0	0	0	0	0	0	0	0	0
31	40Mg31	Mound Phase E-1	0	0	0	0	0	0	0	0	0	0	0	0
159	40Ha1	Mississippian	0	0	0	0	0	0	0	0	0	0	0	0
29	40Mg31	Mound Phase C	0	0	0	0	0	0	0	0	0	0	0	0
28	40Mg31	Mound Phase B	0	0	0	0	0	0	0	0	0	0	0	0
94	40Mr5	Feature 56	1	0	0	0	0	0	0	0	0	0	0	0
26	40MR6	Structure 61	0	0	0	0	0	0	0	0	0	0	0	0
30	40Mg31	Mound Phase D	0	0	0	0	0	0	0	0	0	0	0	0

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
154	40Mr40	Block B, Assemblage 8	0	0	Schroedl 1978
153	40Mr40	Block B, Assemblage 7	0	0	Schroedl 1978
142	40Mr40	Block A, Assemblage 3	7	0	Schroedl 1978
146	40Mr40	Block A, Assemblage 7	0	0	Schroedl 1978
71	40Mr41	Feature 97	0	0	Chapman 1979
143	40Mr40	Block A, Assemblage 4	1	0	Schroedl 1978
82	40Mi11	Feature 43	0	0	Faulkner and Graham 1965
75	40Mr41	Feature 189	0	0	Chapman 1979
141	40Mr40	Block A, Assemblage 2	57	0	Schroedl 1978
147	40Mr40	Block A, Assemblage 8	0	0	Schroedl 1978
145	40Mr40	Block A, Assemblage 6	0	0	Schroedl 1978
76	40Mr41	Feature 190	0	0	Chapman 1979
144	40Mr40	Block A, Assemblage 5	0	0	Schroedl 1978
140	40Mr40	Block A, Assemblage 1	79	0	Schroedl 1978
148	40Mr40	Block B, Assemblage 1	4	0	Schroedl 1978
78	40Lo45	Level 2	0	0	Salo 1969
81	40Mi11	Feature 42	0	0	Faulkner and Graham 1965
70	40Mr41	Feature 27	0	0	Chapman 1979
69	40Mr41	Feature 22	0	0	Chapman 1979
73	40Mr41	Feature 170	0	0	Chapman 1979
152	40Mr40	Block B, Assemblage 6	8	0	Schroedl 1978
114	40Mr25	Watts Bar Level	0	0	Salo 1969
111	40Mr20	Feature 25	0	0	Salo 1969
54	40Mr20	Feature 25	0	0	Schroedl et al. 1985
77	40Lo45	Level 1	0	0	Salo 1969
74	40Mr41	Feature 171	0	0	Chapman 1979
149	40Mr40	Block B, Assemblage 3	4	0	Schroedl 1978
131	40Mr21	Strat 3	0	0	Schroedl 1975
150	40Mr40	Block B, Assemblage 4	15	0	Schroedl 1978
151	40Mr40	Block B, Assemblage 5	19	0	Schroedl 1978
130	40Mr21	Strat 2	0	0	Schroedl 1975
72	40Mr41	Feature 130	0	0	Chapman 1979

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
160	40Ha10	Unit 10 Woodland	0	0	Lewis et al. 1995; This dissertation
156	40Ha63	Area C, T.P. 15	0	0	Graham 1964
129	40Mr21	Strat 1	0	0	Schroedl 1975
155	40Ha63	Area A	0	0	Graham 1964
10	40Re108	Area 1	0	0	Schroedl 1972
88	40Mi11	Total Units	0	0	Faulkner and Graham 1965
139	40Mr23	Unit B, Level 6	0	0	Chapman 1973
3	40Mi20	Feature 21	0	0	Faulkner and Graham 1966
1	40Mi20	Feature 5	0	0	Faulkner and Graham 1966
83	40Mi11	Feature 50	0	0	Faulkner and Graham 1965
2	40Mi20	Feature 17	0	0	Faulkner and Graham 1966
84	40Mi11	Feature 56	0	0	Faulkner and Graham 1965
86	40Mi11	Feature 101	0	0	Faulkner and Graham 1965
11	40Re108	Area 2	0	0	Schroedl 1972
85	40Mi11	Feature 100	0	0	Faulkner and Graham 1965
87	40Mi11	Feature 102	0	0	Faulkner and Graham 1965
157	40Ha63	Area D, F. 69	0	0	Graham 1964
137	40Mr23	Unit B, Level 4	0	0	Chapman 1973
14	40Mr23	Feature 597	0	0	Gleeson 1970
164	40Pk3	F. 402	0	0	Riggs et al. 1988
15	40Mr23	Feature 607	0	0	Gleeson 1970
158	40Ha1	Woodland	0	0	Lewis et al. 1995; This dissertation
133	40Mr23	Unit A, Level 3	0	0	Chapman 1973
162	40Ha10	Unit 64/65 Woodland	0	0	Lewis et al. 1995; This dissertation
134	40Mr23	Unit A, Level 4	0	0	Chapman 1973
136	40Mr23	Unit B, Level 3	0	0	Chapman 1973
9	40Rh7	Mound E	0	0	Schroedl 1978
138	40Mr23	Unit B, Level 5	0	0	Chapman 1973
37	40Mg31	Hamilton Component	0	0	Lewis and Kneberg 1946
4	40Rh6	Premound 1	0	0	Schroedl 1978
161	40Ha10	Unit 62 Woodland	0	0	Lewis et al. 1995; This dissertation

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
115	40Mr25	Rest of Site	0	0	Salo 1969
132	40Mr23	Unit A, Level 2	0	0	Chapman 1973
8	40Rh7	Mound C	0	0	Schroedl 1978
106	40Mr5	Feature 269	0	0	Salo 1969
135	40Mr23	Unit B, Level 2	0	0	Chapman 1973
79	40Ha2	Mound	0	0	Lewis et al. 1995; This dissertation
66	40Mr20	Feature 68	0	0	Schroedl et al. 1985
48	40Mr20	Feature 7	0	1	Schroedl et al. 1985
47	40Mr20	Feature 3	0	0	Schroedl et al. 1985
57	40Mr20	Feature 36	0	0	Schroedl et al. 1985
113	40MR20	House I Wall Trenches	0	0	Schroedl et al. 1985
58	40Mr20	Feature 39	0	0	Schroedl et al. 1985
61	40Mr20	Feature 47	0	0	Schroedl et al. 1985
36	40Mg31	Original Humus	0	0	Lewis and Kneberg 1946
41	40Mr20	Structure 8 (1975)	0	0	Schroedl et al. 1985
46	40Mr20	Structure 3 (1975)	0	0	Schroedl et al. 1985
53	40Mr20	Feature 23	0	0	Schroedl et al. 1985
39	40Mr20	Structure 1 (1967)	0	0	Schroedl et al. 1985
110	40MR20	Feature 23	0	0	Schroedl et al. 1985
5	40Rh6	Premound 3	0	0	Schroedl 1978
40	40Mr20	Structure 7 (1975)	0	0	Schroedl et al. 1985
60	40Mr20	Feature 46	0	0	Schroedl et al. 1985

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
80	40Ha3	Mound	0	0	Lewis et al. 1995; This dissertation
43	40Mr20	Structure 12 (1975)	0	0	Schroedl et al. 1985
67	40Mr20	Feature 69	0	0	Schroedl et al. 1985
7	40Rh6	Stage 2	0	0	Schroedl 1978
112	40MR20	House I Floor	0	0	Schroedl et al. 1985
125	40Ld24	Premound Midden	0	0	Schroedl 1975
51	40Mr20	Feature 19	0	0	Schroedl et al. 1985
65	40Mr20	Feature 67	0	0	Schroedl et al. 1985
49	40Mr20	Feature 12	0	0	Schroedl et al. 1985
104	40Mr5	Feature 194	0	0	Salo 1969
91	40Mr5	Feature 18	0	0	Salo 1969
126	40Ld24	Area B	0	0	Schroedl 1975
13	40Re124	Post Mound	0	0	Schroedl 1972
123	40Mr50	Structure #660	0	0	Polhemus 1977
52	40Mr20	Feature 22	0	0	Schroedl et al. 1985
109	40MR20	Feature 22	0	0	Schroedl et al. 1985
6	40Rh6	Stage 1	0	0	Schroedl 1978
56	40Mr20	Feature 33	0	0	Schroedl et al. 1985
64	40Mr20	Feature 66	0	0	Schroedl et al. 1985
22	40Re12	Mound Phase G-1	0	0	Koerner 2005
42	40Mr20	Structure 9 (1975)	0	0	Schroedl et al. 1985
101	40Mr5	Feature 149	0	0	Salo 1969
124	40Ld24	Mound Fill	0	0	Schroedl 1975

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
68	40Mr20	Feature 1	0	0	Schroedl et al. 1985
20	40Re12	Mound Phase E	0	0	Koerner 2005
128	40Ld24	Area D	0	0	Schroedl 1975
24	40Re12	Mound Phase H	0	0	Koerner 2005
18	40Re12	Mound Phase C	0	0	Koerner 2005
45	40Mr20	Structure 11 (1975)	0	0	Schroedl et al. 1985
100	40Mr5	Feature 148	0	0	Salo 1969
19	40Re12	Mound Phase D	0	0	Koerner 2005
50	40Mr20	Feature 13	0	0	Schroedl et al. 1985
120	40Mr32	Feature 1	0	0	Salo 1969
23	40Re12	Mound Phase G	0	0	Koerner 2005
21	40Re12	Mound Phase F	0	0	Koerner 2005
62	40Mr20	Feature 57	0	0	Schroedl et al. 1985
63	40Mr20	Feature 64	0	0	Schroedl et al. 1985
55	40Mr20	Feature 32	0	0	Schroedl et al. 1985
122	40Ha210	Daub Layer	0	0	Council and Honerkamp 1990
35	40Mg31	Village under Mound	0	0	Lewis and Kneberg 1946
127	40Ld24	Area C	0	0	Schroedl 1975
59	40Mr20	Feature 43	0	0	Schroedl et al. 1985
12	40Re108	Area 3	0	0	Schroedl 1972
17	40Re12	Mound Phase B	0	0	Koerner 2005
97	40Mr5	Feature 71	0	0	Salo 1969
103	40Mr5	Feature 187	0	0	Salo 1969
44	40Mr20	Structure 10 (1975)	0	0	Schroedl et al. 1985
105	40Mr5	Feature 234	0	0	Salo 1969
107	40Mr7	Area A	0	1	Salo 1969
102	40Mr5	Feature 175	0	0	Salo 1969
90	40Mr5	Feature 6	0	0	Salo 1969
121	40Mr32	Feature 2	0	0	Salo 1969
116	40Mr26	Whole Site	0	0	Salo 1969
93	40Mr5	Feature 27	0	0	Salo 1969

Table A.2. (Cont.)

ID	Site	Provenience	QTCS	QTIn	References
92	40Mr5	Feature 21	0	0	Salo 1969
16	40Re12	Mound Phase A	0	0	Koerner 2005
108	40Mr7	Area B	0	1	Salo 1969
98	40Mr5	Feature 104	0	0	Salo 1969
25	40MR6	Structure 34	0	0	Polhemus 1987; This dissertation
117	40Mr27	Feature 1	0	0	Salo 1969
99	40Mr5	Feature 111	0	0	Salo 1969
118	40Mr27	Feature 3	0	0	Salo 1969
34	40Mg31	Mound Phase G	0	0	Lewis and Kneberg 1946; This dissertation
119	40Mr27	Feature 8 Pit B	0	0	Salo 1969
163	40Ha10	Mississippian	0	0	Lewis et al. 1995; This dissertation
89	40Mr5	Feature 5	0	0	Salo 1969
38	40LD208	All	0	0	Chapman 1990
33	40Mg31	Mound Phase F	0	0	Lewis and Kneberg 1946; This dissertation
95	40Mr5	Feature 62	0	0	Salo 1969
96	40Mr5	Feature 67	0	0	Salo 1969
27	40Mg31	Mound Phase A	0	0	Lewis and Kneberg 1946; This dissertation
32	40Mg31	Mound Phase E-2	0	0	Lewis and Kneberg 1946; This dissertation
31	40Mg31	Mound Phase E-1	0	0	Lewis and Kneberg 1946; This dissertation
159	40Ha1	Mississippian	0	0	Lewis et al. 1995; This dissertation
29	40Mg31	Mound Phase C	0	0	Lewis and Kneberg 1946; This dissertation
28	40Mg31	Mound Phase B	0	0	Lewis and Kneberg 1946; This dissertation
94	40Mr5	Feature 56	0	0	Salo 1969
26	40MR6	Structure 61	0	0	Salo 1969
30	40Mg31	Mound Phase D	0	0	Lewis and Kneberg 1946; This dissertation

Table A.3. Eigenvector scores for northern Georgia correspondence analyses.

Axis	Eigenvalue	Percent Inertia
1	0.522288	30.28%
2	0.46461	26.94%
3	0.202787	11.76%
4	0.183527	10.64%
5	0.126182	7.32%
6	0.095467	5.53%
7	0.068073	3.95%
8	0.022223	1.29%
9	0.016264	0.94%
10	0.012748	0.74%
11	0.008755	0.51%
12	0.001977	0.11%

Table A.4. Eigenvector scores for northern Georgia complicated stamped ceramics.

Axis	Eigenvalue	Percent Inertia
1	0.965438	31.48%
2	0.908725	29.63%
3	0.719392	23.46%
4	0.400546	13.06%
5	0.072313	2.36%

Table A.5. Eigenvector scores for northern Georgia complicated stamped ceramics excluding the Napier stamped type.

Axis	Eigenvalue	Percent Inertia
1	0.965457	34.57%
2	0.908497	32.53%
3	0.72122	25.82%
4	0.197848	7.08%

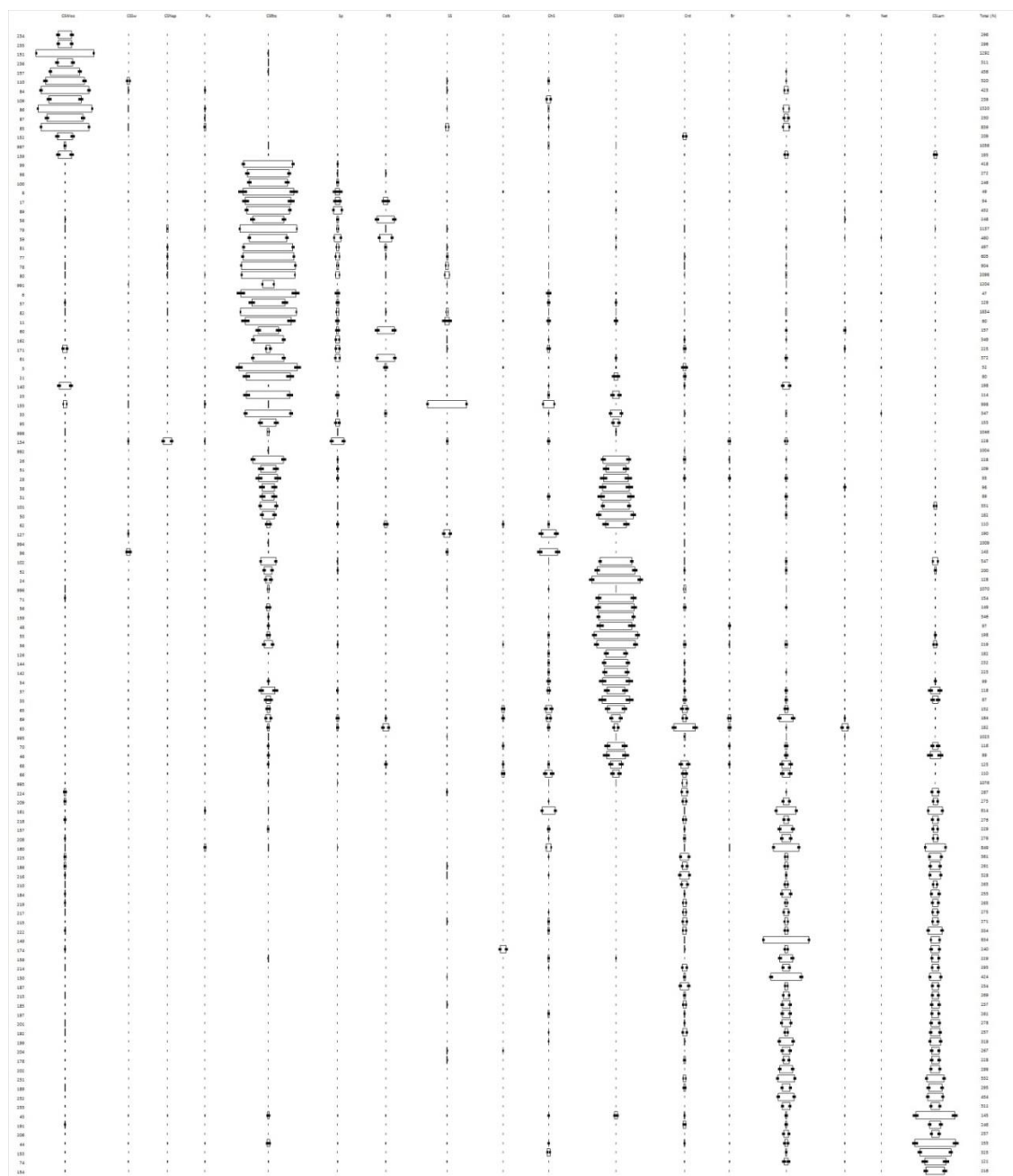


Figure A.1. Total seriation plot for northwestern Georgia.

Table A.6. Eigenvector scores for northern Georgia complicated stamped motifs excluding elongated-Us, figure-8s, and figure-9s.

Axis	Eigenvalue	Percent Inertia
1	0.791389	47.40%
2	0.502722	30.11%
3	0.147712	8.85%
4	0.106378	6.37%
5	0.077376	4.63%
6	0.043861	2.63%

Table A.7. Eigenvector scores for northern Georgia complicated stamped motifs including elongated-Us, figure-8s, and figure-9s.

Axis	Eigenvalue	Percent Inertia
1	0.792239	32.45%
2	0.549356	22.50%
3	0.49109	20.11%
4	0.225171	9.22%
5	0.144699	5.93%
6	0.09114	3.73%
7	0.076855	3.15%
8	0.042027	1.72%
9	0.029013	1.19%

Table A.8. Motif data and correspondence analysis results for Georgia motif seriation.

ID	Site	Provenience	Mass	ChiDist	Inertia	Dim. 1	Dim. 2	Line_Diamonds	Concentric_Diamonds
18	9CK105	Area A	0.003034	1.765814	0.009461	1.571406	0.81099	31	0
30	9CK7	Whole Site	0.004796	1.765814	0.014954	1.571406	0.81099	49	0
31	9CK85	Feature 12	0.011256	1.765814	0.035097	1.571406	0.81099	115	0
32	9CK85	Feature 2	0.002545	1.765814	0.007935	1.571406	0.81099	26	0
36	9CO1	Whole Site	0.005285	1.765814	0.01648	1.571406	0.81099	54	0
39	9FL193	Block B Feature 2	0.003426	1.700271	0.009903	1.550095	0.777733	34	0
42	9FU3	Whole Site	0.005383	1.642721	0.014527	1.530722	0.7475	52	0
38	9FL193	Block A Midden	0.003817	1.594859	0.009709	1.514031	0.721453	36	0
34	9CK9	Northern Locus	0.012626	1.530278	0.029567	1.490458	0.684666	115	0
35	9CK9	Whole Site	0.012626	1.530278	0.029567	1.490458	0.684666	115	0
41	9FU2	Whole Site	0.009102	1.640934	0.02451	1.466232	0.711248	88	4
17	9CK103	Whole Site	0.004502	1.447684	0.009436	1.457903	0.633862	39	0
51	9MU108	Whole Site	0.00323	1.39657	0.0063	1.435792	0.599357	27	0
10	9BR9	Late Component	0.0092	1.332673	0.01634	1.404774	0.550952	73	0
33	9CK9	Early Features	0.010375	1.388826	0.020011	1.394119	0.656534	87	0
50	9MU103	Whole Site	0.035823	1.222645	0.05355	1.328895	0.432537	247	0
43	9GO4	Whole Site	0.019086	1.220487	0.02843	1.326606	0.428965	131	0
22	9CK19	Late Component	0.002545	1.230844	0.003855	1.312403	0.464379	19	1
8	9BR140	Whole Site	0.001958	1.207289	0.002853	1.31035	0.403597	13	0
45	9GW70	Whole Site	0.10874	1.223962	0.162902	1.19679	0.22638	553	0
19	9CK12	Whole Site	0.005187	1.048495	0.005703	1.147613	0.262619	31	4
21	9CK17	Late Component	0.036018	1.022808	0.03768	1.116888	0.280679	233	44
20	9CK16	Late Component	0.010179	1.0076	0.010334	1.102585	0.266494	65	13
44	9GW495	Whole Site	0.009494	1.441809	0.019736	1.071593	0.031003	32	0
49	9LU7	Midden Zone	0.005677	0.964897	0.005285	1.000636	0.291366	37	10
23	9CK20	Whole Site	0.007439	0.708844	0.003738	0.770605	-0.025059	37	21
24	9CK26	Whole Site	0.002936	1.100154	0.003554	0.390554	0.172367	12	2
66	9WH5	Whole Site	0.023588	0.3147	0.002336	0.099966	-0.175863	67	115
52	9PS3	Late Component	0.019379	0.941616	0.017183	0.007188	-0.925133	30	90
28	9CK5	Mound, Under Stage 2	0.007928	0.899456	0.006414	-0.065859	-0.957094	0	42
12	9CK1	Area 2, Features	0.055789	0.807034	0.036336	-0.16213	-0.876225	1	333
14	9CK1	Feature 883	0.021141	0.742485	0.011655	-0.174856	-0.859017	4	125

Table A.8. (Cont.)

ID	Site	Provenience	Mass	ChiDist	Inertia	Dim. 1	Dim. 2	Line_Diamonds	Concentric_Diamonds
40	9FU1	Whole Site	0.011256	0.854094	0.008211	-0.181333	-0.968637	19	72
4	9BR1	Mound D, Feature 1	0.001175	1.662685	0.003247	-0.2172	-1.315064	0	5
37	9EB1	Whole Site	0.006166	0.858386	0.004543	-0.324922	-1.114739	0	43
13	9CK1	Feature 41	0.012724	0.85341	0.009267	-0.326747	-1.024749	0	79
15	9CK1	Structure 3	0.063815	1.158222	0.085607	-0.35335	-1.249044	6	395
11	9CK1	Area 1, Features	0.032103	0.838417	0.022567	-0.360013	-1.075531	0	232
16	9CK1	Structure 3 Pits	0.012332	0.945789	0.011032	-0.409047	-1.066773	0	102
27	9CK5	Mound, Under Stage 1	0.00323	1.117902	0.004036	-0.518127	-0.965806	0	19
26	9CK5	Mound, Stage 1 Summit	0.002153	2.94954	0.018733	-0.524364	-1.773749	0	9
1	9BR1	Mantle 3 to Mantle 4	0.004404	3.303625	0.04807	-0.52747	-1.283327	0	35
25	9CK5	Midden over Stage 2	0.002741	1.964227	0.010573	-0.559583	-0.814283	0	9
9	9BR27	Whole Site	0.004796	1.100696	0.00581	-0.611054	-1.087877	0	45
2	9BR1	Black Midden	0.026231	1.029335	0.027792	-0.613748	-1.171053	0	223
58	9WH19	Whole Site	0.00969	1.200531	0.013966	-0.641562	-1.190832	0	96
6	9BR1	Saucer 3	0.017716	1.174556	0.02444	-0.672793	-1.22763	0	172
7	9BR1	Saucer 4	0.005579	1.147477	0.007346	-0.686877	-1.201064	0	53
5	9BR1	Saucer 2	0.011745	1.261157	0.018681	-0.687409	-1.217014	0	120
3	9BR1	Lamar Bone Bed	0.001958	1.210348	0.002868	-0.712121	-1.024483	0	14
29	9CK5	Outer mound slope deposits	0.003524	1.457958	0.00749	-0.714286	-0.322319	0	14
59	9WH2	Late Component	0.187041	0.911079	0.155257	-0.944253	-0.004464	0	1296
63	9WH3	Whole Site	0.018596	1.396862	0.036286	-1.060275	0.859999	3	81
53	9ST6	Whole Site	0.00646	1.865374	0.022478	-1.246492	1.678448	0	14
54	9TW2	Whole Site	0.004307	2.92202	0.03677	-1.395516	2.156355	0	5
56	9WH16	Whole Site	0.008417	2.377379	0.047574	-1.404294	2.369726	0	3
65	9WH4	Whole Site	0.002251	2.057873	0.009533	-1.416233	2.229189	0	2
48	9HM3	Whole Site	0.006851	2.179891	0.032557	-1.42962	2.398368	0	2
57	9WH17	Whole Site	0.01566	2.470894	0.09561	-1.485241	2.538065	0	0
46	9HM2	Refuse Pit 1	0.013507	2.305966	0.071823	-1.485418	2.546523	0	0
64	9WH32	Whole Site	0.004698	2.272072	0.024253	-1.485511	2.551013	0	0
47	9HM2	Refuse Pit 2	0.005579	2.269644	0.028739	-1.48554	2.552392	0	0
55	9WH13	Whole Site	0.006851	2.321831	0.036935	-1.485696	2.559865	0	0
61	9WH26	Whole Site	0.002741	2.33786	0.014979	-1.485718	2.560922	0	0
62	9WH27	Whole Site	0.007536	2.391795	0.043114	-1.485778	2.563805	0	0

Table A.8. (Cont.)

ID	Site	Provenience	Mass	ChiDist	Inertia	Dim. 1	Dim. 2	Line_Diamonds	Concentric_Diamonds
60	9WH20	Whole Site	0.002055	2.601659	0.013912	-1.485938	2.571492	0	0

Table A.8. (Cont.)

ID	Site	Provenience	Line_Block	Filfot	Ovals_Circles	Squares_Rectangles	Scrolls
18	9CK105	Area A	0	0	0	0	0
30	9CK7	Whole Site	0	0	0	0	0
31	9CK85	Feature 12	0	0	0	0	0
32	9CK85	Feature 2	0	0	0	0	0
36	9CO1	Whole Site	0	0	0	0	0
39	9FL193	Block B Feature 2	1	0	0	0	0
42	9FU3	Whole Site	3	0	0	0	0
38	9FL193	Block A Midden	3	0	0	0	0
34	9CK9	Northern Locus	14	0	0	0	0
35	9CK9	Whole Site	14	0	0	0	0
41	9FU2	Whole Site	1	0	0	0	0
17	9CK103	Whole Site	7	0	0	0	0
51	9MU108	Whole Site	6	0	0	0	0
10	9BR9	Late Component	21	0	0	0	0
33	9CK9	Early Features	17	0	0	2	0
50	9MU103	Whole Site	119	0	0	0	0
43	9GO4	Whole Site	64	0	0	0	0
22	9CK19	Late Component	6	0	0	0	0
8	9BR140	Whole Site	7	0	0	0	0
45	9GW70	Whole Site	558	0	0	0	0
19	9CK12	Whole Site	18	0	0	0	0
21	9CK17	Late Component	91	0	0	0	0
20	9CK16	Late Component	26	0	0	0	0
44	9GW495	Whole Site	65	0	0	0	0
49	9LU7	Midden Zone	10	0	1	0	0
23	9CK20	Whole Site	18	0	0	0	0
24	9CK26	Whole Site	5	6	0	5	0
66	9WH5	Whole Site	37	0	12	10	0
52	9PS3	Late Component	39	39	0	0	0
28	9CK5	Mound, Under Stage 2	32	7	0	0	0
12	9CK1	Area 2, Features	198	26	11	1	0
14	9CK1	Feature 883	68	13	4	2	0

Table A.8. (Cont.)

ID	Site	Provenience	Line_Block	Filfot	Ovals_Circles	Squares_Rectangles	Scrolls
40	9FU1	Whole Site	7	17	0	0	0
4	9BR1	Mound D, Feature 1	3	4	0	0	0
37	9EB1	Whole Site	14	6	0	0	0
13	9CK1	Feature 41	30	17	2	2	0
15	9CK1	Structure 3	110	140	1	0	0
11	9CK1	Area 1, Features	68	25	0	3	0
16	9CK1	Structure 3 Pits	23	1	0	0	0
27	9CK5	Mound, Under Stage 1	4	7	3	0	0
26	9CK5	Mound, Stage 1 Summit	0	13	0	0	0
1	9BR1	Mantle 3 to Mantle 4	4	4	0	0	2
25	9CK5	Midden over Stage 2	3	11	5	0	0
9	9BR27	Whole Site	3	0	0	1	0
2	9BR1	Black Midden	12	26	4	3	0
58	9WH19	Whole Site	3	0	0	0	0
6	9BR1	Saucer 3	1	7	1	0	0
7	9BR1	Saucer 4	0	3	0	1	0
5	9BR1	Saucer 2	0	0	0	0	0
3	9BR1	Lamar Bone Bed	0	4	2	0	0
29	9CK5	Outer mound slope deposits	3	9	10	0	0
59	9WH2	Late Component	0	0	267	348	0
63	9WH3	Whole Site	3	0	16	87	0
53	9ST6	Whole Site	2	0	35	15	0
54	9TW2	Whole Site	0	0	37	2	0
56	9WH16	Whole Site	2	0	56	25	0
65	9WH4	Whole Site	0	0	11	10	0
48	9HM3	Whole Site	1	0	26	41	0
57	9WH17	Whole Site	0	0	42	118	0
46	9HM2	Refuse Pit 1	0	0	52	86	0
64	9WH32	Whole Site	0	0	21	27	0
47	9HM2	Refuse Pit 2	0	0	26	31	0
55	9WH13	Whole Site	0	0	39	31	0
61	9WH26	Whole Site	0	0	16	12	0
62	9WH27	Whole Site	0	0	47	30	0

Table A.8. (Cont.)

ID	Site	Provenience	Line_Block	Filfot	Ovals_Circles	Squares_Rectangles	Scrolls
60	9WH20	Whole Site	0	0	15	6	0

Table A.9. Eigenvector scores for eastern Tennessee correspondence analyses.

Axis	Eigenvalue	Percent Inertia
1	0.909378	25.51%
2	0.73869	20.72%
3	0.380165	10.66%
4	0.274461	7.70%
5	0.266485	7.48%
6	0.191916	5.38%
7	0.153077	4.29%
8	0.11489	3.22%
9	0.100163	2.81%
10	0.080547	2.26%
11	0.060714	1.70%
12	0.05227	1.47%
13	0.047177	1.32%
14	0.044426	1.25%
15	0.040531	1.14%
16	0.030903	0.87%
17	0.016283	0.46%
18	0.014358	0.40%
19	0.010221	0.29%
20	0.005474	0.15%
21	0.004978	0.14%
22	0.004069	0.11%
23	0.003766	0.11%
24	0.003434	0.10%
25	0.002854	0.08%
26	0.002411	0.07%
27	0.002083	0.06%
28	0.002014	0.06%
29	0.001891	0.05%
30	0.001236	0.03%
31	0.000937	0.03%
32	0.000803	0.02%
33	0.000726	0.02%
34	0.000476	0.01%
35	0.000268	0.01%
36	0.000198	0.01%
37	0.000191	0.01%
38	0.000112	0%
39	9.60E-05	0%
40	2.70E-05	0%

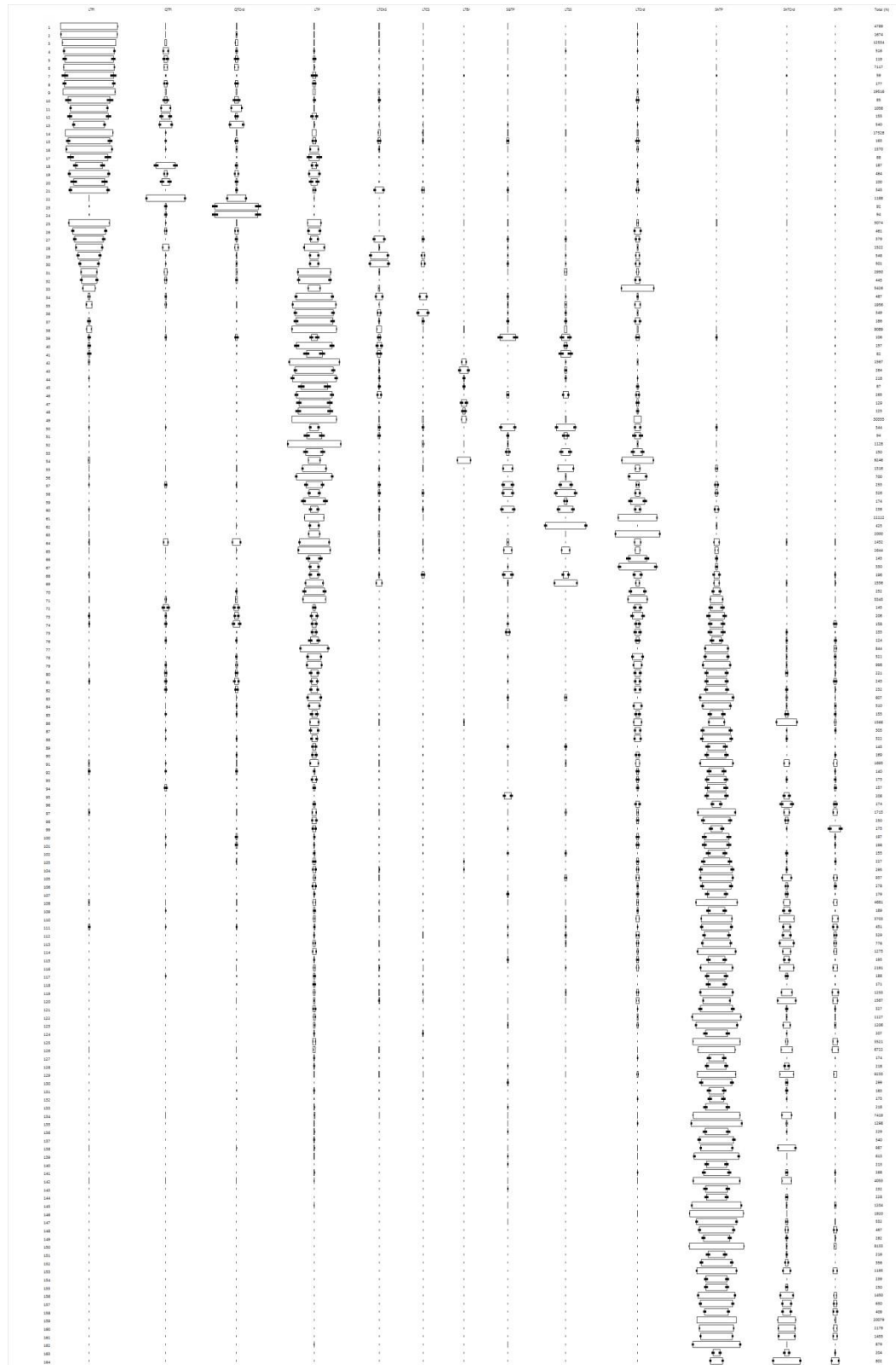


Figure A.2. Total seriation plot for eastern Tennessee.

APPENDIX B: RADIOCARBON DATA AND REGIONAL BAYESIAN MODELS

Table B.1. All radiocarbon data used in this study.

Phase	Lab ID	Site	Name	Provenience	Material
GA_1	Beta-190664	9Ck1182	Avery	F. 61	Charred maize?
GA_1	Beta-216324	9Ck1182	Avery	F. 117	Charred maize?
GA_1	Beta-228934	9FI164	Rush	Square 1	Maize
GA_1	Beta-52428	9FI193	Whitehead Farm I	Feature 2, Above Cobbles	UID Charcoal
GA_1	Beta-52429	9FI193	Whitehead Farm I	Feature 2, Below Cobbles	UID Charcoal
GA_1	Beta-53013	9FI193	Whitehead Farm I	Feature 2.03	UID Charcoal
GA_1	Beta-82594	9Fo16	Summerour	Structure on Mound Summit, Firepit A	UID Wood Charcoal
GA_1	Beta-94644	9Ck9	Hickory Log	Pit Feature 1031	-
GA_1	Beta-94647	9Ck9	Hickory Log	Pit Feature 1803	UID Charcoal
GA_1	Beta-94649	9Ck9	Hickory Log	Pit Feature 9645	-
GA_1	Beta-98605	9Ck9	Hickory Log	Pit Feature 7010	-
GA_1	Beta-98606	9Ck9	Hickory Log	Pit Feature 7902	-
GA_1	UGA-14545	9Ck9	Hickory Log	Pit Feature 9635	UID Charcoal
GA_1	UGA-14546	9Ck9	Hickory Log	Pit Feature 7902	UID Charcoal
GA_1	UGA-14547	9Ck9	Hickory Log	Pit Feature 7902	UID Charcoal
GA_1	UGA-14548	9Ck9	Hickory Log	Pit Feature 9645	UID Charcoal
GA_1	UGA-14549	9Mu103	Potts Tract	Pit Feature 122	UID Charcoal
GA_1	UGA-14550	9Mu103	Potts Tract	Pit Feature 83	Charred Walnut
GA_1	UGA-5375	9Ck131	Hobgood	Pit Feature 5	UID Charcoal
GA_1	UGA-55	9Mu103	Potts Tract	Pit Feature 133	UID Charcoal
GA_1	UGAMS-29864	9Gw70	Rivermoore	East House Trench, L.2	charcoal, pine
GA_1	UM-1675	9Lu7	Chestatee	Feature 14, Hearth Bed	UID Charcoal
GA_1	Beta-52427	9FI193	Whitehead Farm I	Feature 1	UID Charcoal
GA_1	GX-2825	9Do2	Annewakee Creek	Feature 7	UID Charcoal
GA_1	GX-2826	9Do2	Annewakee Creek	Feature 16, Hearth?	-
GA_2	Beta-144161	9Br1	Etowah	Saucer 1 Fill	Soot from Sherd
GA_2	Beta-144162	9Br1	Etowah	Saucer 2 Fill	Soot from Sherd
GA_2	Beta-144163	9Br1	Etowah	Saucer 4 Fill	Soot from Sherd
GA_2	Beta-144164	9Br1	Etowah	Saucer 3 Fill	Soot from Sherd
GA_2	Beta-144811	9Br1	Etowah	Black Midden Fill	Soot from Sherd
GA_2	Beta-145489	9Br1	Etowah	Saucer 1 Fill	Soot from Sherd
GA_2	Beta-145490	9Br1	Etowah	Saucer 4 Fill	Soot from Sherd

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
GA_2	Beta-145491	9Br1	Etowah	Saucer 3 Fill	Soot from Sherd
GA_2	Beta-257893	9Ck1	Long Swamp	Palisade, Feature 1365	UID Wood Charcoal
GA_2	Beta-257894	9Ck1	Long Swamp	Structure 3, Floor	Burned Cane Matting
GA_2	Beta-257895	9Ck1	Long Swamp	Structure 3, Interior Post	UID Wood Charcoal
GA_2	Beta-260068	9Ck1	Long Swamp	Pit Feature 39	Soot from Sherd
GA_2	Beta-260069	9Ck1	Long Swamp	Pit Feature 727	Soot from Sherd
GA_2	Beta-260070	9Ck1	Long Swamp	Pit Feature 760	Soot from Sherd
GA_2	Beta-41373	9Co45	Lake Acworth	Pit Feature 1	UID Wood
GA_2	Beta-41374	9Co46	Butler Creek	Pit Feature 4	UID Charcoal
GA_2	M-1061	9Br1	Etowah	Mound C, Burial 155	UID Charcoal
GA_2	M-1062	9Br1	Etowah	Mound C, Burial 164	UID Wood Charcoal
GA_2	M-1064	9Br1	Etowah	Mound C, Feature 19	UID Charcoal
GA_2	M-402	9Br1	Etowah	Mound C, Burial 38	UID Wood
GA_2	M-542	9Br1	Etowah	Mound C, Burial 57	UID Wood
GA_2	M-543	9Br1	Etowah	Mound C, Burial 57	UID Shell
GA_2	UGA-213	9Mu101	Bell Field	Structure 8B Midden	UID Charcoal
GA_2	UGA-215	9Mu101	Bell Field	Structure 8 Basin	UID Charcoal
GA_2	UGA-224	9Mu101	Bell Field	Structure 8B Midden	UID Charcoal
GA_2	UGA-509	9Mu101	Bell Field	Structure 12, Feature 115	UID Charcoal
GA_2	UGA-510	9Mu101	Bell Field	Structure 8C	UID Charcoal
GA_2	UGA-70	9Mu100	Sixtoe Field	Feature 18, Pit A	UID Charcoal
GA_2	UGAMS-25390	9Ck5	Wilbanks	Sub-Structure Floor	White-tailed Deer
GA_2	UGAMS-29083	9Ck85	Woodstock Fort	Feature 13, Pit D	White-tailed deer; metacarpal/-tarsal
GA_2	UGAMS-29084	9Ck85	Woodstock Fort	Feature 2 (Lot 4148)	White-tailed deer; calcaneous
GA_2	UGAMS-29085	9Ck85	Woodstock Fort	North of Palisade (Lot 4105)	Acorn
GA_2	UGAMS-29088	9Mu100	Sixtoe Field	Feature 64	Charred maize
GA_2	UGAMS-29090	9Mu100	Sixtoe Field	Feature 18	White-tailed deer; phalange
GA_2	UGAMS-29225	9Br1	Etowah	Mound C, Black humus sand	Charred acorns
GA_2	UGAMS-29226	9Br1	Etowah	Mound C, Clay core mound	White-tailed deer; phalange
GA_2	UGAMS-29227	9Br1	Etowah	Mound C, Floor of St. 3	White-tailed deer; astragalus
GA_2	UGAMS-29228	9Br1	Etowah	Mound C, Feature 6	Charred cane
GA_2	UGAMS-29229	9Br1	Etowah	Mound C, Core mound	Charred maize

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
GA_2	UGAMS-29230	9Br1	Etowah	Mound C, Zone D	White-tailed deer; astragalus
GA_2	UGAMS-29231	9Br1	Etowah	Mound C, Original occupation	White-tailed deer; calcaneus
GA_2	UGAMS-29232	9Br1	Etowah	Mound C, Feature 1	White-tailed deer; astragalus
GA_2	UGAMS-29234	9Br1	Etowah	Mound C, Mantle C and D	White-tailed deer; metatarsal
GA_2	UGAMS-29235	9Br1	Etowah	Mound C, Beneath core mound	Charred maize cobs
GA_2	UGAMS-29236	9Br1	Etowah	Mound C, Mantle A	UID large mammal
GA_2	UGAMS-29862	9Mu100	Sixtoe Field	XU-J, Feature 64	charred maize
GA_3	Beta-134792	9Br1	Etowah	Post from Palisade Trench	UID Wood
GA_3	Beta-134793	9Br1	Etowah	Post from Palisade Trench	UID Wood
GA_3	Beta-67942	9Br1	Etowah	Orange Layer, Feature 64A	Maize
GA_3	Beta-67943	9Br1	Etowah	Orange Layer, Feature 64A	UID Wood
GA_3	UGA-142	9F13	Plant Hammond	Provenience 1, Structure 1	UID Charcoal
GA_3	UGA-143	9F13	Plant Hammond	Structure3 (2?), Below Structure 1	UID Charcoal
GA_3	UGA-328	9F13	Plant Hammond	Feature 20	UID Charcoal
GA_3	UGAMS-25389	9F13	Plant Hammond	Fill over St. #1	White-tailed Deer
GA_3	UGAMS-25391	9Mu101	Bell Field	St. #5	Monocot stem; cf. arundinaria
GA_3	UGAMS-25392	9Mu101	Bell Field	St. #17, F. 135	Charred Maize Cob
GA_3	UGAMS-29091	9Mu101	Bell Field	Structure #19	Charred maize
GA_3	UGAMS-29092	9Mu101	Bell Field	Structure #2	Charred maize
GA_3	UGAMS-29094	9Br1	Etowah	Lamar Bone Bed, Level 2 (Lot 5573)	White-tailed deer; phalange
GA_3	UGAMS-29233	9Br1	Etowah	Mound C, Zone F	White-tailed deer; distal tibia
GA_4	UGA-205	9Mu102	Little Egypt	Structure 1	UID Charcoal
GA_4	UGA-208	9Mu102	Little Egypt	Structure 1	UID Charcoal
GA_4	UGA-210	9Mu102	Little Egypt	-	UID Charcoal
GA_4	UGA-307	9F15	King	Structure 2	UID Wood Charcoal
GA_4	UGA-403	9Mu102	Little Egypt	-	UID Charcoal
GA_4	UGA-56	9Mu103	Potts Tract	-	UID Charcoal
GA_4	UGA-589	9F15	King	Structure 8	UID Wood Charcoal
GA_4	UGA-591	9F15	King	Structure 4	UID Wood Charcoal
GA_4	UGAMS-29095	9Mu103	Potts Tract	Structure #1 Floor	Charred maize
GA_4	UGAMS-29097	9Mu102	Little Egypt	Feature 28	Hickory nut
GA_4	UGAMS-29098	9Mu102	Little Egypt	Feature 18	White-tailed deer; metacarpal/-tarsal

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
TN_1	CWRU-26	40Ld45	Higgs	Posthole 9	Wood Charcoal
TN_1	GX-10245	40Jn89	-	Feature 2	Wood Charcoal
TN_1	GX-10246	40Jn90	-	Feature 1	Wood Charcoal
TN_1	GX-11436	40Ld183	Kittrell Mound	Mound Fill	Wood Charcoal
TN_1	GX-2154	40Mr23	Icehouse Bottom	Feature 35	-
TN_1	GX-2487	40Mr23	Icehouse Bottom	Feature 87	-
TN_1	GX-5045	40Mr23	Icehouse Bottom	Feature 595	-
TN_1	GX-5243	40Mr40	Patrick Site	Feature 86	UID Charcoal
TN_1	GX-5246	40Mr40	Patrick Site	Feature 103	UID Charcoal
TN_1	UGAMS-28824	40Mr23	Icehouse Bottom	Feature 597, Strat II, L. 6	Carya spp.
TN_2	Beta-127866	40Ha2	Davis	Above Md. L. 1	Wood Charcoal
TN_2	GX-4208	40Mr20	Martin Farm	Structure 3	UID Charcoal
TN_2	GX-4213	40Mr20	Martin Farm	Feature 7	UID Charcoal
TN_2	GX-573	40Mi11	Westmoreland-Barber	Feature 50	Wood Charcoal
TN_2	GX-575	40Mi20	Lay	Early Mound Burial	Burnt Log
TN_2	UGAMS-28816	40Mr20	Martin Farm	Feature 7, Level 5	Carya spp.
TN_2	UGAMS-28817	40Mr20	Martin Farm	Feature 7, Level 8	Monocot stem; cf. arundinaria
TN_2	UGAMS-28818	40Pk3	Hiwassee Old Town	Feature 402, Level 2	White-tailed Deer; rib
TN_2	UGAMS-28819	40Pk3	Hiwassee Old Town	Feature 402, Level 7	White-tailed Deer; humerus
TN_2	UGAMS-28821	40Mi11	Westmoreland-Barber	Feature 56	White-tailed Deer; radius; worked
TN_3	AA80208	40Re12	DeArmond	Feature 103	Bone artifact
TN_3	AA86381	40Mr6	Toqua	Mound A. St. 14	<i>Iva annua</i> ; sumpweed
TN_3	Beta-128375	40Ha3	Hixon	Burial, Floor O, Md. L. B1	UID Wood
TN_3	Beta-128377	40Re12	DeArmond	Feature 16	<i>Meleagris gallopavo</i> ; wild turkey
TN_3	Beta-181800	40Mg31	Hiwassee Island	Md. L. E-1, F. 42	Bone awl
TN_3	GX-14934	40Ld208	Kimberly-Clark	Structure 1	Wood Charcoal
TN_3	GX-1572	40Mr27	Mayfield II	Level 1	Wood Charcoal
TN_3	GX-2594	40Rh6	Leauty Mound	Structure 4	Wood Charcoal
TN_3	GX-4209	40Mr20	Martin Farm	Feature 57	UID Charcoal
TN_3	GX-4210	40Mr20	Martin Farm	Feature 64	UID Charcoal
TN_3	GX-4211	40Mr20	Martin Farm	Feature 66	UID Charcoal

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
TN_3	GX-4212	40Mr20	Martin Farm	Feature 69	UID Charcoal
TN_3	GX-6075	40Mr6	Toqua	Mound A, St. 14	Wood Charcoal
TN_3	GX-6077	40Mr6	Toqua	Mound A, St. 62	Wood Charcoal
TN_3	GX-7732	40Mr5	Tomotley	Feature 325	Wood Charcoal
TN_3	M-730	40Re4	Alford	Mound 4 Burial	Wood Charcoal
TN_3	M-731	40Re12	DeArmond	Structure 35; Below Mound	Wood Charcoal
TN_3	TX-5903	40Ha102	Fishing Center	Burial 5	UID Charcoal
TN_3	UGA-1245	40Mr50	Tellico Blockhouse	Structure A	Wood Charcoal
TN_3	UGAMS-28802	40Mg31	Hiwassee Island	Mound Phase G, Under F. 58	UID Large Mammal; worked
TN_3	UGAMS-28803	40Mg31	Hiwassee Island	Mound Phase G, F. 58 Floor	White-tailed Deer; metapodial; worked
TN_3	UGAMS-28805	40Ha3	Hixon	Level 2	White-tailed Deer; ulna; worked
TN_3	UGAMS-28806	40Ha3	Hixon	Premound Level 1	White-tailed Deer; metatarsal; worked
TN_3	UGAMS-28807	40Ha3	Hixon	Mound Floor G, F. 42	White-tailed Deer; ulna; worked
TN_3	UGAMS-28808	40Ha3	Hixon	Mound Level 1	White-tailed Deer; ulna; worked
TN_3	UGAMS-28811	40Re12	DeArmond	Mound Phase D	White-tailed Deer; ulna; worked
TN_3	UGAMS-28814	40Re12	DeArmond	Mound Phase G-1	White-tailed Deer; metatarsal; worked
TN_3	UGAMS-28815	40Mr20	Martin Farm	Feature 13	Carya spp.
TN_3	UGAMS-28822	40Mr6	Toqua	Mound A, Phase IX-X, St. 61	Monocot fragments
TN_3	UGAMS-28823	40Rh6	Leuty	H-3 Floor	Wood carya spp.
TN_3	UGAMS-28825	40Ld24	Bat Creek	Area C, Feature 37	Carya spp.
TN_3	UGAMS-28827	40Mr50	Tellico Blockhouse	Structure 660A; roof fall	Wood carya spp.
TN_3	UGAMS-29866	40Re12	DeArmond	Pre-Mound Habitation	White-tailed deer
TN_4	-	40Mg31	Hiwassee Island	Md. L. D, F. 27	-
TN_4	-	40Mg31	Hiwassee Island	Under Md., F. 69	-
TN_4	A-3342	40By13	Ledford Island	Feature 38	UID Charcoal
TN_4	AA80150	40An19	Cox	Mound St. 3	-

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
TN_4	AA80151	40An19	Cox	Village	-
TN_4	AA80152	40An19	Cox	Village	-
TN_4	Beta-127867	40Ha1	Dallas	F. 4, St. 7	Wood Charcoal
TN_4	Beta-128660	40Ha1	Dallas	Grave Cover, Strat II	UID Wood
TN_4	Beta-179901	40Je1	Fains Island	Mound	Bone awl
TN_4	GX-4135	40Re124	CRBRP	Post-Mound	Wood Charcoal
TN_4	GX-4136	40Re124	CRBRP	Post-Mound	Wood Charcoal
TN_4	GX-4137	40Re124	CRBRP	Post-Mound	Wood Charcoal
TN_4	GX-4138	40Re124	CRBRP	Post-Mound	Wood Charcoal
TN_4	GX-4205	40Mr6	Toqua	Structure 2, F. 43	Wood Charcoal
TN_4	GX-4206	40Mr6	Toqua	Mound A. St. 11	Wood Charcoal
TN_4	GX-4207	40Mr6	Toqua	Structure 3	Cane Charcoal
TN_4	GX-6074	40Mr6	Toqua	Mound A, St. 11	Wood Charcoal
TN_4	GX-6076	40Mr6	Toqua	Structure 29, East Village Midden	Wood Charcoal
TN_4	M-582	40Ha60	Williams Island	Mississippian bowl	<i>Phaseolas vulgaris</i>
TN_4	RH41-DS-161718	40Rh141	Upper Hampton	-	Wood, Pine
TN_4	RH41-S12-abcde	40Rh141	Upper Hampton	Structure 12	Wood, Pine
TN_4	UGA-4804	40Ha146	Hampton Place	Structure 1, Wall Post	UID Wood
TN_4	UGA-4805	40Ha146	Hampton Place	Structure 1, Roof Timber	UID Wood
TN_4	UGA-5391	40Ha210	Heritage Place	F. 8, Post	Wood Charcoal
TN_4	UGA-5392	40Ha210	Heritage Place	F. 5, Post	Wood Charcoal
TN_4	UGA-5394	40Ha210	Heritage Place	F. 6, Post	Wood Charcoal
TN_4	UGAMS-28804	40Mg31	Hiwassee Island	Mound Phase C	White-tailed Deer; metapodial; worked
TN_4	UGAMS-28809	40Re12	DeArmond	Mound Phase B Summit	UID Large Mammal; worked
TN_4	UGAMS-28810	40Re12	DeArmond	Mound Phase B	White-tailed Deer; metatarsal; worked
TN_4	UGAMS-29867	40Ha1	Dallas	Feature 14, Pre-Mound	White-tailed deer
TN_4	UGAMS-29868	40Ha1	Dallas	Feature 36, Strat II	White-tailed deer
Hamilton	GX-2596	40Rh7	McDonald	Mound A, Stage 1	Wood Charcoal
Hamilton	GX-2597	40Rh7	McDonald	Mound A, Stage 1	Wood Charcoal
Hamilton	GX-2598	40Rh7	McDonald	Mound A, Stage 3	Wood Charcoal
Hamilton	GX-2599	40Rh7	McDonald	Mound A, Stage 3	Wood Charcoal

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
Hamilton	GX-2600	40Rh7	McDonald	Mound A, Stage 5	Wood Charcoal
Hamilton	GX-2601	40Rh7	McDonald	Mound A, Stage 5	Wood Charcoal
Hamilton	GX-2602	40Rh7	McDonald	Mound B, Base	Wood Charcoal
Hamilton	GX-2603	40Rh7	McDonald	Mound D, Stage 1	Wood Charcoal
Hamilton	GX-2604	40Rh7	McDonald	Mound D, Stage 1	Wood Charcoal
Hamilton	GX-2605	40Rh7	McDonald	Mound D, Stage 2	Wood Charcoal
Hamilton	GX-2606	40Rh7	McDonald	Mound D, Stage 2	Wood Charcoal
Hamilton	GX-3459	40Re124	CRBRP	Mound, F. 4	Wood Charcoal
Hamilton	GX-3460	40Re124	CRBRP	Mound, F. 5	Wood Charcoal
Hamilton	GX-3461	40Re124	CRBRP	Mound, F. 11	Wood Charcoal
Hamilton	GX-3462	40Re124	CRBRP	Mound, F. 14	Wood Charcoal
Hamilton	GX-3463	40Re124	CRBRP	Mound, Stage 1	Wood Charcoal
Hamilton	UGA-738	40Re124	CRBRP	Mound F. 14	Wood Charcoal
Hamilton	UGAMS-29860	40Rh7	McDonald	Mound D, R.R. 4.19'	charcoal, pine
Hamilton	UGAMS-29861	40Rh7	McDonald	Mound A, R.R. 9.10'	charcoal, pine
N/A	-	40Pk3	Hiwassee Old Town	-	-
N/A	-	40Pk3	Hiwassee Old Town	-	-
N/A	Beta-67944	9Br1	Etowah	Orange Layer, Feature 64B	Maize
N/A	DIC-982	40Hw30	-	Feature 8	Wood Charcoal
N/A	GX-7729	40Mr76	Jones Ferry	-	-
N/A	GX-7730	40Mr76	Jones Ferry	F. 80	-
N/A	GX-7733	40Mr5	Tomotley	Burial 97	Wood Charcoal
N/A	GX-8609	40Mr16	Pate Mound	-	-
N/A	M-1060	9Br1	Etowah	Mound C, Mantle no. 2 Surface	UID Burnt Vegetable Material
N/A	M-729	40Cp2	Bowman Farm	Structure under Mound 2	Cane Charcoal
N/A	SI-5098A	40Mr387	Mud Glyph Cave	Basin Hearth, 86m	Cane Charcoal
N/A	SI-5098B	40Mr387	Mud Glyph Cave	Basin Hearth, 86m	Wood Charcoal
N/A	SI-5469	40Mr387	Mud Glyph Cave	Near Mask and Turtle Glyphs, 56m	Cane Charcoal
N/A	SI-5470	40Mr387	Mud Glyph Cave	Fireplace Rm, 70m	Wood, Pine
N/A	SI-5471	40Mr387	Mud Glyph Cave	Under High Ledge, 78m	Cane Charcoal
N/A	SI-5472	40Mr387	Mud Glyph Cave	Under High Ledge, 79m	Cane Charcoal
N/A	UGA-2097	40Hw44	-	Feature 1	Wood Charcoal

Table B.1. (Cont.)

Phase	Lab ID	Site	Name	Provenience	Material
N/A	UGA-2393	9Ck130	-	Pit Feature 53	UID Wood Charcoal and Nut Fragments
N/A	UGA-504	9Mu101	Bell Field	Structure 14	UID Charcoal
N/A	UGA-525	9Br99	-	-	-
N/A	UGA-526	9Br99	-	-	-
N/A	UGAMS-28812	40Re12	DeArmond	Mound Phase E	White-tailed Deer; metatarsal; worked
N/A	UGAMS-28813	40Re12	DeArmond	Mound Phase F	White-tailed Deer; ulna; worked
N/A	UGAMS-28820	40Mi11	Westmoreland-Barber	Feature 50	White-tailed Deer; metacarpal
N/A	UGAMS-28826	40Ha2	Davis	Premound, Feature 9	Wild Turkey; tarsometatarsus; worked
N/A	UGAMS-29082	9Br139	-	Palisade (Lot 4169)	Cane
N/A	UGAMS-29086	9FI3	Plant Hammond	Structure #3, Level 2 (Lot 36358)	UID wood bark
N/A	UGAMS-29087	9Gw70	Rivermoore	Structure #1, North Trench	UID wood bark
N/A	UGAMS-29089	9Mu100	Sixtoe Field	Casa Colorada	UID wood twig
N/A	UGAMS-29093	9Mu101	Bell Field	Feature 90	White-tailed deer; astragalus
N/A	UGAMS-29096	9Mu103	Potts Tract	Feature 133	Charred maize
N/A	UGAMS-29863	9Mu103	Potts Tract	Feature 133	hickory nut
N/A	UGAMS-29865	9Mu100	Sixtoe Field	Casa Colorada	charcoal, bark

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
GA_1	Beta-190664	9Ck1182	800	70	-	-9.1	-	-	-	-	-	-
GA_1	Beta-216324	9Ck1182	930	40	-	-9.2	-	-	-	-	-	-
GA_1	Beta-228934	9Fl164	1290	100	-	-	-	-	-	-	-	-
GA_1	Beta-52428	9Fl193	980	90	-	-	-	-	-	-	-	-
GA_1	Beta-52429	9Fl193	1220	90	-	-	-	-	-	-	-	-
GA_1	Beta-53013	9Fl193	1080	70	-	-	-	-	-	-	-	-
GA_1	Beta-82594	9Fo16	1150	70	-	-	-	-	-	-	-	-
GA_1	Beta-94644	9Ck9	1230	50	-	-	-	-	-	-	-	-
GA_1	Beta-94647	9Ck9	1150	70	-	-	-	-	-	-	-	-
GA_1	Beta-94649	9Ck9	980	60	-	-	-	-	-	-	-	-
GA_1	Beta-98605	9Ck9	1110	60	-	-	-	-	-	-	-	-
GA_1	Beta-98606	9Ck9	960	60	-	-	-	-	-	-	-	-
GA_1	UGA-14545	9Ck9	1040	60	-	-	-	-	-	-	-	-
GA_1	UGA-14546	9Ck9	1060	60	-	-	-	-	-	-	-	-
GA_1	UGA-14547	9Ck9	860	40	-	-	-	-	-	-	-	-
GA_1	UGA-14548	9Ck9	790	40	-	-	-	-	-	-	-	-
GA_1	UGA-14549	9Mu103	980	50	-	-	-	-	-	-	-	-
GA_1	UGA-14550	9Mu103	790	180	-	-	-	-	-	-	-	-
GA_1	UGA-5375	9Ck131	1160	60	-	-	-	-	-	-	-	-
GA_1	UGA-55	9Mu103	1022	40	-	-	-	-	-	-	-	-
GA_1	UGAMS-29864	9Gw70	1160	23	-	-26.53	-	-	-	-	86.56	0.25
GA_1	UM-1675	9Lu7	970	105	-	-	-	-	-	-	-	-
GA_1	Beta-52427	9Fl193	1250	100	-	-	-	-	-	-	-	-
GA_1	GX-2825	9Do2	1345	85	-	-	-	-	-	-	-	-
GA_1	GX-2826	9Do2	1195	100	-	-	-	-	-	-	-	-
GA_2	Beta-144161	9Br1	990	40	-24.3	-	-	-	-	-	-	-
GA_2	Beta-144162	9Br1	830	40	-25	-	-	-	-	-	-	-
GA_2	Beta-144163	9Br1	850	40	-24.1	-	-	-	-	-	-	-
GA_2	Beta-144164	9Br1	810	40	-25.6	-	-	-	-	-	-	-
GA_2	Beta-144811	9Br1	820	40	-25	-	-	-	-	-	-	-
GA_2	Beta-145489	9Br1	1000	40	-23.7	-	-	-	-	-	-	-
GA_2	Beta-145490	9Br1	1080	40	-23.2	-	-	-	-	-	-	-

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
GA_2	Beta-145491	9Br1	900	40	-22.8	-	-	-	-	-	-	-
GA_2	Beta-257893	9Ck1	840	40	-	-	-	-	-	-	-	-
GA_2	Beta-257894	9Ck1	710	40	-	-	-	-	-	-	-	-
GA_2	Beta-257895	9Ck1	640	40	-	-	-	-	-	-	-	-
GA_2	Beta-260068	9Ck1	770	40	-	-	-	-	-	-	-	-
GA_2	Beta-260069	9Ck1	790	40	-	-	-	-	-	-	-	-
GA_2	Beta-260070	9Ck1	710	40	-	-	-	-	-	-	-	-
GA_2	Beta-41373	9Co45	930	90	-	-	-	-	-	-	-	-
GA_2	Beta-41374	9Co46	970	90	-27.2	-	-	-	-	-	-	-
GA_2	M-1061	9Br1	670	200	-	-	-	-	-	-	-	-
GA_2	M-1062	9Br1	450	200	-	-	-	-	-	-	-	-
GA_2	M-1064	9Br1	850	150	-	-	-	-	-	-	-	-
GA_2	M-402	9Br1	725	200	-	-	-	-	-	-	-	-
GA_2	M-542	9Br1	910	200	-	-	-	-	-	-	-	-
GA_2	M-543	9Br1	500	250	-	-	-	-	-	-	-	-
GA_2	UGA-213	9Mu101	670	60	-	-	-	-	-	-	-	-
GA_2	UGA-215	9Mu101	785	55	-	-	-	-	-	-	-	-
GA_2	UGA-224	9Mu101	670	70	-	-	-	-	-	-	-	-
GA_2	UGA-509	9Mu101	890	50	-	-	-	-	-	-	-	-
GA_2	UGA-510	9Mu101	730	60	-	-	-	-	-	-	-	-
GA_2	UGA-70	9Mu100	905	50	-	-	-	-	-	-	-	-
GA_2	UGAMS-25390	9Ck5	800	20	-	-21.6	-	-	-	-	90.52	0.26
GA_2	UGAMS-29083	9Ck85	620	20	5.9	-22.392	6.071	35.96	12.28	3.41	92.58	0.25
GA_2	UGAMS-29084	9Ck85	860	20	6.8	-22.184	7.076	23.08	7.828	3.44	89.85	0.25
GA_2	UGAMS-29085	9Ck85	640	20	-	-27.307	-	-	-	-	92.32	0.25
GA_2	UGAMS-29088	9Mu100	680	20	-	-8.966	-	-	-	-	91.83	0.25
GA_2	UGAMS-29090	9Mu100	850	20	13.9	-22.77	4.71	41.66	15.101	3.22	89.94	0.24
GA_2	UGAMS-29225	9Br1	900	22	-	-23.82	-	-	-	-	89.40	0.25
GA_2	UGAMS-29226	9Br1	830	22	18.51	-22.80	4.28	43.06	15.64	3.21	90.13	0.25
GA_2	UGAMS-29227	9Br1	860	21	18.42	-22.43	4.80	38.03	13.83	3.21	89.81	0.25
GA_2	UGAMS-29228	9Br1	860	22	-	-27.20	-	-	-	-	89.90	0.25
GA_2	UGAMS-29229	9Br1	850	22	-	-10.88	-	-	-	-	89.91	0.25

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
GA_2	UGAMS-29230	9Br1	860	21	5.39	-22.30	6.16	28.92	10.54	3.20	89.82	0.24
GA_2	UGAMS-29231	9Br1	850	21	21.86	-22.01	5.99	40.38	14.80	3.18	89.99	0.25
GA_2	UGAMS-29232	9Br1	680	21	8.11	-22.67	5.94	32.88	11.87	3.23	91.93	2.50
GA_2	UGAMS-29234	9Br1	830	21	17.62	-22.45	4.80	40.82	14.71	3.24	90.16	0.25
GA_2	UGAMS-29235	9Br1	810	22	-	-10.72	-	-	-	-	90.42	0.26
GA_2	UGAMS-29236	9Br1	840	22	19.1	-21.73	3.96	42.45	15.49	3.20	90.02	0.25
GA_2	UGAMS-29862	9Mu100	770	23	-	-8.59	-	-	-	-	90.85	0.27
GA_3	Beta-134792	9Br1	760	60	-	-	-	-	-	-	-	-
GA_3	Beta-134793	9Br1	920	70	-	-	-	-	-	-	-	-
GA_3	Beta-67942	9Br1	740	70	-9.3	-	-	-	-	-	-	-
GA_3	Beta-67943	9Br1	680	70	-25±2.5	-	-	-	-	-	-	-
GA_3	UGA-142	9FI3	830	70	-	-	-	-	-	-	-	-
GA_3	UGA-143	9FI3	660	70	-	-	-	-	-	-	-	-
GA_3	UGA-328	9FI3	945	140	-	-	-	-	-	-	-	-
GA_3	UGAMS-25389	9FI3	620	20	-	-22	-	-	-	-	92.56	0.26
GA_3	UGAMS-25391	9Mu101	570	25	-	-26.4	-	-	-	-	93.16	0.27
GA_3	UGAMS-25392	9Mu101	560	20	-	-8.7	-	-	-	-	93.23	0.27
GA_3	UGAMS-29091	9Mu101	580	20	-	-8.496	-	-	-	-	93.06	0.26
GA_3	UGAMS-29092	9Mu101	550	20	-	-8.511	-	-	-	-	93.37	0.26
GA_3	UGAMS-29094	9Br1	710	20	9.8	-22.521	4.563	42.1	15.156	3.24	91.59	0.25
GA_3	UGAMS-29233	9Br1	600	21	17.14	-22.54	4.37	38.69	14.06	3.21	92.77	0.25
GA_4	UGA-205	9Mu102	500	55	-	-	-	-	-	-	-	-
GA_4	UGA-208	9Mu102	425	55	-	-	-	-	-	-	-	-
GA_4	UGA-210	9Mu102	395	65	-	-	-	-	-	-	-	-
GA_4	UGA-307	9FI5	540	55	-	-	-	-	-	-	-	-
GA_4	UGA-403	9Mu102	535	65	-	-	-	-	-	-	-	-
GA_4	UGA-56	9Mu103	286	45	-	-	-	-	-	-	-	-
GA_4	UGA-589	9FI5	280	70	-	-	-	-	-	-	-	-
GA_4	UGA-591	9FI5	120	65	-	-	-	-	-	-	-	-
GA_4	UGAMS-29095	9Mu103	300	20	-	-10.111	-	-	-	-	96.38	0.26
GA_4	UGAMS-29097	9Mu102	340	20	-	-23.972	-	-	-	-	95.8	0.26
GA_4	UGAMS-29098	9Mu102	610	20	13.6	-23.319	5.515	42.91	15.325	3.27	92.68	0.25

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
TN_1	CWRU-26	40Ld45	1310	110	-	-	-	-	-	-	-	-
TN_1	GX-10245	40Jn89	1290	155	-	-	-	-	-	-	-	-
TN_1	GX-10246	40Jn90	1320	150	-	-	-	-	-	-	-	-
TN_1	GX-11436	40Ld183	1295	90	-	-	-	-	-	-	-	-
TN_1	GX-2154	40Mr23	1365	90	-	-	-	-	-	-	-	-
TN_1	GX-2487	40Mr23	1345	90	-	-	-	-	-	-	-	-
TN_1	GX-5045	40Mr23	1200	120	-	-	-	-	-	-	-	-
TN_1	GX-5243	40Mr40	1365	145	-	-	-	-	-	-	-	-
TN_1	GX-5246	40Mr40	1430	155	-	-	-	-	-	-	-	-
TN_1	UGAMS-28824	40Mr23	1300	20	-	-25.55	-	-	-	-	85.1	0.23
TN_2	Beta-127866	40Ha2	900	50	-	-	-	-	-	-	-	-
TN_2	GX-4208	40Mr20	935	130	-	-	-	-	-	-	-	-
TN_2	GX-4213	40Mr20	960	120	-	-	-	-	-	-	-	-
TN_2	GX-573	40Mi11	1325	105	-	-	-	-	-	-	-	-
TN_2	GX-575	40Mi20	1100	155	-	-	-	-	-	-	-	-
TN_2	UGAMS-28816	40Mr20	840	20	-	-24.59	-	-	-	-	90.12	0.24
TN_2	UGAMS-28817	40Mr20	830	20	-	-10.15	-	-	-	-	90.13	0.25
TN_2	UGAMS-28818	40Pk3	800	20	8.5	-21.94	4.82	42.83	15.34	3.27	90.52	0.25
TN_2	UGAMS-28819	40Pk3	890	20	5.6	-21.12	4.95	41.44	14.73	3.29	89.56	0.25
TN_2	UGAMS-28821	40Mi11	970	20	8.9	-21.64	5.44	31	10.99	3.3	88.62	0.25
TN_3	AA80208	40Re12	965	45	-	-	-	-	-	-	-	-
TN_3	AA86381	40Mr6	623	38	-	-	-	-	-	-	-	-
TN_3	Beta-128375	40Ha3	810	50	-	-	-	-	-	-	-	-
TN_3	Beta-128377	40Re12	640	50	-	-	-	-	-	-	-	-
TN_3	Beta-181800	40Mg31	810	40	-	-	-	-	-	-	-	-
TN_3	GX-14934	40Ld208	895	70	-	-	-	-	-	-	-	-
TN_3	GX-1572	40Mr27	700	95	-	-	-	-	-	-	-	-
TN_3	GX-2594	40Rh6	850	100	-	-	-	-	-	-	-	-
TN_3	GX-4209	40Mr20	930	140	-	-	-	-	-	-	-	-
TN_3	GX-4210	40Mr20	930	140	-	-	-	-	-	-	-	-
TN_3	GX-4211	40Mr20	755	140	-	-	-	-	-	-	-	-

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
TN_3	GX-4212	40Mr20	790	130	-	-	-	-	-	-	-	-
TN_3	GX-6075	40Mr6	605	120	-	-	-	-	-	-	-	-
TN_3	GX-6077	40Mr6	735	130	-	-	-	-	-	-	-	-
TN_3	GX-7732	40Mr5	985	129	-	-	-	-	-	-	-	-
TN_3	M-730	40Re4	930	150	-	-	-	-	-	-	-	-
TN_3	M-731	40Re12	670	150	-	-	-	-	-	-	-	-
TN_3	TX-5903	40Ha102	700	80	-	-	-	-	-	-	-	-
TN_3	UGA-1245	40Mr50	1090	65	-	-	-	-	-	-	-	-
TN_3	UGAMS-28802	40Mg31	760	20	14.8	-21.75	4.98	41.77	15.19	3.22	90.94	0.25
TN_3	UGAMS-28803	40Mg31	850	20	15.2	-21.56	5.56	41.49	14.83	3.27	89.99	0.25
TN_3	UGAMS-28805	40Ha3	630	20	9.7	-21.46	5.27	40.04	14.4	3.25	92.4	0.25
TN_3	UGAMS-28806	40Ha3	630	20	19.1	-21.77	6.09	41.96	15.08	3.26	92.46	0.25
TN_3	UGAMS-28807	40Ha3	670	20	7.1	-22.01	3.77	39.56	14.07	3.29	91.99	0.25
TN_3	UGAMS-28808	40Ha3	600	20	18.7	-18.09	5	36.41	13.2	3.23	92.8	0.25
TN_3	UGAMS-28811	40Re12	650	20	11.1	-21.35	6.07	41.93	15.07	3.25	92.19	0.25
TN_3	UGAMS-28814	40Re12	870	20	5.9	-21.82	5.62	39.48	14.01	3.3	89.74	0.24
TN_3	UGAMS-28815	40Mr20	770	20	-	-25.24	-	-	-	-	90.81	0.25
TN_3	UGAMS-28822	40Mr6	630	20	-	-11.8	-	-	-	-	92.49	0.25
TN_3	UGAMS-28823	40Rh6	780	20	-	-25.58	-	-	-	-	90.78	0.25
TN_3	UGAMS-28825	40Ld24	770	20	-	-24.2	-	-	-	-	90.87	0.25
TN_3	UGAMS-28827	40Mr50	760	20	-	-26.45	-	-	-	-	90.92	0.25
TN_3	UGAMS-29866	40Re12	870	26	9.97	-21.20	4.83	41.27	14.27	3.37	89.78	0.30
TN_4	-	40Mg31	773	44	-	-	-	-	-	-	-	-
TN_4	-	40Mg31	893	44	-	-	-	-	-	-	-	-
TN_4	A-3342	40By13	450	50	-	-	-	-	-	-	-	-
TN_4	AA80150	40An19	386	36	-	-	-	-	-	-	-	-

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
TN_4	AA80151	40An19	332	36	-	-	-	-	-	-	-	-
TN_4	AA80152	40An19	350	36	-	-	-	-	-	-	-	-
TN_4	Beta-127867	40Ha1	540	60	-	-	-	-	-	-	-	-
TN_4	Beta-128660	40Ha1	560	30	-	-	-	-	-	-	-	-
TN_4	Beta-179901	40Je1	370	30	-	-	-	-	-	-	-	-
TN_4	GX-4135	40Re124	245	120	-	-	-	-	-	-	-	-
TN_4	GX-4136	40Re124	495	135	-	-	-	-	-	-	-	-
TN_4	GX-4137	40Re124	240	115	-	-	-	-	-	-	-	-
TN_4	GX-4138	40Re124	350	105	-	-	-	-	-	-	-	-
TN_4	GX-4205	40Mr6	470	130	-	-	-	-	-	-	-	-
TN_4	GX-4206	40Mr6	280	105	-	-	-	-	-	-	-	-
TN_4	GX-4207	40Mr6	330	120	-	-	-	-	-	-	-	-
TN_4	GX-6074	40Mr6	315	120	-	-	-	-	-	-	-	-
TN_4	GX-6076	40Mr6	400	125	-	-	-	-	-	-	-	-
TN_4	M-582	40Ha60	330	75	-	-	-	-	-	-	-	-
TN_4	RH41-DS-161718	40Rh141	640	40	-	-	-	-	-	-	-	-
TN_4	RH41-S12-abcde	40Rh141	620	40	-	-	-	-	-	-	-	-
TN_4	UGA-4804	40Ha146	385	90	-	-	-	-	-	-	-	-
TN_4	UGA-4805	40Ha146	520	90	-	-	-	-	-	-	-	-
TN_4	UGA-5391	40Ha210	665	60	-	-	-	-	-	-	-	-
TN_4	UGA-5392	40Ha210	535	60	-	-	-	-	-	-	-	-
TN_4	UGA-5394	40Ha210	550	65	-	-	-	-	-	-	-	-
TN_4	UGAMS-28804	40Mg31	630	20	11.1	-21.26	4.66	39.49	14.3	3.23	92.46	0.25
TN_4	UGAMS-28809	40Re12	430	20	8.6	-21.43	5.1	41.03	14.28	3.36	94.74	0.25
TN_4	UGAMS-28810	40Re12	850	20	16.4	-22.18	6.03	41.71	15.01	3.25	89.96	0.25
TN_4	UGAMS-29867	40Ha1	620	27	14.57	-21.73	4.42	40.52	14.19	3.33	92.59	0.32
TN_4	UGAMS-29868	40Ha1	560	26	5.08	-21.96	5.47	40.59	13.85	3.42	93.21	0.31
Hamilton	GX-2596	40Rh7	1135	100	-	-	-	-	-	-	-	-
Hamilton	GX-2597	40Rh7	850	100	-	-	-	-	-	-	-	-
Hamilton	GX-2598	40Rh7	730	95	-	-	-	-	-	-	-	-
Hamilton	GX-2599	40Rh7	595	100	-	-	-	-	-	-	-	-

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
Hamilton	GX-2600	40Rh7	805	95	-	-	-	-	-	-	-	-
Hamilton	GX-2601	40Rh7	795	100	-	-	-	-	-	-	-	-
Hamilton	GX-2602	40Rh7	1030	95	-	-	-	-	-	-	-	-
Hamilton	GX-2603	40Rh7	1150	130	-	-	-	-	-	-	-	-
Hamilton	GX-2604	40Rh7	1275	105	-	-	-	-	-	-	-	-
Hamilton	GX-2605	40Rh7	1145	120	-	-	-	-	-	-	-	-
Hamilton	GX-2606	40Rh7	855	95	-	-	-	-	-	-	-	-
Hamilton	GX-3459	40Re124	1070	180	-	-	-	-	-	-	-	-
Hamilton	GX-3460	40Re124	970	160	-	-	-	-	-	-	-	-
Hamilton	GX-3461	40Re124	725	160	-	-	-	-	-	-	-	-
Hamilton	GX-3462	40Re124	1020	120	-	-	-	-	-	-	-	-
Hamilton	GX-3463	40Re124	1265	170	-	-	-	-	-	-	-	-
Hamilton	UGA-738	40Re124	1030	160	-	-	-	-	-	-	-	-
Hamilton	UGAMS-29860	40Rh7	900	23	-	-26.02	-	-	-	-	88.60	0.26
Hamilton	UGAMS-29861	40Rh7	1070	24	-	-26.61	-	-	-	-	87.47	0.26
N/A	-	40Pk3	1220	60	-	-	-	-	-	-	-	-
N/A	-	40Pk3	1150	70	-	-	-	-	-	-	-	-
N/A	Beta-67944	9Br1	340	50	-11.6	-	-	-	-	-	-	-
N/A	DIC-982	40Hw30	1370	65	-	-	-	-	-	-	-	-
N/A	GX-7729	40Mr76	728	124	-	-	-	-	-	-	-	-
N/A	GX-7730	40Mr76	1228	140	-	-	-	-	-	-	-	-
N/A	GX-7733	40Mr5	1260	135	-	-	-	-	-	-	-	-
N/A	GX-8609	40Mr16	840	15	-	-	-	-	-	-	-	-
N/A	M-1060	9Br1	225	150	-	-	-	-	-	-	-	-
N/A	M-729	40Cp2	760	150	-	-	-	-	-	-	-	-
N/A	SI-5098A	40Mr387	715	60	-	-	-	-	-	-	-	-
N/A	SI-5098B	40Mr387	795	60	-	-	-	-	-	-	-	-
N/A	SI-5469	40Mr387	635	50	-	-	-	-	-	-	-	-
N/A	SI-5470	40Mr387	750	45	-	-	-	-	-	-	-	-
N/A	SI-5471	40Mr387	615	60	-	-	-	-	-	-	-	-
N/A	SI-5472	40Mr387	345	65	-	-	-	-	-	-	-	-
N/A	UGA-2097	40Hw44	615	85	-	-	-	-	-	-	-	-

Table B.1. (Cont.)

Phase	Lab ID	Site	¹⁴ C age years, BP	±	Collagen Yield %	δ ¹³ C,‰	δ ¹⁵ N,‰	%C	%N	C/N	pMC	±
N/A	UGA-2393	9Ck130	1250	75	-	-	-	-	-	-	-	-
N/A	UGA-504	9Mu101	1300	220	-	-	-	-	-	-	-	-
N/A	UGA-525	9Br99	935	60	-	-	-	-	-	-	-	-
N/A	UGA-526	9Br99	1215	70	-	-	-	-	-	-	-	-
N/A	UGAMS-28812	40Re12	1900	20	2.9	-21.94	3.33	37.92	13.18	3.37	78.91	0.22
N/A	UGAMS-28813	40Re12	380	20	6.6	-21.56	5.93	40.26	14.38	3.28	95.39	0.26
N/A	UGAMS-28820	40Mi11	2980	20	6.6	-22.72	6.1	33.82	11.84	3.34	68.96	0.2
N/A	UGAMS-28826	40Ha2	1900	20	1.3	-20.9	5.24	37.8	11.76	3.76	78.96	0.22
N/A	UGAMS-29082	9Br139	420	20	-	-11.598	-	-	-	-	94.95	0.26
N/A	UGAMS-29086	9Fl3	modern	20	-	-27.662	-	-	-	-	146.06	0.37
N/A	UGAMS-29087	9Gw70	4150	25	-	-27.329	-	-	-	-	59.67	0.18
N/A	UGAMS-29089	9Mu100	1280	20	-	-27.618	-	-	-	-	85.25	0.23
N/A	UGAMS-29093	9Mu101	460	20	3	-22.609	4.521	22.809	7.69	3.46	94.39	0.26
N/A	UGAMS-29096	9Mu103	320	20	-	-10.831	-	-	-	-	96.12	0.26
N/A	UGAMS-29863	9Mu103	340	23	-	-23.69	-	-	-	-	95.81	0.28
N/A	UGAMS-29865	9Mu100	1280	24	-	-28.45	-	-	-	-	85.22	0.26

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
GA_1	Beta-190664	9Ck1182	Steve Webb Personal Comm.
GA_1	Beta-216324	9Ck1182	Steve Webb Personal Comm.
GA_1	Beta-228934	9Fl164	Wood and Ledbetter 1990
GA_1	Beta-52428	9Fl193	Stanyard and Baker 1991
GA_1	Beta-52429	9Fl193	Stanyard and Baker 1991
GA_1	Beta-53013	9Fl193	Stanyard and Baker 1991
GA_1	Beta-82594	9Fo16	Pluckhahn 1996
GA_1	Beta-94644	9Ck9	Webb, n.d.
GA_1	Beta-94647	9Ck9	Webb, n.d.
GA_1	Beta-94649	9Ck9	Webb, n.d.
GA_1	Beta-98605	9Ck9	Webb, n.d.
GA_1	Beta-98606	9Ck9	Webb, n.d.
GA_1	UGA-14545	9Ck9	Markin 2007
GA_1	UGA-14546	9Ck9	Markin 2007
GA_1	UGA-14547	9Ck9	Markin 2007
GA_1	UGA-14548	9Ck9	Markin 2007
GA_1	UGA-14549	9Mu103	Markin 2007
GA_1	UGA-14550	9Mu103	Markin 2007
GA_1	UGA-5375	9Ck131	Smith 1985
GA_1	UGA-55	9Mu103	Hally 1979
GA_1	UGAMS-29864	9Gw70	This Dissertation (NSF)
GA_1	UM-1675	9Lu7	Crook 1982
GA_1	Beta-52427	9Fl193	Stanyard and Baker 1991
GA_1	GX-2825	9Do2	Williams 2014
GA_1	GX-2826	9Do2	Williams 2014
GA_2	Beta-144161	9Br1	King 2001
GA_2	Beta-144162	9Br1	King 2001
GA_2	Beta-144163	9Br1	King 2001
GA_2	Beta-144164	9Br1	King 2001
GA_2	Beta-144811	9Br1	King 2001
GA_2	Beta-145489	9Br1	King 2001
GA_2	Beta-145490	9Br1	King 2001

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
GA_2	Beta-145491	9Br1	King 2001
GA_2	Beta-257893	9Ck1	Lewis et al. 2012
GA_2	Beta-257894	9Ck1	Lewis et al. 2012
GA_2	Beta-257895	9Ck1	Lewis et al. 2012
GA_2	Beta-260068	9Ck1	Lewis et al. 2012
GA_2	Beta-260069	9Ck1	Lewis et al. 2012
GA_2	Beta-260070	9Ck1	Lewis et al. 2012
GA_2	Beta-41373	9Co45	Cable and Raymer 1991
GA_2	Beta-41374	9Co46	Cable and Raymer 1991
GA_2	M-1061	9Br1	Crane and Griffin 1962
GA_2	M-1062	9Br1	Crane and Griffin 1962
GA_2	M-1064	9Br1	King 2003
GA_2	M-402	9Br1	Crane and Griffin 1959
GA_2	M-542	9Br1	Crane and Griffin 1959
GA_2	M-543	9Br1	Crane and Griffin 1959
GA_2	UGA-213	9Mu101	Kelly 1972
GA_2	UGA-215	9Mu101	Kelly 1972
GA_2	UGA-224	9Mu101	Kelly 1972
GA_2	UGA-509	9Mu101	Kelly 1972
GA_2	UGA-510	9Mu101	Kelly 1972
GA_2	UGA-70	9Mu100	Kelly et al. 1965
GA_2	UGAMS-25390	9Ck5	This Dissertation (IIRG Money)
GA_2	UGAMS-29083	9Ck85	This Dissertation (NSF)
GA_2	UGAMS-29084	9Ck85	This Dissertation (NSF)
GA_2	UGAMS-29085	9Ck85	This Dissertation (NSF)
GA_2	UGAMS-29088	9Mu100	This Dissertation (NSF)
GA_2	UGAMS-29090	9Mu100	This Dissertation (NSF)
GA_2	UGAMS-29225	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29226	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29227	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29228	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29229	9Br1	This Dissertation (NSF)

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
GA_2	UGAMS-29230	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29231	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29232	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29234	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29235	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29236	9Br1	This Dissertation (NSF)
GA_2	UGAMS-29862	9Mu100	This Dissertation (NSF)
GA_3	Beta-134792	9Br1	Bigman et al. 2011
GA_3	Beta-134793	9Br1	Bigman et al. 2011
GA_3	Beta-67942	9Br1	King 2001
GA_3	Beta-67943	9Br1	King 2001
GA_3	UGA-142	9FI3	Kelly 1972
GA_3	UGA-143	9FI3	Kelly 1972
GA_3	UGA-328	9FI3	Kelly 1972
GA_3	UGAMS-25389	9FI3	This Dissertation (IIRG Money)
GA_3	UGAMS-25391	9Mu101	This Dissertation (IIRG Money)
GA_3	UGAMS-25392	9Mu101	This Dissertation (IIRG Money)
GA_3	UGAMS-29091	9Mu101	This Dissertation (NSF)
GA_3	UGAMS-29092	9Mu101	This Dissertation (NSF)
GA_3	UGAMS-29094	9Br1	This Dissertation (NSF)
GA_3	UGAMS-29233	9Br1	This Dissertation (NSF)
GA_4	UGA-205	9Mu102	Hally 1980
GA_4	UGA-208	9Mu102	Hally 1980
GA_4	UGA-210	9Mu102	Hally 1980
GA_4	UGA-307	9FI5	Hally 2008
GA_4	UGA-403	9Mu102	Hally 1980
GA_4	UGA-56	9Mu103	Hally 1970
GA_4	UGA-589	9FI5	Hally 2008
GA_4	UGA-591	9FI5	Hally 2008
GA_4	UGAMS-29095	9Mu103	This Dissertation (NSF)
GA_4	UGAMS-29097	9Mu102	This Dissertation (NSF)
GA_4	UGAMS-29098	9Mu102	This Dissertation (NSF)

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
TN_1	CWRU-26	40Ld45	McCollough and Faulkner 1973
TN_1	GX-10245	40Jn89	Riggs 1985
TN_1	GX-10246	40Jn90	Riggs 1985
TN_1	GX-11436	40Ld183	Chapman 1987
TN_1	GX-2154	40Mr23	Gleeson 1970
TN_1	GX-2487	40Mr23	Chapman 1973
TN_1	GX-5045	40Mr23	Chapman and Keel 1979
TN_1	GX-5243	40Mr40	Schroedl 1978
TN_1	GX-5246	40Mr40	Schroedl 1978
TN_1	UGAMS-28824	40Mr23	This Dissertation (NSF)
TN_2	Beta-127866	40Ha2	Sullivan 2007
TN_2	GX-4208	40Mr20	Schroedl et al. 1990
TN_2	GX-4213	40Mr20	Schroedl et al. 1990
TN_2	GX-573	40Mi11	Faulkner and Graham 1966
TN_2	GX-575	40Mi20	Faulkner and Graham 1966
TN_2	UGAMS-28816	40Mr20	This Dissertation (NSF)
TN_2	UGAMS-28817	40Mr20	This Dissertation (NSF)
TN_2	UGAMS-28818	40Pk3	This Dissertation (NSF)
TN_2	UGAMS-28819	40Pk3	This Dissertation (NSF)
TN_2	UGAMS-28821	40Mi11	This Dissertation (NSF)
TN_3	AA80208	40Re12	Sullivan and Koerner 2010
TN_3	AA86381	40Mr6	Sullivan et al. 2011
TN_3	Beta-128375	40Ha3	Sullivan 2007
TN_3	Beta-128377	40Re12	Koerner 2005
TN_3	Beta-181800	40Mg31	Sullivan 2009
TN_3	GX-14934	40Ld208	Chapman 1987
TN_3	GX-1572	40Mr27	Salo 1969
TN_3	GX-2594	40Rh6	Schroedl 1973
TN_3	GX-4209	40Mr20	Schroedl et al. 1990
TN_3	GX-4210	40Mr20	Schroedl et al. 1990
TN_3	GX-4211	40Mr20	Schroedl et al. 1990

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
TN_3	GX-4212	40Mr20	Schroedl et al. 1990
TN_3	GX-6075	40Mr6	Polhemus 1986
TN_3	GX-6077	40Mr6	Polhemus 1986
TN_3	GX-7732	40Mr5	Baden 1983
TN_3	M-730	40Re4	Crane and Griffin 1961
TN_3	M-731	40Re12	Faulkner 1967
TN_3	TX-5903	40Ha102	Council 1989
TN_3	UGA-1245	40Mr50	Polhemus 1979
TN_3	UGAMS-28802	40Mg31	This Dissertation (NSF)
TN_3	UGAMS-28803	40Mg31	This Dissertation (NSF)
TN_3	UGAMS-28805	40Ha3	This Dissertation (NSF)
TN_3	UGAMS-28806	40Ha3	This Dissertation (NSF)
TN_3	UGAMS-28807	40Ha3	This Dissertation (NSF)
TN_3	UGAMS-28808	40Ha3	This Dissertation (NSF)
TN_3	UGAMS-28811	40Re12	This Dissertation (NSF)
TN_3	UGAMS-28814	40Re12	This Dissertation (NSF)
TN_3	UGAMS-28815	40Mr20	This Dissertation (NSF)
TN_3	UGAMS-28822	40Mr6	This Dissertation (NSF)
TN_3	UGAMS-28823	40Rh6	This Dissertation (NSF)
TN_3	UGAMS-28825	40Ld24	This Dissertation (NSF)
TN_3	UGAMS-28827	40Mr50	This Dissertation (NSF)
TN_3	UGAMS-29866	40Re12	This Dissertation (NSF)
TN_4	-	40Mg31	Sullivan et al. 2009
TN_4	-	40Mg31	Sullivan et al. 2009
TN_4	A-3342	40By13	Sullivan 1986
TN_4	AA80150	40An19	Sullivan et al. 2009

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
TN_4	AA80151	40An19	Sullivan et al. 2009
TN_4	AA80152	40An19	Sullivan et al. 2009
TN_4	Beta-127867	40Ha1	Sullivan 2007
TN_4	Beta-128660	40Ha1	Sullivan 2007
TN_4	Beta-179901	40Je1	Harle 2003
TN_4	GX-4135	40Re124	Schroedl 1990
TN_4	GX-4136	40Re124	Schroedl 1990
TN_4	GX-4137	40Re124	Schroedl 1990
TN_4	GX-4138	40Re124	Schroedl 1990
TN_4	GX-4205	40Mr6	Polhemus 1986
TN_4	GX-4206	40Mr6	Polhemus 1986
TN_4	GX-4207	40Mr6	Polhemus 1986
TN_4	GX-6074	40Mr6	Polhemus 1986
TN_4	GX-6076	40Mr6	Polhemus 1986
TN_4	M-582	40Ha60	Griffin 1963
TN_4	RH41-DS-161718	40Rh141	Koerner et al. 2009
TN_4	RH41-S12-abcde	40Rh141	Koerner et al. 2009
TN_4	UGA-4804	40Ha146	McCollough and Bass 1983
TN_4	UGA-4805	40Ha146	McCollough and Bass 1983
TN_4	UGA-5391	40Ha210	Council and Honerkamp 1990
TN_4	UGA-5392	40Ha210	Council and Honerkamp 1990
TN_4	UGA-5394	40Ha210	Council and Honerkamp 1990
TN_4	UGAMS-28804	40Mg31	This Dissertation (NSF)
TN_4	UGAMS-28809	40Re12	This Dissertation (NSF)
TN_4	UGAMS-28810	40Re12	This Dissertation (NSF)
TN_4	UGAMS-29867	40Ha1	This Dissertation (NSF)
TN_4	UGAMS-29868	40Ha1	This Dissertation (NSF)
Hamilton	GX-2596	40Rh7	Schroedl 1973
Hamilton	GX-2597	40Rh7	Schroedl 1973
Hamilton	GX-2598	40Rh7	Schroedl 1973
Hamilton	GX-2599	40Rh7	Schroedl 1973

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
Hamilton	GX-2600	40Rh7	Schroedl 1973
Hamilton	GX-2601	40Rh7	Schroedl 1973
Hamilton	GX-2602	40Rh7	Schroedl 1973
Hamilton	GX-2603	40Rh7	Schroedl 1973
Hamilton	GX-2604	40Rh7	Schroedl 1973
Hamilton	GX-2605	40Rh7	Schroedl 1973
Hamilton	GX-2606	40Rh7	Schroedl 1973
Hamilton	GX-3459	40Re124	Schroedl 1990
Hamilton	GX-3460	40Re124	Schroedl 1990
Hamilton	GX-3461	40Re124	Schroedl 1990
Hamilton	GX-3462	40Re124	Schroedl 1990
Hamilton	GX-3463	40Re124	Schroedl 1990
Hamilton	UGA-738	40Re124	Schroedl 1990
Hamilton	UGAMS-29860	40Rh7	This Dissertation (NSF)
Hamilton	UGAMS-29861	40Rh7	This Dissertation (NSF)
N/A	-	40Pk3	Smith 1999
N/A	-	40Pk3	Smith 1999
N/A	Beta-67944	9Br1	King 2001
N/A	DIC-982	40Hw30	Lafferty 1981
N/A	GX-7729	40Mr76	Schroedl et al. 1990
N/A	GX-7730	40Mr76	Schroedl et al. 1990
N/A	GX-7733	40Mr5	Baden 1983
N/A	GX-8609	40Mr16	Davis et al. 1982
N/A	M-1060	9Br1	Crane and Griffin 1962
N/A	M-729	40Cp2	Faulkner 1967
N/A	SI-5098A	40Mr387	Faulkner et al. 1986
N/A	SI-5098B	40Mr387	Faulkner et al. 1986
N/A	SI-5469	40Mr387	Faulkner et al. 1986
N/A	SI-5470	40Mr387	Faulkner et al. 1986
N/A	SI-5471	40Mr387	Faulkner et al. 1986
N/A	SI-5472	40Mr387	Faulkner et al. 1986
N/A	UGA-2097	40Hw44	Lafferty 1981

Table B.1. (Cont.)

Phase	Lab ID	Site	Reference
N/A	UGA-2393	9Ck130	Bowen 1982
N/A	UGA-504	9Mu101	Kelly 1972
N/A	UGA-525	9Br99	Seckinger n.d.
N/A	UGA-526	9Br99	Seckinger n.d.
N/A	UGAMS-28812	40Re12	This Dissertation (NSF)
N/A	UGAMS-28813	40Re12	This Dissertation (NSF)
N/A	UGAMS-28820	40Mi11	This Dissertation (NSF)
N/A	UGAMS-28826	40Ha2	This Dissertation (NSF)
N/A	UGAMS-29082	9Br139	This Dissertation (NSF)
N/A	UGAMS-29086	9FI3	This Dissertation (NSF)
N/A	UGAMS-29087	9Gw70	This Dissertation (NSF)
N/A	UGAMS-29089	9Mu100	This Dissertation (NSF)
N/A	UGAMS-29093	9Mu101	This Dissertation (NSF)
N/A	UGAMS-29096	9Mu103	This Dissertation (NSF)
N/A	UGAMS-29863	9Mu103	This Dissertation (NSF)
N/A	UGAMS-29865	9Mu100	This Dissertation (NSF)

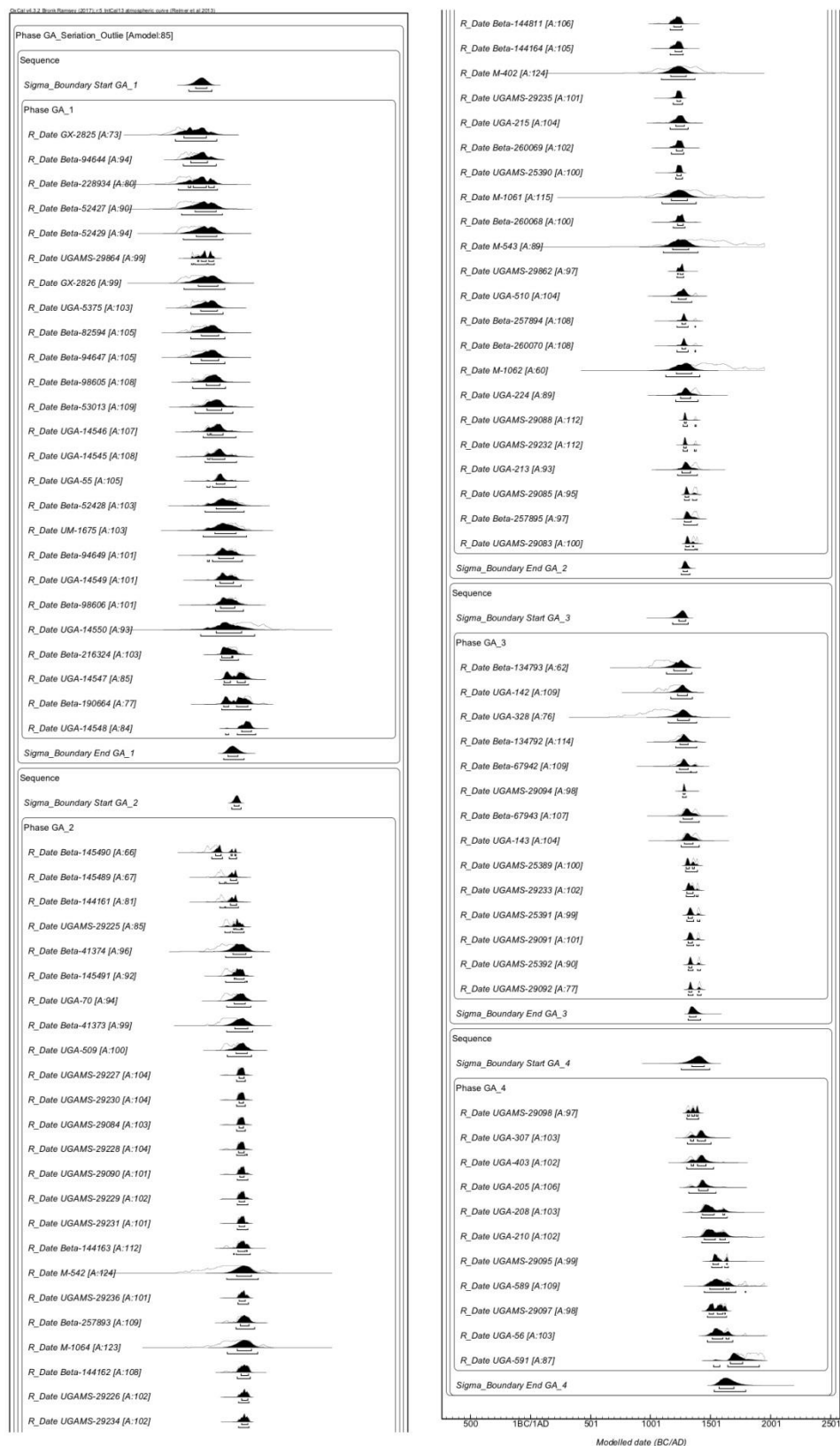


Figure B.1. Bayesian radiocarbon model for northern Georgia seriation.

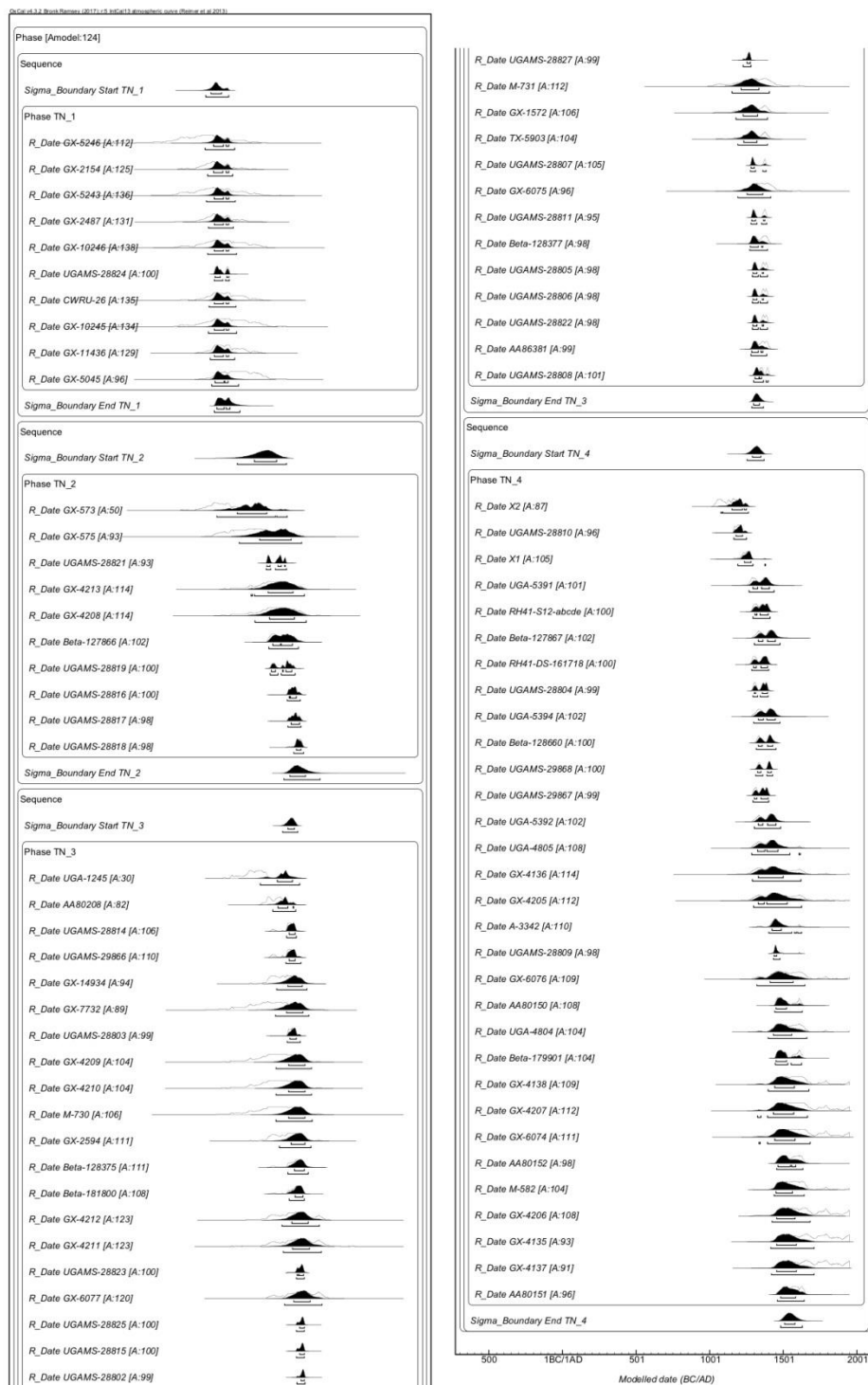


Figure B.2. Bayesian radiocarbon model for eastern Tennessee seriation.

APPENDIX C: OXCAL CODE FOR REGIONAL BAYESIAN MODELS

C.1. [Primary Model] Overlapping multi-phase charcoal outlier model for northern Georgia.

```
Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Phase()
  {
    Sequence()
    {
      Sigma_Boundary("Start GA_1");
      Phase("GA_1")
      {
        R_Date("GX-2825", 1345, 85)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-94644", 1230, 50)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-228934", 1290, 100);
        R_Date("Beta-52427", 1250, 100)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-52429", 1220, 90)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGAMS-29864",1160,23);
        R_Date("GX-2826", 1195, 100)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGA-5375", 1160, 60)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-82594", 1150, 70)
```

```

{
  Outlier("Charcoal", 1);
};
R_Date("Beta-94647", 1150, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-98605", 1110, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-53013", 1080, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14546", 1060, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14545", 1040, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-55", 1022, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-52428", 980, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("UM-1675", 970, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-94649", 980, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14549", 980, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-98606", 960, 60)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40)
{
  Outlier("Charcoal", 1);
};
Span("GA-1");
};
Sigma_Boundary("End GA_1");
};
Sequence()
{
  Sigma_Boundary("Start GA_2");
  Phase("GA_2")
  {
    R_Date("Beta-145490", 1080, 40);
    R_Date("Beta-145489", 1000, 40);
    R_Date("Beta-144161", 990, 40);
    R_Date("UGAMS-29225", 900, 22);
    R_Date("Beta-41374", 970, 90)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-145491", 900, 40);
    R_Date("UGA-70", 905, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-41373", 930, 90)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-509", 890, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-29227", 860, 21);
    R_Date("UGAMS-29230", 860, 21);
    R_Date("UGAMS-29084", 860, 20);
    R_Date("UGAMS-29228", 860, 22);
  }
};

```

```

R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("M-1064", 850, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);

```

```

R_Date("M-1062", 450, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-224", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
};
Sequence()
{
  Sigma_Boundary("Start GA_3");
  Phase("GA_3")
  {
    R_Date("Beta-134793", 920, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-142", 830, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-328", 945, 140)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-134792", 760, 60)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-67942", 740, 70);
  }

```



```

R_Date("UGAMS-29094", 710, 20);
R_Date("Beta-67943", 680, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-143", 660, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("End GA_3");
};
Sequence()
{
  Sigma_Boundary("Start GA_4");
  Phase("GA_4")
  {
    R_Date("UGAMS-29098", 610, 20);
    R_Date("UGA-307", 540, 55)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-403", 535, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-205", 500, 55)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-208", 425, 55)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGA-210", 395, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-29095", 300, 20);

```

```

R_Date("UGA-589", 280, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29097", 340, 20);
R_Date("UGA-56", 286, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-591", 120, 65)
{
  Outlier("Charcoal", 1);
};
Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};
};

```

C.2. [Primary Model] Overlapping multi-phase charcoal outlier model for eastern Tennessee.

```

Plot()
{
  Outlier_Model("Charcoal", Exp(1, -10, 0), U(0, 3), "t");
  Phase()
  {
    Sequence()
    {
      Sigma_Boundary("Start TN_1");
      Phase("TN_1")
      {
        R_Date("GX-5246", 1430, 155)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("GX-2154", 1365, 90)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("GX-5243", 1365, 145)
        {
          Outlier("Charcoal", 1);
        };
      };
    };
  };
};

```

```

R_Date("GX-2487", 1345, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-10246", 1320, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28824", 1300, 20);
R_Date("CWRU-26", 1310, 110)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-10245", 1290, 155)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-11436", 1295, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-5045", 1200, 120)
{
  Outlier("Charcoal", 1);
};
Span("TN-1");
};
Sigma_Boundary("End TN_1");
};
Sequence()
{
  Sigma_Boundary("Start TN_2");
  Phase("TN_2")
  {
    R_Date("GX-573", 1325, 105)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("GX-575", 1100, 155)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-28821", 970, 20);
    R_Date("GX-4213", 960, 120)
    {
      Outlier("Charcoal", 1);
    };
  };
};

```

```

};
R_Date("GX-4208", 935, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-127866", 900, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("End TN_2");
};
Sequence()
{
  Sigma_Boundary("Start TN_3");
  Phase("TN_3")
  {
    R_Date("UGA-1245", 1090, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("AA80208", 965, 45);
    R_Date("UGAMS-28814", 870, 20);
    R_Date("UGAMS-29866", 870, 26);
    R_Date("GX-14934", 895, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("GX-7732", 985, 129)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-28803", 850, 20);
    R_Date("GX-4209", 930, 140)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("GX-4210", 930, 140)
    {
      Outlier("Charcoal", 1);
    };
  };
};

```

```

R_Date("M-730", 930, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2594", 850, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-128375", 810, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4211", 755, 140)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-1572", 700, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-5903", 700, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("End TN_3");
};
Sequence()
{
Sigma_Boundary("Start TN_4");
Phase("TN_4")
{
R_Date("X2", 893, 44);
R_Date("UGAMS-28810", 850, 20);
R_Date("X1", 773, 44);
R_Date("UGA-5391", 665, 60)
{
Outlier("Charcoal", 1);
};
R_Date("RH41-S12-abcde", 620, 40);
R_Date("Beta-127867", 540, 60)
{
Outlier("Charcoal", 1);
};
R_Date("RH41-DS-161718", 640, 40);
R_Date("UGAMS-28804", 630, 20);
R_Date("UGA-5394", 550, 65)
{
Outlier("Charcoal", 1);
};
R_Date("Beta-128660", 560, 30)
{
Outlier("Charcoal", 1);
};
R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60)
{
Outlier("Charcoal", 1);
};
R_Date("UGA-4805", 520, 90)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("GX-4136", 495, 135)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4205", 470, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("A-3342", 450, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80150", 386, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-4804", 385, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80152", 350, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("GX-4135", 245, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4137", 240, 115)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80151", 332, 36)
{
  Outlier("Charcoal", 1);
};
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};
};
};

```

C.3. [Alternative Model] Overlapping multi-phase model for northern Georgia.

```

Plot()
{
  Phase()
  {
    Sequence()
    {
      Sigma_Boundary("Start GA_1");
      Phase("GA_1")
      {
        R_Date("GX-2825", 1345, 85);
        R_Date("Beta-94644", 1230, 50);
        R_Date("Beta-228934", 1290, 100);
        R_Date("Beta-52427", 1250, 100);
        R_Date("Beta-52429", 1220, 90);
        R_Date("UGAMS-29864", 1160, 23);
        R_Date("GX-2826", 1195, 100);
        R_Date("UGA-5375", 1160, 60);
        R_Date("Beta-82594", 1150, 70);
        R_Date("Beta-94647", 1150, 70);
        R_Date("Beta-98605", 1110, 60);
        R_Date("Beta-53013", 1080, 70);
        R_Date("UGA-14546", 1060, 60);
      }
    }
  }
}

```



```

R_Date("UGA-14545", 1040, 60);
R_Date("UGA-55", 1022, 40);
R_Date("Beta-52428", 980, 90);
R_Date("UM-1675", 970, 105);
R_Date("Beta-94649", 980, 60);
R_Date("UGA-14549", 980, 50);
R_Date("Beta-98606", 960, 60);
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40);
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40);
Span("GA-1");
};
Sigma_Boundary("End GA_1");
};
Sequence()
{
Sigma_Boundary("Start GA_2");
Phase("GA_2")
{
R_Date("Beta-145490", 1080, 40);
R_Date("Beta-145489", 1000, 40);
R_Date("Beta-144161", 990, 40);
R_Date("UGAMS-29225", 900, 22);
R_Date("Beta-41374", 970, 90);
R_Date("Beta-145491", 900, 40);
R_Date("UGA-70", 905, 50);
R_Date("Beta-41373", 930, 90);
R_Date("UGA-509", 890, 50);
R_Date("UGAMS-29227", 860, 21);
R_Date("UGAMS-29230", 860, 21);
R_Date("UGAMS-29084", 860, 20);
R_Date("UGAMS-29228", 860, 22);
R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200);
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40);
R_Date("M-1064", 850, 150);
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);

```

```

R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200);
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55);
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200);
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60);
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200);
R_Date("UGA-224", 670, 70);
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60);
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40);
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
};
Sequence()
{
  Sigma_Boundary("Start GA_3");
  Phase("GA_3")
  {
    R_Date("Beta-134793", 920, 70);
    R_Date("UGA-142", 830, 70);
    R_Date("UGA-328", 945, 140);
    R_Date("Beta-134792", 760, 60);
    R_Date("Beta-67942", 740, 70);
    R_Date("UGAMS-29094", 710, 20);
    R_Date("Beta-67943", 680, 70);
    R_Date("UGA-143", 660, 70);
    R_Date("UGAMS-25389", 620, 20);
    R_Date("UGAMS-29233", 600, 21);
    R_Date("UGAMS-25391", 570, 25);
    R_Date("UGAMS-29091", 580, 20);
    R_Date("UGAMS-25392", 560, 20);
    R_Date("UGAMS-29092", 550, 20);
    Span("GA-3");
  };
};

```

```

    Sigma_Boundary("End GA_3");
};
Sequence()
{
    Sigma_Boundary("Start GA_4");
    Phase("GA_4")
    {
        R_Date("UGAMS-29098", 610, 20);
        R_Date("UGA-307", 540, 55);
        R_Date("UGA-403", 535, 65);
        R_Date("UGA-205", 500, 55);
        R_Date("UGA-208", 425, 55);
        R_Date("UGA-210", 395, 65);
        R_Date("UGAMS-29095", 300, 20);
        R_Date("UGA-589", 280, 70);
        R_Date("UGAMS-29097", 340, 20);
        R_Date("UGA-56", 286, 45);
        R_Date("UGA-591", 120, 65);
        Span("GA-4");
    };
    Sigma_Boundary("End GA_4");
};
};
};
};

```

C.4. [Alternative Model] Overlapping multi-phase model for eastern Tennessee.

```

Plot()
{
    Phase()
    {
        Sequence()
        {
            Sigma_Boundary("Start TN_1");
            Phase("TN_1")
            {
                R_Date("GX-5246", 1430, 155);
                R_Date("GX-2154", 1365, 90);
                R_Date("GX-5243", 1365, 145);
                R_Date("GX-2487", 1345, 90);
                R_Date("GX-10246", 1320, 150);
                R_Date("UGAMS-28824", 1300, 20);
                R_Date("CWRU-26", 1310, 110);
                R_Date("GX-10245", 1290, 155);
            }
        }
    }
}

```

```

R_Date("GX-11436", 1295, 90);
R_Date("GX-5045", 1200, 120);
Span("TN-1");
};
Sigma_Boundary("End TN_1");
};
Sequence()
{
Sigma_Boundary("Start TN_2");
Phase("TN_2")
{
R_Date("GX-573", 1325, 105);
R_Date("GX-575", 1100, 155);
R_Date("UGAMS-28821", 970, 20);
R_Date("GX-4213", 960, 120);
R_Date("GX-4208", 935, 130);
R_Date("Beta-127866", 900, 50);
R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("End TN_2");
};
Sequence()
{
Sigma_Boundary("Start TN_3");
Phase("TN_3")
{
R_Date("UGA-1245", 1090, 65);
R_Date("AA80208", 965, 45);
R_Date("UGAMS-28814", 870, 20);
R_Date("UGAMS-29866", 870, 26);
R_Date("GX-14934", 895, 70);
R_Date("GX-7732", 985, 129);
R_Date("UGAMS-28803", 850, 20);
R_Date("GX-4209", 930, 140);
R_Date("GX-4210", 930, 140);
R_Date("M-730", 930, 150);
R_Date("GX-2594", 850, 100);
R_Date("Beta-128375", 810, 50);
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130);
R_Date("GX-4211", 755, 140);
R_Date("UGAMS-28823", 780, 20);

```

```

R_Date("GX-6077", 735, 130);
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150);
R_Date("GX-1572", 700, 95);
R_Date("TX-5903", 700, 80);
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120);
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("End TN_3");
};
Sequence()
{
Sigma_Boundary("Start TN_4");
Phase("TN_4")
{
R_Date("X2", 893, 44);
R_Date("UGAMS-28810", 850, 20);
R_Date("X1", 773, 44);
R_Date("UGA-5391", 665, 60);
R_Date("RH41-S12-abcde", 620, 40);
R_Date("Beta-127867", 540, 60);
R_Date("RH41-DS-161718", 640, 40);
R_Date("UGAMS-28804", 630, 20);
R_Date("UGA-5394", 550, 65);
R_Date("Beta-128660", 560, 30);
R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60);
R_Date("UGA-4805", 520, 90);
R_Date("GX-4136", 495, 135);
R_Date("GX-4205", 470, 130);
R_Date("A-3342", 450, 50);
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125);
R_Date("AA80150", 386, 36);

```

```

R_Date("UGA-4804", 385, 90);
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105);
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120);
R_Date("AA80152", 350, 36);
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105);
R_Date("GX-4135", 245, 120);
R_Date("GX-4137", 240, 115);
R_Date("AA80151", 332, 36);
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};
};

```

C.5. [Alternative Model] Contiguous multi-phase charcoal outlier model for northern Georgia.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start GA_1");
    Phase("GA_1")
    {
      R_Date("GX-2825", 1345, 85)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-94644", 1230, 50)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-228934", 1290, 100);
      R_Date("Beta-52427", 1250, 100)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-52429", 1220, 90)
      {

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29864",1160,23);
R_Date("GX-2826", 1195, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-5375", 1160, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-82594", 1150, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-94647", 1150, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-98605", 1110, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-53013", 1080, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14546", 1060, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14545", 1040, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-55", 1022, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-52428", 980, 90)
{
    Outlier("Charcoal", 1);
};
R_Date("UM-1675", 970, 105)
{
    Outlier("Charcoal", 1);
};

```

```

};
R_Date("Beta-94649", 980, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14549", 980, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-98606", 960, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40)
{
  Outlier("Charcoal", 1);
};
Span("GA-1");
};
Sigma_Boundary("Transition GA_1/GA_2");
Phase("GA_2")
{
  R_Date("Beta-145490", 1080, 40);
  R_Date("Beta-145489", 1000, 40);
  R_Date("Beta-144161", 990, 40);
  R_Date("UGAMS-29225", 900, 22);
  R_Date("Beta-41374", 970, 90)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-145491", 900, 40);
  R_Date("UGA-70", 905, 50)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-41373", 930, 90)
  {
    Outlier("Charcoal", 1);
  };
};

```



```

R_Date("UGA-509", 890, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29227", 860, 21);
R_Date("UGAMS-29230", 860, 21);
R_Date("UGAMS-29084", 860, 20);
R_Date("UGAMS-29228", 860, 22);
R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("M-1064", 850, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260068", 770, 40);

```

```

R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-224", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("Transition GA_2/GA_3");
Phase("GA_3")
{
  R_Date("Beta-134793", 920, 70)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-142", 830, 70)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-328", 945, 140)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-134792", 760, 60)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("Beta-67942", 740, 70);
R_Date("UGAMS-29094", 710, 20);
R_Date("Beta-67943", 680, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-143", 660, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("Transition GA_3/GA_4");
Phase("GA_4")
{
  R_Date("UGAMS-29098", 610, 20);
  R_Date("UGA-307", 540, 55)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-403", 535, 65)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-205", 500, 55)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-208", 425, 55)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-210", 395, 65)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-29095", 300, 20);

```

```

R_Date("UGA-589", 280, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29097", 340, 20);
R_Date("UGA-56", 286, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-591", 120, 65)
{
  Outlier("Charcoal", 1);
};
Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};

```

C.6. [Alternative Model] Contiguous multi-phase charcoal outlier model for eastern Tennessee.

```

Plot()
{
  Outlier_Model("Charcoal", Exp(1, -10, 0), U(0, 3), "t");
  Sequence()
  {
    Sigma_Boundary("Start TN_1");
    Phase("TN_1")
    {
      R_Date("GX-5246", 1430, 155)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2154", 1365, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-5243", 1365, 145)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2487", 1345, 90)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
}

```

```

};
R_Date("GX-10246", 1320, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28824", 1300, 20);
R_Date("CWRU-26", 1310, 110)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-10245", 1290, 155)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-11436", 1295, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-5045", 1200, 120)
{
  Outlier("Charcoal", 1);
};
Span("TN-1");
};
Sigma_Boundary("Transition TN_1/TN_2");
Phase("TN_2")
{
  R_Date("GX-573", 1325, 105)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-575", 1100, 155)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-28821", 970, 20);
  R_Date("GX-4213", 960, 120)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-4208", 935, 130)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-127866", 900, 50)
  {

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("Transition TN_2/TN_3");
Phase("TN_3")
{
    R_Date("UGA-1245", 1090, 65)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("AA80208", 965, 45);
    R_Date("UGAMS-28814", 870, 20);
    R_Date("UGAMS-29866", 870, 26);
    R_Date("GX-14934", 895, 70)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("GX-7732", 985, 129)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-28803", 850, 20);
    R_Date("GX-4209", 930, 140)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("GX-4210", 930, 140)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("M-730", 930, 150)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("GX-2594", 850, 100)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("Beta-128375", 810, 50)
    {
        Outlier("Charcoal", 1);
    };

```

```

};
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4211", 755, 140)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-1572", 700, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-5903", 700, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("Transition TN_3/TN_4");

```

```

Phase("TN_4")
{
  R_Date("X2", 893, 44);
  R_Date("UGAMS-28810", 850, 20);
  R_Date("X1", 773, 44);
  R_Date("UGA-5391", 665, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("RH41-S12-abcde", 620, 40);
  R_Date("Beta-127867", 540, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("RH41-DS-161718", 640, 40);
  R_Date("UGAMS-28804", 630, 20);
  R_Date("UGA-5394", 550, 65)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-128660", 560, 30)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-29868", 560, 26);
  R_Date("UGAMS-29867", 620, 27);
  R_Date("UGA-5392", 535, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-4805", 520, 90)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-4136", 495, 135)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-4205", 470, 130)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("A-3342", 450, 50)
  {
    Outlier("Charcoal", 1);
  };
};

```



```

R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80150", 386, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-4804", 385, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80152", 350, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4135", 245, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4137", 240, 115)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80151", 332, 36)
{
  Outlier("Charcoal", 1);
};
Span("TN-4");
};

```

```

Sigma_Boundary("End TN_4");
};
};

```

C.7. [Alternative Model] Contiguous multi-phase model for northern Georgia.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start GA_1");
    Phase("GA_1")
    {
      R_Date("GX-2825", 1345, 85);
      R_Date("Beta-94644", 1230, 50);
      R_Date("Beta-228934", 1290, 100);
      R_Date("Beta-52427", 1250, 100);
      R_Date("Beta-52429", 1220, 90);
      R_Date("UGAMS-29864", 1160, 23);
      R_Date("GX-2826", 1195, 100);
      R_Date("UGA-5375", 1160, 60);
      R_Date("Beta-82594", 1150, 70);
      R_Date("Beta-94647", 1150, 70);
      R_Date("Beta-98605", 1110, 60);
      R_Date("Beta-53013", 1080, 70);
      R_Date("UGA-14546", 1060, 60);
      R_Date("UGA-14545", 1040, 60);
      R_Date("UGA-55", 1022, 40);
      R_Date("Beta-52428", 980, 90);
      R_Date("UM-1675", 970, 105);
      R_Date("Beta-94649", 980, 60);
      R_Date("UGA-14549", 980, 50);
      R_Date("Beta-98606", 960, 60);
      R_Date("UGA-14550", 790, 180);
      R_Date("Beta-216324", 930, 40);
      R_Date("UGA-14547", 860, 40);
      R_Date("Beta-190664", 800, 70);
      R_Date("UGA-14548", 790, 40);
      Span("GA-1");
    };
    Sigma_Boundary("Transition GA_1/GA_2");
    Phase("GA_2")
    {

```

R_Date("Beta-145490", 1080, 40);
R_Date("Beta-145489", 1000, 40);
R_Date("Beta-144161", 990, 40);
R_Date("UGAMS-29225", 900, 22);
R_Date("Beta-41374", 970, 90);
R_Date("Beta-145491", 900, 40);
R_Date("UGA-70", 905, 50);
R_Date("Beta-41373", 930, 90);
R_Date("UGA-509", 890, 50);
R_Date("UGAMS-29227", 860, 21);
R_Date("UGAMS-29230", 860, 21);
R_Date("UGAMS-29084", 860, 20);
R_Date("UGAMS-29228", 860, 22);
R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200);
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40);
R_Date("M-1064", 850, 150);
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200);
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55);
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200);
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60);
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200);
R_Date("UGA-224", 670, 70);
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60);
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40);
R_Date("UGAMS-29083", 620, 20);

```

    Span("GA-2");
};
Sigma_Boundary("Transition GA_2/GA_3");
Phase("GA_3")
{
    R_Date("Beta-134793", 920, 70);
    R_Date("UGA-142", 830, 70);
    R_Date("UGA-328", 945, 140);
    R_Date("Beta-134792", 760, 60);
    R_Date("Beta-67942", 740, 70);
    R_Date("UGAMS-29094", 710, 20);
    R_Date("Beta-67943", 680, 70);
    R_Date("UGA-143", 660, 70);
    R_Date("UGAMS-25389", 620, 20);
    R_Date("UGAMS-29233", 600, 21);
    R_Date("UGAMS-25391", 570, 25);
    R_Date("UGAMS-29091", 580, 20);
    R_Date("UGAMS-25392", 560, 20);
    R_Date("UGAMS-29092", 550, 20);
    Span("GA-3");
};
Sigma_Boundary("Transition GA_3/GA_4");
Phase("GA_4")
{
    R_Date("UGAMS-29098", 610, 20);
    R_Date("UGA-307", 540, 55);
    R_Date("UGA-403", 535, 65);
    R_Date("UGA-205", 500, 55);
    R_Date("UGA-208", 425, 55);
    R_Date("UGA-210", 395, 65);
    R_Date("UGAMS-29095", 300, 20);
    R_Date("UGA-589", 280, 70);
    R_Date("UGAMS-29097", 340, 20);
    R_Date("UGA-56", 286, 45);
    R_Date("UGA-591", 120, 65);
    Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};

```

C.8. [Alternative Model] Contiguous multi-phase model for eastern Tennessee.

Plot()

```

{
Sequence()
{
Sigma_Boundary("Start TN_1");
Phase("TN_1")
{
R_Date("GX-5246", 1430, 155);
R_Date("GX-2154", 1365, 90);
R_Date("GX-5243", 1365, 145);
R_Date("GX-2487", 1345, 90);
R_Date("GX-10246", 1320, 150);
R_Date("UGAMS-28824", 1300, 20);
R_Date("CWRU-26", 1310, 110);
R_Date("GX-10245", 1290, 155);
R_Date("GX-11436", 1295, 90);
R_Date("GX-5045", 1200, 120);
Span("TN-1");
};
Sigma_Boundary("Transition TN_1/TN_2");
Phase("TN_2")
{
R_Date("GX-573", 1325, 105);
R_Date("GX-575", 1100, 155);
R_Date("UGAMS-28821", 970, 20);
R_Date("GX-4213", 960, 120);
R_Date("GX-4208", 935, 130);
R_Date("Beta-127866", 900, 50);
R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("Transition TN_2/TN_3");
Phase("TN_3")
{
R_Date("UGA-1245", 1090, 65);
R_Date("AA80208", 965, 45);
R_Date("UGAMS-28814", 870, 20);
R_Date("UGAMS-29866", 870, 26);
R_Date("GX-14934", 895, 70);
R_Date("GX-7732", 985, 129);
R_Date("UGAMS-28803", 850, 20);
R_Date("GX-4209", 930, 140);
R_Date("GX-4210", 930, 140);
R_Date("M-730", 930, 150);

```

```

R_Date("GX-2594", 850, 100);
R_Date("Beta-128375", 810, 50);
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130);
R_Date("GX-4211", 755, 140);
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130);
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150);
R_Date("GX-1572", 700, 95);
R_Date("TX-5903", 700, 80);
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120);
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("Transition TN_3/TN_4");
Phase("TN_4")
{
R_Date("X2", 893, 44);
R_Date("UGAMS-28810", 850, 20);
R_Date("X1", 773, 44);
R_Date("UGA-5391", 665, 60);
R_Date("RH41-S12-abcde", 620, 40);
R_Date("Beta-127867", 540, 60);
R_Date("RH41-DS-161718", 640, 40);
R_Date("UGAMS-28804", 630, 20);
R_Date("UGA-5394", 550, 65);
R_Date("Beta-128660", 560, 30);
R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60);
R_Date("UGA-4805", 520, 90);
R_Date("GX-4136", 495, 135);
R_Date("GX-4205", 470, 130);
R_Date("A-3342", 450, 50);
R_Date("UGAMS-28809", 430, 20);

```

```

R_Date("GX-6076", 400, 125);
R_Date("AA80150", 386, 36);
R_Date("UGA-4804", 385, 90);
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105);
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120);
R_Date("AA80152", 350, 36);
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105);
R_Date("GX-4135", 245, 120);
R_Date("GX-4137", 240, 115);
R_Date("AA80151", 332, 36);
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};

```

C.9. [Alternative Model] Sequential multi-phase charcoal outlier model for northern Georgia.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start GA_1");
    Phase("GA_1")
    {
      R_Date("GX-2825", 1345, 85)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-94644", 1230, 50)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-228934", 1290, 100);
      R_Date("Beta-52427", 1250, 100)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-52429", 1220, 90)
    }
  }
}

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29864",1160,23);
R_Date("GX-2826", 1195, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-5375", 1160, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-82594", 1150, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-94647", 1150, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-98605", 1110, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-53013", 1080, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14546", 1060, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-14545", 1040, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-55", 1022, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-52428", 980, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("UM-1675", 970, 105)
{

```



```

    Outlier("Charcoal", 1);
};
R_Date("Beta-94649", 980, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14549", 980, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-98606", 960, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40)
{
    Outlier("Charcoal", 1);
};
Span("GA-1");
};
Sigma_Boundary("End GA_1");
Sigma_Boundary("Start GA_2");
Phase("GA_2")
{
    R_Date("Beta-145490", 1080, 40);
    R_Date("Beta-145489", 1000, 40);
    R_Date("Beta-144161", 990, 40);
    R_Date("UGAMS-29225", 900, 22);
    R_Date("Beta-41374", 970, 90)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("Beta-145491", 900, 40);
    R_Date("UGA-70", 905, 50)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("Beta-41373", 930, 90)
    {

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGA-509", 890, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29227", 860, 21);
R_Date("UGAMS-29230", 860, 21);
R_Date("UGAMS-29084", 860, 20);
R_Date("UGAMS-29228", 860, 22);
R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("M-1064", 850, 150)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200)
{
    Outlier("Charcoal", 1);
};

```

```

};
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-224", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
Sigma_Boundary("Start GA_3");
Phase("GA_3")
{
  R_Date("Beta-134793", 920, 70)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-142", 830, 70)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-328", 945, 140)
  {

```

```

    Outlier("Charcoal", 1);
};
R_Date("Beta-134792", 760, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-67942", 740, 70);
R_Date("UGAMS-29094", 710, 20);
R_Date("Beta-67943", 680, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-143", 660, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("End GA_3");
Sigma_Boundary("Start GA_4");
Phase("GA_4")
{
    R_Date("UGAMS-29098", 610, 20);
    R_Date("UGA-307", 540, 55)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGA-403", 535, 65)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGA-205", 500, 55)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGA-208", 425, 55)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGA-210", 395, 65)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29095", 300, 20);
R_Date("UGA-589", 280, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29097", 340, 20);
R_Date("UGA-56", 286, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-591", 120, 65)
{
  Outlier("Charcoal", 1);
};
Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};

```

C.10. [Alternative Model] Sequential multi-phase charcoal outlier model for eastern Tennessee.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_1");
    Phase("TN_1")
    {
      R_Date("GX-5246", 1430, 155)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2154", 1365, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-5243", 1365, 145)
      {

```

```

    Outlier("Charcoal", 1);
};
R_Date("GX-2487", 1345, 90)
{
    Outlier("Charcoal", 1);
};
R_Date("GX-10246", 1320, 150)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-28824", 1300, 20);
R_Date("CWRU-26", 1310, 110)
{
    Outlier("Charcoal", 1);
};
R_Date("GX-10245", 1290, 155)
{
    Outlier("Charcoal", 1);
};
R_Date("GX-11436", 1295, 90)
{
    Outlier("Charcoal", 1);
};
R_Date("GX-5045", 1200, 120)
{
    Outlier("Charcoal", 1);
};
Span("TN-1");
};
Sigma_Boundary("End TN_1");
Sigma_Boundary("Start TN_2");
Phase("TN_2")
{
    R_Date("GX-573", 1325, 105)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("GX-575", 1100, 155)
    {
        Outlier("Charcoal", 1);
    };
    R_Date("UGAMS-28821", 970, 20);
    R_Date("GX-4213", 960, 120)
    {
        Outlier("Charcoal", 1);
    };
};

```

```

R_Date("GX-4208", 935, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-127866", 900, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("End TN_2");
Sigma_Boundary("Start TN_3");
Phase("TN_3")
{
  R_Date("UGA-1245", 1090, 65)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("AA80208", 965, 45);
  R_Date("UGAMS-28814", 870, 20);
  R_Date("UGAMS-29866", 870, 26);
  R_Date("GX-14934", 895, 70)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-7732", 985, 129)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-28803", 850, 20);
  R_Date("GX-4209", 930, 140)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-4210", 930, 140)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("M-730", 930, 150)
  {
    Outlier("Charcoal", 1);
  };
};

```

```

R_Date("GX-2594", 850, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-128375", 810, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4211", 755, 140)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-1572", 700, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-5903", 700, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);

```



```

R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("End TN_3");
Sigma_Boundary("Start TN_4");
Phase("TN_4")
{
  R_Date("X2", 893, 44);
  R_Date("UGAMS-28810", 850, 20);
  R_Date("X1", 773, 44);
  R_Date("UGA-5391", 665, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("RH41-S12-abcde", 620, 40);
  R_Date("Beta-127867", 540, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("RH41-DS-161718", 640, 40);
  R_Date("UGAMS-28804", 630, 20);
  R_Date("UGA-5394", 550, 65)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("Beta-128660", 560, 30)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-29868", 560, 26);
  R_Date("UGAMS-29867", 620, 27);
  R_Date("UGA-5392", 535, 60)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGA-4805", 520, 90)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("GX-4136", 495, 135)
  {
    Outlier("Charcoal", 1);
  };
};

```

```

R_Date("GX-4205", 470, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("A-3342", 450, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80150", 386, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-4804", 385, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80152", 350, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4135", 245, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4137", 240, 115)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("AA80151", 332, 36)
{
    Outlier("Charcoal", 1);
};
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};

```

C.11. [Alternative Model] Sequential multi-phase model for northern Georgia.

```

Plot()
{
    Sequence()
    {
        Sigma_Boundary("Start GA_1");
        Phase("GA_1")
        {
            R_Date("GX-2825", 1345, 85);
            R_Date("Beta-94644", 1230, 50);
            R_Date("Beta-228934", 1290, 100);
            R_Date("Beta-52427", 1250, 100);
            R_Date("Beta-52429", 1220, 90);
            R_Date("UGAMS-29864", 1160, 23);
            R_Date("GX-2826", 1195, 100);
            R_Date("UGA-5375", 1160, 60);
            R_Date("Beta-82594", 1150, 70);
            R_Date("Beta-94647", 1150, 70);
            R_Date("Beta-98605", 1110, 60);
            R_Date("Beta-53013", 1080, 70);
            R_Date("UGA-14546", 1060, 60);
            R_Date("UGA-14545", 1040, 60);
            R_Date("UGA-55", 1022, 40);
            R_Date("Beta-52428", 980, 90);
            R_Date("UM-1675", 970, 105);
            R_Date("Beta-94649", 980, 60);
            R_Date("UGA-14549", 980, 50);
            R_Date("Beta-98606", 960, 60);
            R_Date("UGA-14550", 790, 180);
            R_Date("Beta-216324", 930, 40);

```

```

R_Date("UGA-14547", 860, 40);
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40);
Span("GA-1");
};
Sigma_Boundary("End GA_1");
Sigma_Boundary("Start GA_2");
Phase("GA_2")
{
R_Date("Beta-145490", 1080, 40);
R_Date("Beta-145489", 1000, 40);
R_Date("Beta-144161", 990, 40);
R_Date("UGAMS-29225", 900, 22);
R_Date("Beta-41374", 970, 90);
R_Date("Beta-145491", 900, 40);
R_Date("UGA-70", 905, 50);
R_Date("Beta-41373", 930, 90);
R_Date("UGA-509", 890, 50);
R_Date("UGAMS-29227", 860, 21);
R_Date("UGAMS-29230", 860, 21);
R_Date("UGAMS-29084", 860, 20);
R_Date("UGAMS-29228", 860, 22);
R_Date("UGAMS-29090", 850, 20);
R_Date("UGAMS-29229", 850, 22);
R_Date("UGAMS-29231", 850, 21);
R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200);
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40);
R_Date("M-1064", 850, 150);
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200);
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55);
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200);
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60);
R_Date("Beta-257894", 710, 40);

```

```

R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200);
R_Date("UGA-224", 670, 70);
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60);
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40);
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
Sigma_Boundary("Start GA_3");
Phase("GA_3")
{
R_Date("Beta-134793", 920, 70);
R_Date("UGA-142", 830, 70);
R_Date("UGA-328", 945, 140);
R_Date("Beta-134792", 760, 60);
R_Date("Beta-67942", 740, 70);
R_Date("UGAMS-29094", 710, 20);
R_Date("Beta-67943", 680, 70);
R_Date("UGA-143", 660, 70);
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("End GA_3");
Sigma_Boundary("Start GA_4");
Phase("GA_4")
{
R_Date("UGAMS-29098", 610, 20);
R_Date("UGA-307", 540, 55);
R_Date("UGA-403", 535, 65);
R_Date("UGA-205", 500, 55);
R_Date("UGA-208", 425, 55);
R_Date("UGA-210", 395, 65);
R_Date("UGAMS-29095", 300, 20);
R_Date("UGA-589", 280, 70);
R_Date("UGAMS-29097", 340, 20);
R_Date("UGA-56", 286, 45);
R_Date("UGA-591", 120, 65);

```

```

    Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};

```

C.12. [Alternative Model] Sequential multi-phase model for eastern Tennessee.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start TN_1");
    Phase("TN_1")
    {
      R_Date("GX-5246", 1430, 155);
      R_Date("GX-2154", 1365, 90);
      R_Date("GX-5243", 1365, 145);
      R_Date("GX-2487", 1345, 90);
      R_Date("GX-10246", 1320, 150);
      R_Date("UGAMS-28824", 1300, 20);
      R_Date("CWRU-26", 1310, 110);
      R_Date("GX-10245", 1290, 155);
      R_Date("GX-11436", 1295, 90);
      R_Date("GX-5045", 1200, 120);
      Span("TN-1");
    };
    Sigma_Boundary("End TN_1");
    Sigma_Boundary("Start TN_2");
    Phase("TN_2")
    {
      R_Date("GX-573", 1325, 105);
      R_Date("GX-575", 1100, 155);
      R_Date("UGAMS-28821", 970, 20);
      R_Date("GX-4213", 960, 120);
      R_Date("GX-4208", 935, 130);
      R_Date("Beta-127866", 900, 50);
      R_Date("UGAMS-28819", 890, 20);
      R_Date("UGAMS-28816", 840, 20);
      R_Date("UGAMS-28817", 830, 20);
      R_Date("UGAMS-28818", 800, 20);
      Span("TN-2");
    };
    Sigma_Boundary("End TN_2");
    Sigma_Boundary("Start TN_3");
  }
}

```

```

Phase("TN_3")
{
  R_Date("UGA-1245", 1090, 65);
  R_Date("AA80208", 965, 45);
  R_Date("UGAMS-28814", 870, 20);
  R_Date("UGAMS-29866", 870, 26);
  R_Date("GX-14934", 895, 70);
  R_Date("GX-7732", 985, 129);
  R_Date("UGAMS-28803", 850, 20);
  R_Date("GX-4209", 930, 140);
  R_Date("GX-4210", 930, 140);
  R_Date("M-730", 930, 150);
  R_Date("GX-2594", 850, 100);
  R_Date("Beta-128375", 810, 50);
  R_Date("Beta-181800", 810, 40);
  R_Date("GX-4212", 790, 130);
  R_Date("GX-4211", 755, 140);
  R_Date("UGAMS-28823", 780, 20);
  R_Date("GX-6077", 735, 130);
  R_Date("UGAMS-28825", 770, 20);
  R_Date("UGAMS-28815", 770, 20);
  R_Date("UGAMS-28802", 760, 20);
  R_Date("UGAMS-28827", 760, 20);
  R_Date("M-731", 670, 150);
  R_Date("GX-1572", 700, 95);
  R_Date("TX-5903", 700, 80);
  R_Date("UGAMS-28807", 670, 20);
  R_Date("GX-6075", 605, 120);
  R_Date("UGAMS-28811", 650, 20);
  R_Date("Beta-128377", 640, 50);
  R_Date("UGAMS-28805", 630, 20);
  R_Date("UGAMS-28806", 630, 20);
  R_Date("UGAMS-28822", 630, 20);
  R_Date("AA86381", 623, 38);
  R_Date("UGAMS-28808", 600, 20);
  Span("TN-3");
};
Sigma_Boundary("End TN_3");
Sigma_Boundary("Start TN_4");
Phase("TN_4")
{
  R_Date("X2", 893, 44);
  R_Date("UGAMS-28810", 850, 20);
  R_Date("X1", 773, 44);
  R_Date("UGA-5391", 665, 60);
  R_Date("RH41-S12-abcde", 620, 40);

```

```

R_Date("Beta-127867", 540, 60);
R_Date("RH41-DS-161718", 640, 40);
R_Date("UGAMS-28804", 630, 20);
R_Date("UGA-5394", 550, 65);
R_Date("Beta-128660", 560, 30);
R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60);
R_Date("UGA-4805", 520, 90);
R_Date("GX-4136", 495, 135);
R_Date("GX-4205", 470, 130);
R_Date("A-3342", 450, 50);
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125);
R_Date("AA80150", 386, 36);
R_Date("UGA-4804", 385, 90);
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105);
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120);
R_Date("AA80152", 350, 36);
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105);
R_Date("GX-4135", 245, 120);
R_Date("GX-4137", 240, 115);
R_Date("AA80151", 332, 36);
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};

```

C.13. [Alternative Model] Individual phase charcoal outlier model for GA-1.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start GA_1");
    Phase("GA_1")
    {
      R_Date("GX-2825", 1345, 85)
      {

```



```

    Outlier("Charcoal", 1);
};
R_Date("Beta-94644", 1230, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-228934", 1290, 100);
R_Date("Beta-52427", 1250, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-52429", 1220, 90)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29864", 1160, 23);
R_Date("GX-2826", 1195, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-5375", 1160, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-82594", 1150, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-94647", 1150, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-98605", 1110, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-53013", 1080, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14546", 1060, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14545", 1040, 60)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGA-55", 1022, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-52428", 980, 90)
{
    Outlier("Charcoal", 1);
};
R_Date("UM-1675", 970, 105)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-94649", 980, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14549", 980, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-98606", 960, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40)
{
    Outlier("Charcoal", 1);
};
Span("GA-1");
};
Sigma_Boundary("End GA_1");
};
};

```

C.14. [Alternative Model] Individual phase charcoal outlier model for GA-2.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start GA_2");
    Phase("GA_2")
    {
      R_Date("Beta-145490", 1080, 40);
      R_Date("Beta-145489", 1000, 40);
      R_Date("Beta-144161", 990, 40);
      R_Date("UGAMS-29225", 900, 22);
      R_Date("Beta-41374", 970, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-145491", 900, 40);
      R_Date("UGA-70", 905, 50)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-41373", 930, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGA-509", 890, 50)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-29227", 860, 21);
      R_Date("UGAMS-29230", 860, 21);
      R_Date("UGAMS-29084", 860, 20);
      R_Date("UGAMS-29228", 860, 22);
      R_Date("UGAMS-29090", 850, 20);
      R_Date("UGAMS-29229", 850, 22);
      R_Date("UGAMS-29231", 850, 21);
      R_Date("Beta-144163", 850, 40);
      R_Date("M-542", 910, 200)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-29236", 840, 22);
      R_Date("Beta-257893", 840, 40)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
}

```

```

};
R_Date("M-1064", 850, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-224", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
};
};

```

C.15. [Alternative Model] Individual phase charcoal outlier model for GA-3.

```

Plot()
{
    Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
    Sequence()
    {
        Sigma_Boundary("Start GA_3");
        Phase("GA_3")
        {
            R_Date("Beta-134793", 920, 70)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("UGA-142", 830, 70)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("UGA-328", 945, 140)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("Beta-134792", 760, 60)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("Beta-67942", 740, 70);
            R_Date("UGAMS-29094", 710, 20);
            R_Date("Beta-67943", 680, 70)
            {

```

```

    Outlier("Charcoal", 1);
};
R_Date("UGA-143", 660, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("End GA_3");
};
};

```

C.16. [Alternative Model] Individual phase charcoal outlier model for GA-4.

```

Plot()
{
    Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
    Sequence()
    {
        Sigma_Boundary("Start GA_4");
        Phase("GA_4")
        {
            R_Date("UGAMS-29098", 610, 20);
            R_Date("UGA-307", 540, 55)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("UGA-403", 535, 65)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("UGA-205", 500, 55)
            {
                Outlier("Charcoal", 1);
            };
            R_Date("UGA-208", 425, 55)
            {
                Outlier("Charcoal", 1);
            };

```

```

};
R_Date("UGA-210", 395, 65)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29095", 300, 20);
R_Date("UGA-589", 280, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29097", 340, 20);
R_Date("UGA-56", 286, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-591", 120, 65)
{
  Outlier("Charcoal", 1);
};
Span("GA-4");
};
Sigma_Boundary("End GA_4");
};
};

```

C.17. [Alternative Model] Individual phase model for GA-1.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start GA_1");
    Phase("GA_1")
    {
      R_Date("GX-2825", 1345, 85);
      R_Date("Beta-94644", 1230, 50);
      R_Date("Beta-228934", 1290, 100);
      R_Date("Beta-52427", 1250, 100);
      R_Date("Beta-52429", 1220, 90);
      R_Date("UGAMS-29864", 1160, 23);
      R_Date("GX-2826", 1195, 100);
      R_Date("UGA-5375", 1160, 60);
      R_Date("Beta-82594", 1150, 70);
      R_Date("Beta-94647", 1150, 70);
      R_Date("Beta-98605", 1110, 60);
    }
  }
}

```

```

R_Date("Beta-53013", 1080, 70);
R_Date("UGA-14546", 1060, 60);
R_Date("UGA-14545", 1040, 60);
R_Date("UGA-55", 1022, 40);
R_Date("Beta-52428", 980, 90);
R_Date("UM-1675", 970, 105);
R_Date("Beta-94649", 980, 60);
R_Date("UGA-14549", 980, 50);
R_Date("Beta-98606", 960, 60);
R_Date("UGA-14550", 790, 180);
R_Date("Beta-216324", 930, 40);
R_Date("UGA-14547", 860, 40);
R_Date("Beta-190664", 800, 70);
R_Date("UGA-14548", 790, 40);
Span("GA-1");
};
Sigma_Boundary("End GA_1");
};
};

```

C.18. [Alternative Model] Individual phase model for GA-2.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start GA_2");
    Phase("GA_2")
    {
      R_Date("Beta-145490", 1080, 40);
      R_Date("Beta-145489", 1000, 40);
      R_Date("Beta-144161", 990, 40);
      R_Date("UGAMS-29225", 900, 22);
      R_Date("Beta-41374", 970, 90);
      R_Date("Beta-145491", 900, 40);
      R_Date("UGA-70", 905, 50);
      R_Date("Beta-41373", 930, 90);
      R_Date("UGA-509", 890, 50);
      R_Date("UGAMS-29227", 860, 21);
      R_Date("UGAMS-29230", 860, 21);
      R_Date("UGAMS-29084", 860, 20);
      R_Date("UGAMS-29228", 860, 22);
      R_Date("UGAMS-29090", 850, 20);
      R_Date("UGAMS-29229", 850, 22);
      R_Date("UGAMS-29231", 850, 21);
    }
  }
}

```



```

R_Date("Beta-144163", 850, 40);
R_Date("M-542", 910, 200);
R_Date("UGAMS-29236", 840, 22);
R_Date("Beta-257893", 840, 40);
R_Date("M-1064", 850, 150);
R_Date("Beta-144162", 830, 40);
R_Date("UGAMS-29226", 830, 22);
R_Date("UGAMS-29234", 830, 21);
R_Date("Beta-144811", 820, 40);
R_Date("Beta-144164", 810, 40);
R_Date("M-402", 725, 200);
R_Date("UGAMS-29235", 810, 22);
R_Date("UGA-215", 785, 55);
R_Date("Beta-260069", 790, 40);
R_Date("UGAMS-25390", 800, 20);
R_Date("M-1061", 670, 200);
R_Date("Beta-260068", 770, 40);
R_Date("M-543", 500, 250);
R_Date("UGAMS-29862", 770, 23);
R_Date("UGA-510", 730, 60);
R_Date("Beta-257894", 710, 40);
R_Date("Beta-260070", 710, 40);
R_Date("M-1062", 450, 200);
R_Date("UGA-224", 670, 70);
R_Date("UGAMS-29088", 680, 20);
R_Date("UGAMS-29232", 680, 21);
R_Date("UGA-213", 670, 60);
R_Date("UGAMS-29085", 640, 20);
R_Date("Beta-257895", 640, 40);
R_Date("UGAMS-29083", 620, 20);
Span("GA-2");
};
Sigma_Boundary("End GA_2");
};
};

```

C.19. [Alternative Model] Individual phase model for GA-3.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start GA_3");
    Phase("GA_3")
    {

```

```

R_Date("Beta-134793", 920, 70);
R_Date("UGA-142", 830, 70);
R_Date("UGA-328", 945, 140);
R_Date("Beta-134792", 760, 60);
R_Date("Beta-67942", 740, 70);
R_Date("UGAMS-29094", 710, 20);
R_Date("Beta-67943", 680, 70);
R_Date("UGA-143", 660, 70);
R_Date("UGAMS-25389", 620, 20);
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-25391", 570, 25);
R_Date("UGAMS-29091", 580, 20);
R_Date("UGAMS-25392", 560, 20);
R_Date("UGAMS-29092", 550, 20);
Span("GA-3");
};
Sigma_Boundary("End GA_3");
};
};

```

C.20. [Alternative Model] Individual phase model for GA-4.

```

Plot(GA_4)
{
  Sequence(GA_4)
  {
    Sigma_Boundary("Start GA_4");
    Phase("GA_4")
    {
      R_Date("UGAMS-29098", 610, 20);
      R_Date("UGA-307", 540, 55);
      R_Date("UGA-403", 535, 65);
      R_Date("UGA-205", 500, 55);
      R_Date("UGA-208", 425, 55);
      R_Date("UGA-210", 395, 65);
      R_Date("UGAMS-29095", 300, 20);
      R_Date("UGA-589", 280, 70);
      R_Date("UGAMS-29097", 340, 20);
      R_Date("UGA-56", 286, 45);
      R_Date("UGA-591", 120, 65);
      Span("GA-4");
    };
    Sigma_Boundary("End GA_4");
  };
};

```

C.21. [Alternative Model] Individual phase charcoal outlier model for TN-1.

```
Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_1");
    Phase("TN_1")
    {
      R_Date("GX-5246", 1430, 155)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2154", 1365, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-5243", 1365, 145)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2487", 1345, 90)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-10246", 1320, 150)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-28824", 1300, 20);
      R_Date("CWRU-26", 1310, 110)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-10245", 1290, 155)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
};
```

```

R_Date("GX-11436", 1295, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-5045", 1200, 120)
{
  Outlier("Charcoal", 1);
};
Span("TN-1");
};
Sigma_Boundary("End TN_1");
};
};

```

C.22. [Alternative Model] Individual phase charcoal outlier model for TN-2.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_2");
    Phase("TN_2")
    {
      R_Date("GX-573", 1325, 105)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-575", 1100, 155)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-28821", 970, 20);
      R_Date("GX-4213", 960, 120)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-4208", 935, 130)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-127866", 900, 50)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
}

```

```

R_Date("UGAMS-28819", 890, 20);
R_Date("UGAMS-28816", 840, 20);
R_Date("UGAMS-28817", 830, 20);
R_Date("UGAMS-28818", 800, 20);
Span("TN-2");
};
Sigma_Boundary("End TN_2");
};
};

```

C.23. [Alternative Model] Individual phase charcoal outlier model for TN-3.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_3");
    Phase("TN_3")
    {
      R_Date("UGA-1245", 1090, 65)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("AA80208", 965, 45);
      R_Date("UGAMS-28814", 870, 20);
      R_Date("UGAMS-29866", 870, 26);
      R_Date("GX-14934", 895, 70)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-7732", 985, 129)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-28803", 850, 20);
      R_Date("GX-4209", 930, 140)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-4210", 930, 140)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("M-730", 930, 150)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("GX-2594", 850, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-128375", 810, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4211", 755, 140)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-1572", 700, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-5903", 700, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120)
{
  Outlier("Charcoal", 1);
};
};

```

```

R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("End TN_3");
};
};

```

C.24. [Alternative Model] Individual phase charcoal outlier model for TN-4.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_4");
    Phase("TN_4")
    {
      R_Date("X2", 893, 44);
      R_Date("UGAMS-28810", 850, 20);
      R_Date("X1", 773, 44);
      R_Date("UGA-5391", 665, 60)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("RH41-S12-abcde", 620, 40);
      R_Date("Beta-127867", 540, 60)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("RH41-DS-161718", 640, 40);
      R_Date("UGAMS-28804", 630, 20);
      R_Date("UGA-5394", 550, 65)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-128660", 560, 30)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
}

```

```

R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-4805", 520, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4136", 495, 135)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4205", 470, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("A-3342", 450, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80150", 386, 36)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-4804", 385, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80152", 350, 36)

```



```

{
  Outlier("Charcoal", 1);
};
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4135", 245, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4137", 240, 115)
{
  Outlier("Charcoal", 1);
};
R_Date("AA80151", 332, 36)
{
  Outlier("Charcoal", 1);
};
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};

```

C.25. [Alternative Model] Individual phase model for TN-1.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start TN_1");
    Phase("TN_1")
    {
      R_Date("GX-5246", 1430, 155);
      R_Date("GX-2154", 1365, 90);
      R_Date("GX-5243", 1365, 145);
      R_Date("GX-2487", 1345, 90);
      R_Date("GX-10246", 1320, 150);
      R_Date("UGAMS-28824", 1300, 20);
      R_Date("CWRU-26", 1310, 110);
      R_Date("GX-10245", 1290, 155);
      R_Date("GX-11436", 1295, 90);
      R_Date("GX-5045", 1200, 120);
    }
  }
}

```

```

    Span("TN-1");
  };
  Sigma_Boundary("End TN_1");
};
};

```

C.26. [Alternative Model] Individual phase model for TN-2.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start TN_2");
    Phase("TN_2")
    {
      R_Date("GX-573", 1325, 105);
      R_Date("GX-575", 1100, 155);
      R_Date("UGAMS-28821", 970, 20);
      R_Date("GX-4213", 960, 120);
      R_Date("GX-4208", 935, 130);
      R_Date("Beta-127866", 900, 50);
      R_Date("UGAMS-28819", 890, 20);
      R_Date("UGAMS-28816", 840, 20);
      R_Date("UGAMS-28817", 830, 20);
      R_Date("UGAMS-28818", 800, 20);
      Span("TN-2");
    };
    Sigma_Boundary("End TN_2");
  };
};

```

C.27. [Alternative Model] Individual phase model for TN-3.

```

Plot()
{
  Sequence()
  {
    Sigma_Boundary("Start TN_3");
    Phase("TN_3")
    {
      R_Date("UGA-1245", 1090, 65);
      R_Date("AA80208", 965, 45);
      R_Date("UGAMS-28814", 870, 20);
      R_Date("UGAMS-29866", 870, 26);
      R_Date("GX-14934", 895, 70);
    };
  };
};

```

```

R_Date("GX-7732", 985, 129);
R_Date("UGAMS-28803", 850, 20);
R_Date("GX-4209", 930, 140);
R_Date("GX-4210", 930, 140);
R_Date("M-730", 930, 150);
R_Date("GX-2594", 850, 100);
R_Date("Beta-128375", 810, 50);
R_Date("Beta-181800", 810, 40);
R_Date("GX-4212", 790, 130);
R_Date("GX-4211", 755, 140);
R_Date("UGAMS-28823", 780, 20);
R_Date("GX-6077", 735, 130);
R_Date("UGAMS-28825", 770, 20);
R_Date("UGAMS-28815", 770, 20);
R_Date("UGAMS-28802", 760, 20);
R_Date("UGAMS-28827", 760, 20);
R_Date("M-731", 670, 150);
R_Date("GX-1572", 700, 95);
R_Date("TX-5903", 700, 80);
R_Date("UGAMS-28807", 670, 20);
R_Date("GX-6075", 605, 120);
R_Date("UGAMS-28811", 650, 20);
R_Date("Beta-128377", 640, 50);
R_Date("UGAMS-28805", 630, 20);
R_Date("UGAMS-28806", 630, 20);
R_Date("UGAMS-28822", 630, 20);
R_Date("AA86381", 623, 38);
R_Date("UGAMS-28808", 600, 20);
Span("TN-3");
};
Sigma_Boundary("End TN_3");
};
};

```

C.28. [Alternative Model] Individual phase model for TN-4.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Sigma_Boundary("Start TN_4");
    Phase("TN_4")
    {
      R_Date("X2", 893, 44);
    }
  }
}

```

```

R_Date("UGAMS-28810", 850, 20);
R_Date("X1", 773, 44);
R_Date("UGA-5391", 665, 60);
R_Date("RH41-S12-abcde", 620, 40);
R_Date("Beta-127867", 540, 60);
R_Date("RH41-DS-161718", 640, 40);
R_Date("UGAMS-28804", 630, 20);
R_Date("UGA-5394", 550, 65);
R_Date("Beta-128660", 560, 30);
R_Date("UGAMS-29868", 560, 26);
R_Date("UGAMS-29867", 620, 27);
R_Date("UGA-5392", 535, 60);
R_Date("UGA-4805", 520, 90);
R_Date("GX-4136", 495, 135);
R_Date("GX-4205", 470, 130);
R_Date("A-3342", 450, 50);
R_Date("UGAMS-28809", 430, 20);
R_Date("GX-6076", 400, 125);
R_Date("AA80150", 386, 36);
R_Date("UGA-4804", 385, 90);
R_Date("Beta-179901", 370, 30);
R_Date("GX-4138", 350, 105);
R_Date("GX-4207", 330, 120);
R_Date("GX-6074", 315, 120);
R_Date("AA80152", 350, 36);
R_Date("M-582", 330, 75);
R_Date("GX-4206", 280, 105);
R_Date("GX-4135", 245, 120);
R_Date("GX-4137", 240, 115);
R_Date("AA80151", 332, 36);
Span("TN-4");
};
Sigma_Boundary("End TN_4");
};
};

```

APPENDIX D: OXCAL CODE FOR PLATFORM MOUND CHRONOLOGIES

D.1. [Primary Model] Mound at Dallas (40Ha1).

```
Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Phase("1")
    {
      R_Date("Beta-127867", 540, 60)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-128660", 560, 30)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("UGAMS-29868", 560, 26);
    };
    Boundary("End 1");
  };
};
```

D.2. [Primary Model] Mound at DeArmond (40Re12).

```
Plot()
{
  Sequence()
  {
    Boundary("Start 1");
```

```

Phase("1")
{
  R_Date("UGAMS-28814", 870, 20);
  R_Date("UGAMS-28810", 850, 20);
  R_Date("Beta-128377", 640, 50);
  R_Date("UGAMS-28811", 650, 20);
  R_Date("UGAMS-28809", 430, 20);
};
Boundary("End 1");
};
};

```

D.3. [Primary Model] Mound at Hiwassee Island (40Mg31).

```

Plot()
{
  Sequence()
  {
    Boundary("Start 1");
    Phase("1")
    {
      R_Date("UGAMS-28803", 850, 20);
      R_Date("Beta-181800", 810, 40);
      R_Date("NA2", 773, 44);
      R_Date("UGAMS-28802", 760, 20);
      R_Date("UGAMS-28804", 630, 20);
    };
    Boundary("End 1");
  };
};

```

D.4. [Primary Model] Mound at Hixon (40Ha3).

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Sequence("1")
    {
      R_Date("UGAMS-28806", 630, 20);
    }
    Phase()
    {

```

```

R_Date("UGAMS-28807", 670, 20);
R_Date("UGAMS-28805", 630, 20);
R_Date("Beta-128375", 810, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-28808", 600, 20);
};
};
Boundary("End 1");
};
};

```

D.5. [Primary Model] Mound at Toqua (40Mr6).

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Sequence("1")
    {
      Phase()
      {
        R_Date("GX-6077", 735, 130)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGAMS-28822", 620, 20);
      };
      Phase()
      {
        R_Date("AA86381", 623, 38);
        R_Date("GX-6075", 605, 120)
        {
          Outlier("Charcoal", 1);
        };
      };
      Phase()
      {
        R_Date("GX-4206", 280, 105)
        {
          Outlier("Charcoal", 1);
        };
      };
    }
  }
}

```

```

R_Date("GX-6074", 315, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-4207", 330, 120);
};
Boundary("End 1");
};
};

```

D.6. [Primary Model] Mound at Bell Field (9Mu101).

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Sequence("1")
    {
      Phase("Third Core Mound")
      {
        R_Date("UGAMS-25391", 570, 25);
        R_Date("UGAMS-29092", 550, 20);
      };
      Phase("Second Core Mound")
      {
        R_Date("UGA-213", 670, 60)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGA-215", 785, 55)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGA-224", 670, 70)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGA-510", 730, 60)
        {
          Outlier("Charcoal", 1);
        };
      };
    };
  };
};

```



```

Phase("First Core Mound/Summit")
{
  R_Date("UGA-509", 890, 50)
  {
    Outlier("Charcoal", 1);
  };
  R_Date("UGAMS-25392", 560, 20);
  R_Date("UGAMS-29091", 580, 20);
  R_Date("UGAMS-29093", 460, 20);
};
};
Boundary("End 1");
};
};

```

D.7. [Primary Model] Etowah's (9Br1) Mound C.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Sequence("1")
    {
      Phase()
      {
        R_Date("UGAMS-29228", 860, 22);
        R_Date("UGAMS-29231", 850, 21);
        R_Date("M-1064", 850, 150)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UGAMS-29227", 860, 21);
      };
      Phase()
      {
        R_Date("UGAMS-29225", 900, 22);
        R_Date("UGAMS-29226", 830, 22);
        R_Date("UGAMS-29229", 850, 22);
        R_Date("UGAMS-29230", 860, 21);
        R_Date("UGAMS-29234", 830, 21);
        R_Date("UGAMS-29235", 810, 22);
        R_Date("UGAMS-29236", 840, 22);
        Span("Mound C");
      };
    };
  };
}

```

```

R_Date("M-1061", 670, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("M-1062", 450, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("M-402", 725, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("M-542", 910, 200)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29233", 600, 21);
R_Date("UGAMS-29232", 680, 21);
};
};
Boundary("End 1");
};
};

```

D.8. [Primary Model] Hamilton mounds.

```

Plot(Hamilton)
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence(Hamilton)
  {
    Sigma_Boundary("Start Hamilton");
    Phase("Hamilton")
    {
      R_Date("GX-2604", 1275, 105)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-3463", 1265, 170)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("GX-2596", 1135, 100)
      {
        Outlier("Charcoal", 1);
      };
    };
  };
};

```

```

};
R_Date("GX-2605", 1145, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2603", 1150, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29861", 1070, 24);
R_Date("GX-3459", 1070, 180)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2602", 1030, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-3462", 1020, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("UGA-738", 1030, 160)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-3460", 970, 160)
{
  Outlier("Charcoal", 1);
};
R_Date("UGAMS-29860", 900, 23);
R_Date("GX-2606", 855, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2597", 850, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-3461", 725, 160)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2600", 805, 95)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("GX-2601", 795, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2598", 730, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("GX-2599", 595, 100)
{
  Outlier("Charcoal", 1);
};
Span("TN-Ham");
};
Sigma_Boundary("End Hamilton");
};
};

```

D.9. [Primary Model] Etowah (9Br1) saucers.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Phase()
    {
      R_Date("Beta-145490", 1080, 40)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-145489", 1000, 40)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-144161", 990, 40)
      {
        Outlier("Charcoal", 1);
      };
      R_Date("Beta-145491", 900, 40)
      {
        Outlier("Charcoal", 1);
      };
    }
  }
}

```

```

R_Date("Beta-144162", 830, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144163", 850, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144164", 810, 40)
{
  Outlier("Charcoal", 1);
};
};
Boundary("End 1");
};
};

```

D.10. [Primary Model] Etowah (9Br1) midden sequencD.

```

Plot()
{
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
    Boundary("Start 1");
    Sequence("1")
    {
      Phase()
      {
        R_Date("Beta-145490", 1080, 40)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-145489", 1000, 40)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-144161", 990, 40)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-145491", 900, 40)
        {
          Outlier("Charcoal", 1);
        };
      };
    };
  };
};

```

```

R_Date("Beta-144162", 830, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144163", 850, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-144164", 810, 40)
{
  Outlier("Charcoal", 1);
};
};
R_Date("Beta-144811", 820, 40)
{
  Outlier("Charcoal", 1);
};
Phase()
{
  R_Date("Beta-67942", 740, 70);
  R_Date("Beta-67943", 680, 70)
  {
    Outlier("Charcoal", 1);
  };
};
R_Date("UGAMS-29094", 710, 20);
};
Boundary("End 1");
};
};

```

APPENDIX E: CERAMIC DATA USED FOR SOCIAL NETWORK ANALYSES

Key to Abbreviations:

CSSw Complicated Stamped Swift Creek
CSNap Complicated Stamped Napier
CSWoo Complicated Stamped Woodstock
CSEto Complicated Stamped Etowah
CSWil Complicated Stamped Wilbanks
CS Complicated Stamped
P Plain
FI Fabric Impressed
SS Simple Stamped
ChS Check Stamped
Crd Cordmarked
Br Brushed
In Incised
Pt Painted
Sp Slipped
Pu Punctated
Net Net Impressed
Cob Corncob Impressed
PB Polished Black
NP Negative Painted

SGT (Prefix) Sand/Grit Tempered
ShT (Prefix) Shell Tempered
LT (Prefix) Limestone Tempered
QT (Prefix) Quartz Tempered

Table E.1. Temper, AD 800-1050.

Site	LT	ShT	SGT
40Ha10	5393	0	0
40Ha63	751	0	23
40Ld45	6165	73	274
40Mi11	9126	49	15
40Mr20	0	0	139
40Mr21	5807	0	604
40Mr23	3985	260	2568
40Mr25	3	0	1283
40Mr40	63193	86	5298
40Mr41	1722	0	288
40Re108	146	0	94
9Br73	0	0	290
9Ck105	0	0	63
9Ck2	0	0	5568
9Ck47	0	0	71
9Ck62	0	0	342
9Ck85	0	0	273
9Ck9	0	0	307
9Co55	0	0	57
9Co59	0	0	53
9Co60	0	0	126
9Do2	17	1	752
9Fl193	1	0	1235
9Fo16	0	0	157
9Gw70	0	0	1260
9Lu7	0	0	1835
9Mu103	0	4	421

Table E.2. Temper, AD 1050-1325.

Site	LT	LShTP	ShT	SGT
40Ha1	6192	0	0	0
40Ha10	2581	0	0	0
40Ha2	1298	0	157	15
40Ha210	4	0	81	0
40Ha3	474	0	1006	0
40Ha63	30400	0	0	0
40Ld208	0	0	204	0
40Ld24	1389	0	13460	16
40Mg31	11625	0	5843	0
40Mi11	1900	0	0	0
40Mi20	379	0	0	0
40Mr20	5592	14	7269	52
40Mr25	898	0	141	83
40Mr32	4	0	51	0
40Mr5	283	0	319	31
40Mr50	9	0	66	3
40Pk3	1065	84	8	28
40Re108	215	0	89	8
40Re12	971	0	9318	4
40Re124	25	0	127	0
40Rh6	555	0	454	15
40Rh7	190	0	2	1
9Br1	1262	0	5726	13559
9Br26	0	0	3	158
9Br60A	0	0	3	96
9Ck1	231	0	6	8794
9Ck4	0	0	3	953
9Ck46	0	0	0	75
9Ck5	0	0	39	2021
9Ck85	0	0	0	57
9Co45	0	0	0	2469
9Co52	0	0	0	132
9Co55	10	0	0	124
9Co57	0	0	0	44
9Co73	59	0	0	1
9Co75	0	0	0	198
9Fl3	0	0	107	547
9Mu100	1426	0	0	604
9Mu101	0	0	139	297

Table E.3. Temper, AD 1325-1650.

Site	LT	ShT	SGT
40Ha1	0	20121	0
40Ha10	0	8252	0
40Mg31	0	5669	4
40Mr26	12	837	9
40Mr27	1	1616	3
40Mr32	3	203	0
40Mr5	21	5269	29
40Mr6	0	129	1
40Mr7	121	11382	107
40Re12	401	9116	7
9Br1	0	8	523
9Br60A	0	6	120
9Br60B	0	0	56
9Go4	0	4504	4620
9Hm2	0	0	234
9Mu100	16	4441	5161
9Mu102	6	8311	6161
9Mu103	0	643	1930

Table E.4. Surface treatment, AD 800-1050.

Site	P	Crd	Br	ChS	FI	CS	SS	Pu	In	Sp
40Ha10	1095	3012	0	109	1150	0	27	0	0	0
40Ha63	537	11	0	72	20	119	9	0	0	0
40Ld45	1540	236	7	24	4676	0	20	0	9	0
40Mi11	6972	127	100	712	880	5	387	0	7	0
40Mr20	0	137	0	0	2	0	0	0	0	0
40Mr21	3708	471	0	53	2003	0	176	0	0	0
40Mr23	3447	551	1100	92	38	66	1513	5	1	0
40Mr25	121	381	0	0	784	0	0	0	0	0
40Mr40	3415	2501	0	1692	59346	947	662	0	8	6
40Mr41	503	163	0	0	1343	0	1	0	0	0
40Re108	120	105	0	1	7	4	3	0	0	0
9Br73	18	0	0	0	271	0	1	0	0	0
9Ck105	27	0	0	3	0	33	0	0	0	0
9Ck2	2553	0	0	14	518	2152	42	41	248	0
9Ck47	41	0	0	7	15	0	8	0	0	0
9Ck62	33	0	0	38	269	0	2	0	0	0
9Ck85	105	0	0	15	0	151	2	0	0	0
9Ck9	97	0	0	5	0	202	2	0	1	0
9Co55	19	0	0	27	0	1	7	0	3	0
9Co59	29	0	0	19	2	0	3	0	0	0
9Co60	89	0	0	19	0	5	8	0	5	0
9Do2	612	1	8	9	0	62	6	1	14	57
9Fl193	1123	1	0	1	1	81	0	0	29	0
9Fo16	132	0	0	4	0	18	1	0	2	0
9Gw70	62	9	0	0	0	1189	0	0	0	0
9Lu7	983	0	0	168	9	68	590	17	0	0
9Mu103	28	0	0	0	0	396	0	0	1	0

Table E.5. Surface treatments, AD 1050-1325.

Site	P	Crd	Br	ChS	Fl	CS	SS	Pt	Pu	In	Sp	NP	Ef	Net	Cob	PB
40Ha1	1246	3361	1418	0	162	5	0	0	0	0	0	0	0	0	0	0
40Ha10	802	1725	0	39	4	0	11	0	0	0	0	0	0	0	0	0
40Ha2	605	109	0	149	15	0	592	0	0	0	0	0	0	0	0	0
40Ha210	80	1	0	0	0	2	0	0	2	0	0	0	0	0	0	0
40Ha3	646	766	17	10	41	0	0	0	0	0	0	0	0	0	0	0
40Ha63	23046	3598	2431	221	31	663	316	0	0	94	0	0	0	0	0	0
40Ld208	186	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40Ld24	10712	2510	0	65	1389	0	71	15	0	12	182	0	0	0	0	0
40Mg31	9002	7777	0	37	472	70	0	33	4	0	73	0	0	0	0	0
40Mi11	1681	22	137	20	31	0	9	0	0	0	0	0	0	0	0	0
40Mi20	288	0	41	19	6	0	25	0	0	0	0	0	0	0	0	0
40Mr20	9730	3170	9	6	382	15	4	4	2	12	99	0	0	0	0	0
40Mr25	911	360	0	10	121	8	30	0	0	2	0	0	0	0	0	0
40Mr32	53	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
40Mr5	300	297	0	0	7	0	0	0	3	26	0	0	0	0	0	0
40Mr50	43	1	0	0	32	0	1	0	0	1	0	0	0	0	0	0
40Pk3	1123	16	9	1	1	44	0	0	0	0	0	0	0	0	0	0
40Re108	241	29	0	16	0	0	24	0	0	2	0	0	0	0	0	0
40Re12	5902	2978	0	86	864	7	127	75	12	32	186	1	26	0	0	0
40Re124	134	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40Rh6	745	21	0	0	1	0	318	25	0	0	2	0	0	0	0	0
40Rh7	97	88	0	0	0	1	7	0	0	0	0	0	0	0	0	0
9Br1	11551	138	17	60	1	3407	4	22	0	111	135	0	0	2	14	344
9Br26	115	0	1	0	0	41	0	0	0	3	0	0	0	0	1	0
9Br60A	16	0	0	0	0	83	0	0	0	0	0	0	0	0	0	0
9Ck1	2386	14	0	5	37	5910	267	0	3	59	289	0	0	0	0	51
9Ck4	447	0	0	0	0	441	0	2	0	0	68	0	0	0	0	0
9Ck46	28	0	0	38	0	7	2	0	0	0	0	0	0	0	0	0
9Ck5	746	3	0	1	0	1285	0	0	0	8	16	0	0	0	0	1
9Ck85	44	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0
9Co45	2201	1	0	0	0	73	0	0	7	63	0	0	0	0	9	0
9Co52	76	0	0	2	0	54	0	0	0	0	0	0	0	0	0	0
9Co55	61	0	0	44	10	1	18	0	0	0	0	0	0	0	0	0
9Co57	27	0	0	6	0	9	0	0	1	1	0	0	0	0	0	0
9Co73	59	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
9Co75	159	0	0	0	0	31	0	0	0	7	1	0	0	0	0	0
9Fl3	382	3	1	5	0	261	0	0	0	2	0	0	0	0	0	0
9Mu100	600	17	0	2	0	373	1	2	0	2	18	0	0	0	0	0
9Mu101	201	28	0	15	6	35	9	2	0	0	11	0	0	0	0	0

Table E.6. Surface treatment, AD 1325-1650.

Site	P	Crd	ChS	FI	CS	SS	In	Pt	Pu	NP	Sp	Ef	Br	Cob
40Ha1	13548	6048	0	324	12	0	143	4	30	0	12	0	0	0
40Ha10	7621	77	0	285	6	0	244	1	6	0	12	0	0	0
40Mg31	3145	1714	0	386	182	0	0	155	0	1	90	0	0	0
40Mr26	546	302	1	1	0	0	2	0	0	0	0	0	0	0
40Mr27	1513	37	0	27	0	0	0	22	0	0	21	0	0	0
40Mr32	203	0	2	0	1	0	0	0	0	0	0	0	0	0
40Mr5	4872	62	247	0	22	9	106	0	1	0	0	0	0	0
40Mr6	102	22	0	1	0	0	3	0	0	1	0	0	0	0
40Mr7	9303	1883	6	37	38	9	314	2	6	0	12	0	0	0
40Re12	6249	2399	62	476	17	43	145	26	24	6	44	33	0	0
9Br1	319	2	2	0	194	0	11	0	0	0	0	0	0	0
9Br60A	78	0	0	0	47	1	0	0	0	0	0	0	0	0
9Br60B	9	0	0	0	39	0	8	0	0	0	0	0	0	0
9Go4	8165	13	0	0	179	1	766	0	0	0	0	0	0	0
9Hm2	0	0	13	0	215	0	6	0	0	0	0	0	0	0
9Mu100	8451	7	194	0	450	0	603	0	26	0	1	0	4	0
9Mu102	11843	457	29	2	1359	12	808	0	0	5	0	0	0	24
9Mu103	1992	21	0	0	281	0	279	0	0	0	0	0	0	0