Masthead Logo
University of Tennessee, Knoxville
Trace: Tennessee Research and Creative Exchange

Masters Theses
Graduate School

12-2018

Human Response to Late Holocene Climate Change at the Patrick Site (40MR40) in East Tennessee

Daniel Hamilton Webb Jr.
University of Tennessee

Recommended Citation

Webb, Daniel Hamilton Jr., "Human Response to Late Holocene Climate Change at the Patrick Site (40MR40) in East Tennessee. " Master's Thesis, University of Tennessee, 2018.
https://trace.tennessee.edu/utk_gradthes/5338

To the Graduate Council:

I am submitting herewith a thesis written by Daniel Hamilton Webb Jr. entitled "Human Response to Late Holocene Climate Change at the Patrick Site (40MR40) in East Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Anthropology.

Kandace Hollenbach, Major Professor

We have read this thesis and recommend its acceptance:

David G. Anderson, Jefferson Chapman

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

Human Response to Late Holocene Climate Change at the Patrick Site (40MR40) in East Tennessee

A Thesis Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Daniel Hamilton Webb Jr.
December 2018

ACKNOWLEDGEMENTS

I wish to offer my advisor, Dr. Kandace D. Hollenbach, my deepest gratitude for her guidance in all aspects of my research and training. Her enthusiasm and flexibility as a mentor made it possible for me to craft a project suited to my own personal interests and enjoy the process of learning along the way.

This thesis also owes a tremendous debt of gratitude to Dr. Gerald F. Schroedl for his meticulous documentation of the Patrick site. His foresight to collect and curate soil monoliths from the site made this project possible. Thank you to my committee members, Dr. Jefferson Chapman and Dr. David G. Anderson, for their helpful insight and support throughout the course of this study. A special thanks to Howard J. Cyr deserves for generously donating his time and advice through the entire course of this project, and to Dr. Sally Horn who has supported my research and education from day-one.

Finally, to my wife Lillie, who has granted me a seemingly endless amount of encouragement and patience through the many seasons of my life in graduate school, thanks.

ABSTRACT

Current archaeological research links Late Holocene climate variability to patterns of dispersal and reorganization during the Archaic-Woodland transition in the Southeast (3200-2400 cal BP). This study uses geomorphic and archaeological proxy data from curated soil monoliths collected at the Patrick site (40MR40), located in Monroe County along the Little Tennessee River in Tennessee, to the assess the impact of Late Holocene climate change on the Late Archaic and Early Woodland groups that utilized the river valley. The results of these analyses indicate that the progressive downcutting of the river, apparent in sediments dating between 5700-3600 cal BP, had an ameliorating effect on the floodplain landscape that preceded the intensified use of first river terrace during the Terminal Late Archaic Iddins phase and Early Woodland Watts Bar phase.

Decreases in coarse grain sediments associated with high-energy flooding and subsequent increases in cumulic soil formation at the Patrick site demonstrate that the floodplain environment had begun to stabilized during the Late Archaic period at approximately 3600 cal BP. This pattern is followed by dense midden accumulation, increases in the occurrence of cultivated plant foods, and a precipitous increase in pottery associated with Early Woodland Watts Bar and Patrick phase occupations at the site; suggesting that local populations took advantage the increasingly inhabitable floodplain environment. This study posits that the relatively cooler and wetter climate conditions of the Late Holocene Subboreal climate period (5000-2400 cal BP) may not have had a disruptive effect on prehistoric populations in the lower Little Tennessee

River valley, contrasting what has been observed elsewhere in the Southeast during the Archaic-Woodland transition.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

The Little Tennessee River flows from the Blue Ridge Mountains down into the rolling hills and valleys of East Tennessee, where its current slows and gradually carves channels through the narrow valley floor, leaving islands and narrow floodplains in its wake. This dynamic landscape has provided a physical setting for some 11,000 years of Native American occupation, resulting in the accumulation of a tremendous amount of archaeological deposits. These contexts constitute an invaluable record of material culture, human lifeways, and long-term environmental change. This being the case, natural and anthropogenic processes in the lower Little Tennessee River Valley have been the subject of an appreciable amount of archaeological research, initiated with the Tellico Archaeological Project, a multi-year series of investigations carried out between 1967 to 1979 and designed to mitigate the impacts of the 1979 impoundment of the lower Little Tennessee River at the completion of Tellico Dam (Schroedl 2009:68-69). Environmental archaeology was an especially important theme of this research resulting in numerous publications addressing processes such as landscape development, subsistence, and human-environment interaction (Chapman 1980; Chapman et al. 1982; Chapman and Shea 1981; Cridlebaugh 1981, 1984; Delcourt et al. 1986; Schroedl 2009).

This thesis attempts to bridge such studies with themes in 21st century southeastern archaeology using data from a site that now lies beneath the waters of the Tellico Reservoir. The principle subject of my research is the interplay between human behavior and the dynamic landscape of the lower Little Tennessee River Valley. I use archaeological, paleoethnobotanical, and geomorphological data from the Patrick site

(40MR40) along the Little Tennessee River in Monroe County to observe processes of site-formation and environmental change during the Late Archaic and Early Woodland period. These data are used to characterize the interplay between prehistoric land use and the depositional environment in order to speak to site-specific human-environment interactions that characterize this timeframe. This case study addresses the broader research question that concerns how humans have responded to climate change at what has been coined as the Archaic-Woodland transition (3200-2400 cal BP); once thought of as a period of cultural, technological and behavioral transformation, but more recently regarded as a time of "eventful environmental change" (Anderson and Sassaman 2012:70) coinciding with complex cultural changes throughout the region (Kidder 2006:196). I address this question using a comparative multiple proxy method in a highly dynamic environment, partly as an effort to demonstrate the method's utility as less invasive interpretive tool well suited to floodplain archaeology.

The Research Problem

Anderson and Mainfort (2002:3) dated the appearance of the Woodland period cultures in the Southeast to roughly 3000 cal BP, but more recent estimates infer and earlier age of 3200 cal BP (Anderson and Sassaman 2012:70). Monument construction, plant domestication, increases in sedentism, and the appearance of pottery traditionally served as taxonomic markers for the end of the Archaic period and the transition to Woodland period culture. This narrative has changed dramatically in recent years, and modern studies now focus on the restructuring of Late Archaic period societies, abandonment, and the disintegration of established trade networks possibly associated with climate change (Anderson 2001, 2010; Anderson and Sassaman 2012:107; Kidder 2006, 2010; Sanger 2010). A hotly debated topic at the 2008 Caldwell Conference entitled "*Trend Tradition and Turmoil, What Happened to the South Eastern Archaic?*" was the degree to which climate events influenced changes among Late Archaic populations, as well as what the consequences of climate events may have been respecting subsistence, settlement, and social organization (Thomas and Sanger 2010). These questions have yet to be applied to the wooded riverine environments of East Tennessee.

The Middle Holocene thermal maximum, also known as the Hypsithermal or Atlantic period (8900-5000 ^{14}C BP), is characterized by an ending of major post-glacial marine transgression and an increase in ocean temperatures globally (Driese et al. 2017; Sandweiss et al. 1999). While this period was once thought to have been much warmer than modern conditions, current understandings of the Atlantic period characterize it as a time of higher climate variability, with greater seasonal extremes, warmer summers and cooler winters occurring in the Northern Hemisphere (Anderson 2001; Driese et al. 2008:287; Ganopolski et al. 1998; Mayewski et al. 2004). Warmer and drier conditions are widely associated with Middle Holocene thermal maximum in North America (Ballard et al. 2016; Dean et al. 1996:150; Driese et al. 2008; Kocis 2011:50). Anderson and Sassaman (2012:73) suggest that such trends may have afforded an increase in floodplain productivity, making riparian settings more favorable to Middle Archaic period human populations.

The Middle Holocene thermal maximum was followed by a slight decrease in global temperatures associated with declining solar insolation, and a gradual drop in of sea level occurring at the transition from the warmer Atlantic climate episode to a generally cooler, Subboreal climate (also known as the Subatlantic or Neoglacial), beginning around 5000 cal BP and lasting through 2400 cal BP (Anderson 2001:146; Anderson and Sassaman 2012:4; Kocis 2011:51-52; Schuldenrein 1996:8; Wanner et al. 2008:2). The transition out of Middle Holocene climatic conditions has been widely linked to increases in precipitation and hydrological activity, specifically flooding and channel migration, throughout the Southeast (Brown et al. 1999; Hardt et al. 2010; Knox 1993; Schuldenrein 2006:7-10). Kocis's study of floodplain catenas along the Tennessee River (2011:51-52) interprets increases in the percent of sand in sediment profiles to indicate increased flooding observed between 5000 cal BP to 3000 cal BP. Several pronounced temperature fluctuations have been identified during the 5000-2400 cal BP timeframe of the Subboreal climatic episode, including a rapid drop in global temperatures and the onset of wetter conditions at ca. 2900 ^{14}C BP and again at ca. 2750-2450 ^{14}C BP (Anderson 2001:164-165; Baillie 1988; Bond et al. 1997; van Geel et al. 1998, 1999). Further, Kidder's (2006) synthesis of global Holocene climate trends demonstrates a shift to wetter and cooler conditions in the Southeast between calendar years 3200 cal BP to 2600 cal BP, roughly in agreement with a major cooling trend and rapid climate occurrence in the Northern Hemisphere occurring between 3500 and 2500 cal BP (Mayewski et al. 2004:250).

Fluctuations in seasonal flood regimes, erosion, channel migration, and ecological disruption related to hydrological and meteorological change during the Late Holocene may well have impacted floodplain environments utilized by hunter-gatherer groups during the Late Archaic and Early Woodland periods (Cyr 2012; Fiedel 2001;

Kidder 2006, 2010; Little 2003; Schuldenrein 2006:7-10). Kidder (2006) identifies crevasse splays along relic channels of the lower Mississippi River that represent unprecedented flooding caused by pronounced climate changes occurring in North America between 3000 to 2500 cal BP. Such flooding, Kidder (2006:221, 222) suggests, had a disruptive effect on Late Archaic trade networks and settlement patterns in the Lower Mississippi Valley. This hypothesis and the supporting data were more recently revisited by Thomas and Sanger (2010), where the authors concluded that the supporting climatic and archaeological data were far from clear. Sanger suggests "waves of abandonment" in response to fluctuations in sea level during the Late Archaic at multiple shell ring sites on the Georgia and South Carolina coasts (Sanger 2010:210-212, 214). In the case of these environments, changes in precipitation and sea level clearly had some degree disruptive affect leading to the reorganization or dispersal of Late Archaic populations.

Schuldenrein's (2006:27) synopsis of geoarchaeological data from the Interior Appalachian Plateau, Coastal Plain, Lower Mississippi River Valley, and Piedmont regions indicates cumulic soil formation following alluvial aggradation that correlates with climate forcing during this period. This suggests that climatic forces were acting on floodplains in such a way that they may have created a more stable landscape, contrasting the damaging effects of climate change on the coast. Little's (2003) broad synthesis of climate change in the Southeast utilizes shellfish deposits as a proxy for human response to changes in hydrology and ecology resulting from alterations in global mean temperatures. He concludes that the ecological effects of climate change in the interior regions of the Southeast were likely to have been far less dramatic than those observed in more ecologically restricted environments such as arid, coastal and delta environments. Changing temperatures and precipitation regimes in riparian and woodland environments may simply have affected fluctuations in resource abundance rather than causing dramatic destabilization among hunter-gatherer groups (Little 2003:23)

Landscape Evolution in the Little Tennessee River Valley

In their assessments of the lower Little Tennessee River Valley's (LTRV) geochronology, Paul Delcourt (1980:117) and Jefferson Chapman and colleagues (1982:115-117) suggest that the Little Tennessee River system became increasingly stable beginning in the Late Archaic period between 4000 and 3000 ^{14}C BP (Chapman et al. 1982). Subsistence and settlement data from Late Archaic and Early Woodland contexts at the Patrick site and others on the lower alluvial terrace suggest settlement pattern continuity and a gradually increasing investment in plant food production preceding inferred increases in population density relative to previous periods (Chapman 1981:131; Chapman and Shea 1981; Davis 1990; Schroedl 1978: 219,239,231). This presumed transition to a more stable river system in the LTRV may have made the lower river terraces more inhabitable and decreased the cost of horticulture.

Kidder (2010) cautions that climate trends should be expected to manifest differently around the world, and Anderson (2001:147) is quick to point out that correlation simply does not substantiate a causal relationship. How Late Holocene climate variability impacted Native American populations occupying river valleys and floodplains of East Tennessee remains unclear. This gap in the literature presents a research problem that can be addressed by materials and contexts from the Little Tennessee River Valley.

Addressing the Question

Studies that seek to understand the links between environmental conditions and human behavior often focus on factors that are tied to paleoeconomy, subsistence, and settlement (Branch et al. 2005:67). Using a range of analyses, archaeologists are able to reconstruct past environmental conditions, which can inform understandings of occupational and subsistence activities (Cyr et al. 2016). Such analyses attempt to isolate environmental conditions and cultural materials in order to determine patterns of deposition and site formation processes.

A comparative analysis of natural and anthropogenic processes at the Patrick site during the Late Archaic and Early Woodland periods offers the opportunity to examine how the climate change that was so disruptive in the Lower Mississippi Valley and along the Georgia coast is manifest in the lower LTRV (Fiedel 2001; Kidder 2006, 2010; Sanger 2010). In this thesis, I attempt to resolve the research problem through the application of the contextual approach. Through this lens, the physical environment with which humans interact are recognized to be a dynamic aspect of their lived experiences (Butzer 1973). By studying the contexts that are these environment, we can develop deeper understandings of how humans interface with and view the world around them. Here, I apply this theoretical orientation to data from the Patrick site, in order to understand how site patterns and environmental conditions reflect the interplay between human and their ecosystems. Through the lens of a contextual approach, I place patterns of Late Archaic and Early Woodland land-use at the Patrick site within the framework of alternating depositional environments. By examining how Late Archaic and Early Woodland foragers, horticulturalists and fishers operated within a dynamic floodplain landscape, I will address the broader question of how changes in climate articulate with changes in land-use during these periods.

Analytical Approach

Initial excavations at the Patrick site were carried out from 1972 to 1975 by archaeologists from the University of Tennessee, with funding from the Tennessee Valley Authority (TVA). The principle objective of this investigation was to assess and document the Woodland midden at the site, prior to the inundation of the valley by the Tellico Dam (Schroedl 1978). During the 1972 field season, Schroedl and crew collected continuous columns of soil and sediment, or monoliths, from backhoe trenches and unit profiles for curation and future analysis.

Floodplain sediments are known to be valuable records for paleoclimatic studies and have received increased attention in the 21st century following improvements in methodology and higher resolution dating techniques (Driese et al. 2004, 2008; Kocis 2011; Leigh et al. 2018). The soil monoliths collected at the Patrick site offer an accessible and useful tool for assessing changes in both the environmental and the archaeological record in Little Tennessee River Valley. Some 45 years after collection, I began a series of laboratory-based analyses on two such monoliths: one from Backhoe Trench 2, designated monolith M1, and another from Backhoe Trench 5, designated monolith M3.

Stabilization of the monoliths and data collection were accomplished during the summer and fall of 2017 at the University of Tennessee's Archaeological Research Laboratory (ARL) and Geoarchaeological and Paleoenvironmental Services Center (GPSC). The analyses I performed there include macro-stratigraphic analysis, particle size analysis, organic matter analysis, micro-artifact analysis, macro-botanical (paleoethnobotanical) analysis, magnetic susceptibility analysis, and accelerator mass spectrometry (AMS) dating of plant materials. Radiocarbon samples (n=15) were collected from curated monoliths and soil samples from four locations at the site in order to construct a temporal framework for changes in depositional environment and premodern land use. Variability in sedimentation, soil formation, erosion, and the vertical distribution of cultural materials at the Patrick site were assessed in two soil monolith profiles in order to articulate geomorphic responses to the onset of Subboreal climate conditions with intra-site patterns of human activity and occupation. These proxy data were integrated into a stratigraphically oriented visualization which enabled the analysis of patterns reflected within and between the monoliths, as well as site-level patterns reflected by data from the 1972, 1973, and 1975 excavations.

Chapter 2 provides an overview of the Patrick site's geographic and environmental setting within the lower Little Tennessee River Valley. This includes an overview of the regional climate, geology and ecology. The cultural chronology and archaeological record of the LTRV is discussed in Chapter 3. I place particular emphasis on the settlement and subsistence patterns associated with the Archaic and Woodland periods and discuss patterns of change and continuity between them. I synthesize the methodology, analysis and findings of the 1972, 1973, and 1975 excavations at the

Patrick site in Chapter 4. This information provides an essential framework for the findings of this study.

In Chapter 5, I outline the methods and procedures of my sample preparation and analyses. The results of these analysis are presented in Chapter 6 along with discussions regarding the findings of this study. The analyses results are followed by a detailed description of site stratigraphy which is then correlated with artifact and feature assemblages defined at the Patrick site by Schroedl (1978). The thesis concludes with Chapter 7, where I integrate the findings of this study with site-specific patterns of land use, landscape change, and regional climate flux in order to assess human responses to Late-Holocene climate change in the LTRV. I provide recommendations for future analysis of the Patrick site monoliths and encourage others to revisit the Tellico collections with new methods and new questions. All raw data and inventories are provided in the appendices.

CHAPTER 2. GEOGRAPHY

The Patrick site (40MR40) is located on the now submerged east bank of the Little Tennessee River at the downstream end of Thirty Acre Island, a 1000-meter-by-200-meter-wide channel bar island in Monroe County, Tennessee (see Figure 1). Nine Mile Creek feeds into the Little Tennessee River, forming a confluence immediately downstream from the site. The Icehouse Bottom (40MR23) and Harrison Branch (40MR21) sites are located on the opposite bank, between 1,000 and 1,600 meters upstream. The downstream end of Thirty Acre Island is separated from steep limestone bluffs on the mainland by a narrow and seasonally inundated slough that fed into the main river channel at the toe of the island.

The surface topography of the site gently undulates by approximately one foot, likely the result of modern agricultural practices (see Figures 2 and 3). The southwest bank ran parallel to the main river channel and rose abruptly from the waterline at 765.0 ft above mean sea level (AMSL) to an elevation of to 780.0 ft AMSL, prior to the completion of the reservoir. The opposite bank on the slough side of the downstream end of the island had a gradually sloping bank approximately 50 ft wide with a gradual slope up to 780.0 ft AMSL at the central axis of the island. A low ridge ranging from 780.0 to 785.0 ft ASML ran southeast to northwest along the eastern bank of the island, roughly parallel to the slough and limestone bluffs. This feature likely represents a levee formation overlying the relic channel bar core of the island (see Figure 4).

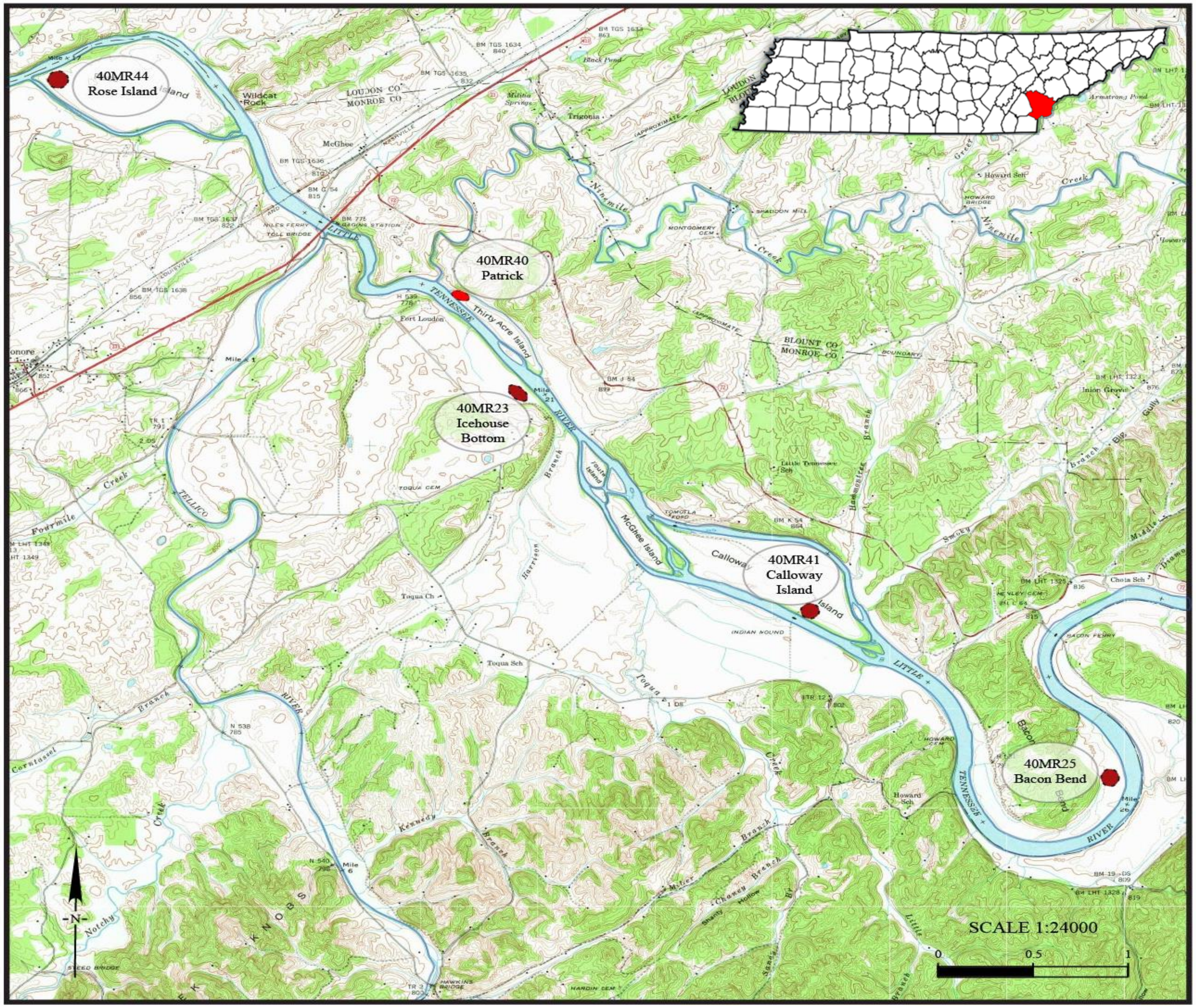

Figure 1. Patrick site and view of the Little Tennessee River with sites 40MR41, 40MR25, 40MR23, and 40MR44 between River Miles 16.5-28.1.

Figure 2. The Patrick site in 1972, facing north towards the downstream end of the island (Archival Photo from McClung Museum Collections).

Figure 3. The Patrick site during the 1972 excavation season. Facing East with excavation blocks 1, 2, 3 in the foreground (Archival Photo from McClung Museum Collections).

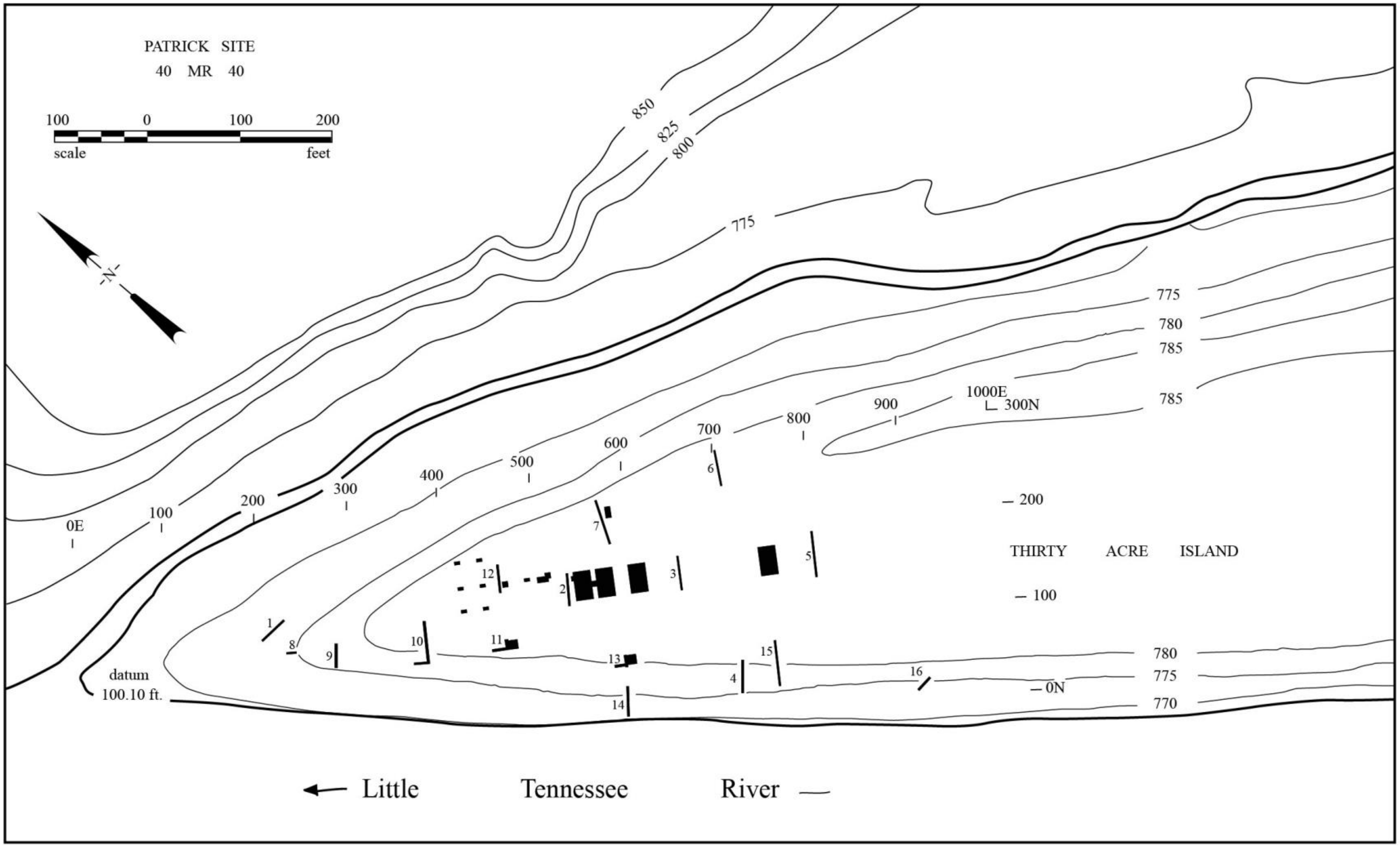

Figure 4. Patrick site contour map with contour interval of 5.0 feet. (Adapted from TVA Tellico Project Map 65-MS-810-K-504; Schroedl 1978:4).

Physiographic Region

The Patrick site is positioned at the eastern edge of the Ridge and Valley province, just west of the Blue Ridge Mountain province and less than one mile east of where the Little Tennessee River meets its major tributary, the Tellico River. The Ridge and Valley province is characterized by roughly parallel northeast to southwest trending ridges and valleys. The linear valleys that bound the Little Tennessee River form depositional basins for the rivers that flow out of the Blue Ridge mountains, with narrow terraces of varying ages and widths bounding the river channels. Rising between these valleys are ridges composed of Ordovician formations of interbedded cherty dolomite and limestone (Friesen and Steir 2016). Well-developed systems of solution cavities such as caves and sinkholes effectively drain the area, reducing the amount of surface water beyond the main channel and tributaries, save the occasional sinkhole pond (Davis 1990:24).

Roughly five miles upstream from the Patrick site and to the southeast is the border of the Blue Ridge Mountains. This ecoregion is characterized by a biologically diverse and mountainous topography dissected by deeply incised streams and river channels. The mountains are composed of a variety of igneous, metamorphic, and sedimentary rocks that are typically overlain by well drained and highly acidic brown loamy soils. The Blue Ridge and greater Appalachian Mountain chain began forming some 480 million years ago, and the current topography was shaped by a series of mountain forming events beginning in the Cenozoic period (Poag and Sevon 1989). Elevations in these mountains range from 2,000 to 6,200 meters AMSL (Taylor and Kurtz 2016).

Climate

A rhythmic seasonal oscillation is characteristic of the area's modern humid mesothermal climate pattern. Precipitation in the area is at its highest during winter and spring months with a more even distribution of rain in the summer and fall. Seasonal flooding occurred annually prior to the damming of the river, and Davis (1990:23-24) reports that spring floods were a particularly regular occurrence in the region. According the Chapman and Shea (1981:62), the growing season ranges from 150 days in the uplands to 200 days in the lower valley.

Delcourt's (1979:268-271) study of pollen in sediments collected from Anderson Pond, Tennessee, indicated that modern climate conditions have persisted for much of the Holocene beginning ca. 5000 ^{14}C BP, but more recent assessments of the same sediment samples call this conclusion into question, as the sediment record dating between 160-5600 cal BP was found to be missing entirely; meaning the entire Late Holocene record is not represented in this context as was once thought (Driese et al. 2017:88; Liu et al. 2013). Modern chronologies of global climate and sea level change increasingly emphasize variability in meteorological conditions throughout the Holocene (Driese et al 2008; Mayewski et al. 2004), and recent archaeological studies have emphasized ecological change resulting from centennial and millennial scale warming and cooling stages that correlate to archaeologically visible shifts in prehistoric subsistence and settlement strategies (Adelsberger and Kidder 2007; Anderson 2001, 2010; Kidder 2006, 2010; Fidel 2001; Little 2003; Sanger 2010). It is likely that much of the Southeast has experienced shifts in precipitation regimes throughout the Holocene as a result of converging continental and oceanic air masses. The number of viable high-resolution paleoclimate and paleo-hydrological records relating directly to East Tennessee environments has grown in the last 20 years, but further research is needed to develop clear understanding of the variable Holocene paleoclimates in the Southeast (Driese et al. 2004, 2008; Kocis 2011; Sally Horn, personal communication 2018).

Geology

Thirty Acre Island is reported to have been cultivated heavily during historic and modern times, as evidenced by an average 1-foot-deep (30.3 cm) plow zone (Schroedl 1978). Medium-fine to coarse sand deposits overlie the downward sloping flanks of the island, likely the result of flooding in the last 200 to 500 years. Henry Timberlake's 1762 map of the area indicate that Thirty Acre Island may have been narrower with a wider inner side channel (Williams 1927). This may indicate that the island has been growing laterally inward towards the mainland during the 200 years prior the impoundment of the Little Tennessee River.

The study area is located within a densely furrowed thrust and fold complex plainly visible as a series of parallel ridges and valleys. The ridges are broad and smooth, and composed primarily of Ordovician limestone and dolomites of the Knox group series, with slopes covered by coarse gravels overlain with brown clay loam soils. A prominent geological feature of the landscape is the Great Smoky Thrust Fault running perpendicular to the river at River Mile 31.0, separating the Ridge and Valley province from the Blue Ridge mountain province to the east. The fault forced Cambrian-age metamorphic rock up over the Ordovician limestone/dolomite formations (Diagle et al. 2006; Powell et al. 1994).

Within the LTRV, ten alluvial terraces spanning 80 feet in elevation have been identified and are classified as T-0 through T-9. Exposures of the most recent T-0 terrace along the river channel begins with gravel beds that grade upwards into overbank deposits of sand and silt, followed by silty clays and, in some locations, plow zones. Alluvial sediments generally range from massive to poorly-bedded and are primarily composed primarily of fine sand and quartzite silt (Chapman et al. 1982:117; Delcourt 1980). Rising above the T-0 is the older T-1 terrace which ranges from 500 feet to a maximum of 4,000 feet wide. The second terrace (T-2) at the nearby Toqua Bottoms returned a radiocarbon date of 27595 ± 980 ^{14}C BP suggesting a terminal Pleistocene origin (Chapman et al. 1982:117). The T-3 through T-9 terraces occur at the margins of the valley and comprise a minor portion of the floodplain.

Delcourt's (1980) model for landscape response to cycles of Quaternary climatic change utilizes radiocarbon dating and stratigraphic interpolation of LTRV terrace sediments to suggest that peak aggradation of the T-1 terraces in the Little Tennessee River valley occurred between 15,000-7000 ^{14}C BP. A drier climate during the Mid-Holocene climatic optimum reduced flooding in the valley between approximately 7000-3000 ^{14}C BP, when the river is thought to have incised its channel into the T-1, forming the modern (pre-1979 inundation) floodplain (Delcourt 1980:121). During the Late Holocene period, the T-1 floodplain surfaces became increasingly stable while remaining subject to a seasonal spring/winter flooding regime with little aggradation until Mississippian and Historic times (Chapman et al. 1982). Such flooding may have been responsible for varying degrees of surface scouring, deposition, and levee formation along the banks immediately adjacent to the river (Chapman 1973:113).

Since monitoring of seismic activity in the southern Appalachians began in 1981, East Tennessee has increasingly been recognized as the location of highly concentrated zone of high seismic activity, known as the ETSZ or East Tennessee Seismic Zone (Powell et al. 1994:686; Warrel et al. 2017). This raises the distinct possibility that terrace forming and channel migration of the Little Tennessee River were influenced by faulting and earthquake activity during the Holocene. What, if any, impact this may have had on premodern populations who inhabited this area has received little attention in the past and may provide a promising avenue of future research.

Local Biota

The late glacial and Early Holocene forests surrounding the Patrick site would have been a closed canopy of primarily deciduous trees (Delcourt 1979). During the Middle to Late Holocene, mixed mesophytic oak and chestnut forests began to occupy the Ridge and Valley region. The forests in the valley continued to change as the climate warmed and as human activity increased. Cridlebaugh's (1981) study of the pollen record from Tuskegee Pond and excavated wood charcoal from the Icehouse Bottom site (40MR23) suggests that the forests and lowlands of the valley were steadily transforming into a patchwork of pines and deciduous trees in the Late Holocene, with an increase in open floodplains areas (Chapman et al. 1982:118).

The modern landscape that surrounds the Patrick site location is classified by Griffith and colleagues (1998) as the Level IV Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion, composed of white oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests. Lowlands and river terraces are characterized as grassland barrens intermixed with cedar-pine glades. These forests are thought to have been dominated in premodern times by oaks, maples, hickories, walnut and chestnut along with a tremendously variable understory of herbaceous plants (Chapman 1973:115). Upland and lowland forested areas would have been very capable of producing a significant source of calories for animal and human populations (Chapman et al. 1982). Upriver and to the east of the Patrick site lies the hummocky ridges of Level IV Southern Dissected Ridges and Knobs ecoregion Griffin and colleagues (1998). The ridges of this area are covered in chestnut-oak and pine forests with areas of white oak, mixed mesophytic forests and tulip poplar dominating the lower slopes and draws (Friesen and Stier 2016).

Though prehistoric faunal assemblages from this area dating earlier than the Mississippian period are somewhat limited due to the highly acidic soils, modern faunal inventories since AD 1400 indicate a tremendous diversity of vertebrate species flourished in the valley and uplands. The earliest historical accounts of the area indicate that this was the case prior to modern influences (Chapman and Shea 1981:61-62, Williams 1927:68-72, 1928:193). The floodplain, by definition, would have been a highly productive environment for plant and animal species in comparison to surrounding terrain, simply due to the greater availability of water and nutrients (Brown 1997:104-105).

CHAPTER 3. CULTURE & CHRONOLOGY

Seasonal occupations of the Little Tennessee River Valley floodplain and surrounding uplands date back as far as the Pleistocene - Holocene transition (Chapman 1977; Davis 1990). Fluted bifaces recovered from secondary contexts in the region suggest that Paleoindian peoples likely took full advantage of the abundant resources in the area accessing the interior of the Blue Ridge by way of the river valley and collecting resources in the lowlands. Overbank deposition at locations where the river exits the narrow mountain gorges onto the broad floodplains likely buried evidence of early people's presence along the lower river terraces. At such positions along the river banks where sediments aggraded (often very quickly), deeply stratified archaeological sites were formed. Though excavations of these sites have not yet isolated primary Paleoindian contexts, they *have* yielded a remarkably rich material record documenting at least the last 10,000 years of human presence in the valley.

The following section reviews key characteristics of East Tennessee premodern culture periods as outlined below, with particular emphasis given to aspects that highlight the evolution of settlement and subsistence patterns among the peoples of the valley. Much of the literature cited herein represents the tireless efforts of the Tennessee Valley Authority and the University of Tennessee archaeologists, which have produced a comprehensive body of research detailing material culture, land use, and landscape development. Delcourt (1980), Chapman and colleagues (1982), and Davis (1990) provide well developed hypotheses of landform development, land use and settlement patterning, respectively. These models provide a good baseline with which to compare the environmental and cultural data collected from the Patrick site monoliths. It is important to note, however, that it is far beyond the scope or intent of this thesis to provide a synthesis of the entire body of research associated with the Tellico Archaeological Project. Syntheses of the lower LTRV archaeological record are readily available for further reference (Chapman 1975, 1994; Chapman et al. 1982; Chapman and Shea 1981; Cridlebaugh 1984; Davis 1990; Kimball 1985; Schroedl 2009).

Temporal Divisions and Radiocarbon Dates

The local culture chronology in Table 1 has been adapted from Davis (1990:56), which is in turn a modified version of the framework presented in Kimball (1985). This sequence is founded on radiocarbon dated components from East Tennessee that contained culturally diagnostic artifacts, namely bifaces and ceramics. Both the Kimball (1985) and Davis (1990) chronologies are founded on reported radiocarbon dates calibrated by Kimball (1985:275) using dendrochronologically based calibration curves established by Damon et al. (1972, 1974). Kimball's calibrated age determinations are based on what is now an outdated calibration curve. Radiocarbon dates from the Late Archaic to Mississippian periods typically do not adjust the generalized temporal frame beyond one to two hundred calendar years, but Middle Archaic through Paleoindian culture periods appear to be well off and increasingly so with age (Kimball 1985:282-291). Thus, I find that the temporal divisions for the Late Archaic through Woodland and Mississippian periods proposed in Kimball (1985) and Davis (1990) remain useful for the purpose of this study, and as such they are used here.

The shortcomings of the chronological frameworks utilized by Kimball (1985) and Davis (1990) become readily apparent when dated culture periods are compared

Table 1. Culture Chronology of the Little Tennessee River Valley (adapted from Davis 1990:56 and Kimball 1985. All dates presented in this table were calibrated by Kimball (1985) using data from Damon et al. (1972, 1974).

Culture Period & Archaeological Phase	cal yr. BC/AD	cal yr. BP.
Historic Period		
Mississippian IV (Overhill)	AD 1600-1838	112-350 BP
Late Mississippian Period		
Mississippian III (Dallas)	AD 1300-1600	350-650 BP
Early Mississippian Period		
Hiwassee Island	AD 1000-1300	650-950 BP
Martin Farm	AD 900-1000	950-1050 BP
Middle Woodland Period		
Woodland III (Icehouse Bottom)	AD 350-600	1350-1550 BP
Woodland II (Patrick)	200 BC-AD 350	1550-2150 BP
Early Woodland		
Woodland I (Watts Bar)	1,000-200 BC	2150-2950 BP
Late Archaic Period		
Undesignated (Iddins)	1,800-1,000 BC	2950-3750 BP
Undesignated (Savannah River)	3000-1,800 BC	3750-4950 BP
Middle Archaic Period		
Undesignated (Sykes)	4,500-3,000 BC ?	4950-6450 BP ?
Undesignated (Guilford)	5,000-4,000 BC ?	6950-5950 BP ?
Morrow Mountain	5,500-5000 BC	7450-6950 BP
Stanly	5,800-5,500 BC	7750-7450 BP
Stanly	6,000-5,800 BC	7950-7750 BP
Early Archaic		
Kanawha	6,100-5,800 BC	8050-7750 BP
LeCroy	6,500-5,800 BC	8450-7750 BP
St. Albans	6,900-6,500 BC	8850-8450 BP
Upper Kirk	7,400-6,800 BC	9350-8750 BP
Lower Kirk	8,000-7,300 BC	9950-9250 BP
Undesignated (Dalton)	8,500-8,000 BC ?	10450-9950 BP ?
Paleo-Indian Period		
Undesignated (Clovis)	11,000-8,500 BC?	12950-10450 BP ?

with the currently established chronology of the Southeastern Archaic period as defined by Anderson and Sassaman (2012); radiocarbon calibration methods since the 1980s show radiocarbon determinations and calendar ages increasingly diverge in a somewhat erratic fashion the further back in time one goes. Davis's (1990) culture chronology dates the Early and Middle Archaic periods between 10450-4950 cal BP, but the currently established dates for these periods are 11500-5800 cal BP, significantly older than the temporal framework employed here (Anderson and Sassaman 2012:66). Similarly, Anderson and Sassaman (2012:66) date the Late Archaic period in the Southeast from 5800-3200 cal BP, whereas Davis dates this period in the Little Tennessee River Valley to 4950-2950 cal BP.

Despite these shortcomings, I have adopted the Davis (1990:56) adaptation of Kimball's (1985) chronological framework due to the fact that it is an accurately reflection of the sequence of change between taxonomically identifiable culture periods in the Little Tennessee River Valley and the broader East Tennessee region. Utilizing their framework allows for a far less complicated (and convoluted) comparison between the results of this study and the established body of literature relating to the archaeology of the lower LTRV as well as the broader East Tennessee region.

In addition to the lower LTRV chronology established by Kimball (1985) and Davis (1980), this study makes use of previously reported radiocarbon dates from various Archaic and Woodland contexts in East Tennessee. Of the dates referenced in this study, 53 were calibrated using OxCal software, v4.3.2 (Ramsey 2017) with the IntCal13 dataset (Reimer et al. 2013), in to facilitate direct comparison with the dated contexts analyzed in this study (see Appendices B.1 and B.2). The 53 calibrated radiocarbon reference dates are presented as the median of two standard deviations ($\mu\pm2\sigma$ or 95% probability) and therefore are not considered to be absolute measures (Teleford et al 2004). All referenced calibrated dates are presented here as “cal BP (median at 2σ)”, or “cal BP” when applicable, and un-calibrated referenced dates are presented in conventional radiocarbon years as “^{14}C BP”. All radiocarbon dates from the Patrick site and other sites in East Tennessee that were calibrated for reference by this study are presented in Appendix A.

The Early and Middle Archaic (10450-4950 cal BP)

Excavation and surface collection in the lower LTRV revealed a long history of Archaic period land use and occupation on the terraces and uplands surrounding the river (Chapman 1975, 1977, 1978, 1981; Davis 1990; Kimball 1985). Deeply buried Archaic deposits were excavated at eight sites in the valley, including the Icehouse Bottom (40MR23), Calloway Island (40MR41), Rose Island (40MR44) and Bacon Farm (40LD43) sites, among others. Radiocarbon-dated contexts bearing diagnostic projectile points allowed researchers to develop a well-dated chronology of Early and Middle Archaic occupations in the region, as well as models of subsistence, settlement, and landscape change (Anderson and Sassaman 1996; Chapman 1977, 1985; Chapman et al. 1982; Chapman and Shea 1981; Davis 1990; Kimball 1985).

Early Archaic Period (ca. 10,450-7750 cal BP)

The Early Archaic period is the first clearly recognized culture in the Little Tennessee Valley, and a likely development from transitional terminal Pleistocene cultures. Paleoindian components have yet to be definitively identified in the area, but Clovis bifaces from surface collection suggest that hunter-gatherers were present in the valley no later than the end of the Pleistocene (Chapman 1985:145). The earliest contexts are associated with the transitional Paleoindian-Early Archaic era, Dalton phase bifaces. The following Early Archaic period phases associated with Kirk Corner Notched, St. Albans, LeCroy and Kanawha bifaces are much better defined (Davis 1990:208).

The earliest well-defined Early Archaic context was documented at the Icehouse Bottom site (strata M-O), where a deposit associated with the Lower Kirk phase returned a date of 9435±270 ^{14}C BP (Chapman 1977:158, sample GX4126; see Appendix A.2). A calibration of this same date, using OxCal software, v4.3.2 (Ramsey 2017) with the IntCal13 dataset (Reimer et al. 2013), suggests a significantly earlier age of 10737 cal BP (median at 2σ; see Appendix A.2.). Material culture associated with this period includes a wide variety of expedient flake tools and scrapers, as well as ground stone tools such manos and metatés. Residential sites are defined by hearths with prepared surfaces, surface scatters of fire-cracked rock, and shallow basin features (Chapman 1977).

Spatial patterning among Early Archaic period sites suggest that peoples were seasonally mobile and utilized the adjacent Blue Ridge Mountains to the east. Seasonal habitation sites in the LTRV appear to have been situated within areas of high biotic diversity such as river confluences and floodplains. During the Lower and Upper Kirk phase, residential base camps were located across a wide range of landforms including the T-1 and T-2 as well as upland areas. Hunting or logistical camps were established along tributary valleys and lowlands up the Tellico River, southeast of the LTRV. This logistical pattern suggests a degree of organizational complexity among Upper and Lower Kirk phase peoples (Schroedl 2009:83).

The later LeCroy, Stanly and St. Albans phases of the Early Archaic period coincide with what appears to be a gradual decrease in occupation intensity indicated by increasingly fewer sites within the lower LTRV. The intensive and dispersed settlement pattern of the preceding Kirk phases contrasts with later settlement patterning during the Early Archaic period (Davis 1990:208-210). Schroedl (2009:83) proposes that this pattern may be related to differences in population densities and adjustments to the onset of a warmer Middle Holocene climate.

Middle Archaic Period (ca. 7950-4950 cal BP)

The Middle Archaic period in the Little Tennessee River Valley is subdivided into five units. Kirk Stemmed, Stanly, and Morrow Mountain bifaces define the initial three phases of this period, spanning a timeframe of 7950-6950 cal B.P (Davis 1990:56). Guilford and Sykes types bifaces may be diagnostic artifacts for the later 2000 years of the Middle Archaic period in the valley (Davis 1990:56; Kimball 1985). In the LTRV, Middle Archaic cultures are also signified by their association with notched net-sinkers, grooved axes and banner stones, as well as a discernable increase in slate and metavolcanic raw materials such as quartz and quartzite. Shallow basins, unprepared hearths, and surface concentrations of fire-cracked rock are typical of Middle Archaic period sites along the valley (Chapman 1985:148-149; Davis 1990:210).

Early to Middle Archaic Period Settlement and Subsistence

Most sites during these periods were located along the first and second terraces of the river. There appears to be a gradual decline in utilization of the region, evidenced by a sharp decrease in residential sites in the valley, with an increase of sites along the nearby Tellico River tributary. Populations occupying the Southern Ridge and Valley may have lived elsewhere, while continuing to hunt and forage in the LTRV. Davis (1990:212) reports a very limited number of Western Piedmont Guilford bifaces associated with this period which may reflect contact with non-local populations and increased mobility during the Middle Archaic period. Much about this period remains poorly understood, and it is almost certain that numerous mobile groups utilized the valley throughout the Early and Middle Holocene.

Populations living in the LTRV during the Early and Middle Archaic periods were seasonally mobile foragers, with diets that included terrestrial game as well as wild plant foods, particularly edible nuts. The increased occurrence of net-sinkers during the Middle Archaic period could reflect an increasing riverine adaptation, but such a development is far from clear. The poor preservation of faunal remains within Archaic contexts calls for caution regarding assumptions about the degree of importance of terrestrial over aquatic or plant foods. Macrobotanical data from the Bacon Farm (40LD43) and Icehouse Bottom (40MR23) sites indicate that some Early and Middle Archaic groups supplemented terrestrial game animals with nuts, predominantly hickory and acorn. It is likely that mast seeding events were a critical time for gathering during the Early and Middle Archaic in the LTRV. In contrast, few remains of weedy seed-bearing taxa or the suite of cultigens observed in Late Archaic contexts were found in Early and Middle Archaic contexts, leading some to suggest that such foods played a minor role in the local Middle Holocene subsistence strategies (Chapman 1977:115; Chapman and Shea 1978:77). It is important to note, however, that seeds and tubers are less durable than nutshell and their underrepresentation is likely the result of “differential attrition” rather than actual lack of use (Yarnell 1982:2, 4).

The Late Archaic Period (4950-2950 cal BP)

Davis (1990:56) and Kimball (1985) divide the Late Archaic period in the Little Tennessee River Valley into two culture phases: the Savannah River phase (4850-3750 cal BP) and the subsequent Iddins phase (3750-2950 cal BP). Both phases are listed as “undesignated” (meaning insufficiently defined) in Davis’s chronology (1990:56). As with the temporal divisions of the Early and Middle Archaic periods, these phases are based on the stratigraphic positioning of diagnostic projectile points and on radiocarbon-dated contexts. Stratified deposits from the Bacon Bend and Iddins sites were particularly informative of these phases, as well as the well-preserved terminal Late Archaic contexts at the Higgs site (45LD1) along the Tennessee River. Stemmed bifaces of the Savannah River or Appalachian Stemmed and Ledbetter or Iddins types are the locally diagnostic artifacts for this time period, and surface scatters of fire-cracked rock and rock-filled fire pits are typical. Shell was found at the Higgs site, but does not occur in abundance among contexts in the LTRV (Chapman 1981:141; Schroedl 1978; Davis 1990).

Savannah River Phase (4850-3750 cal BP)

The diagnostic artifact for contexts associated with the initial Late Archaic Savannah River phase in the lower LTRV is the Savannah River Stemmed biface. The best contexts for this phase were documented at the Bacon Bend site, located just upstream from the Patrick and Icehouse Bottom sites between River Miles 24 and 27. Chapman's (1981) report on excavations at the Bacon Bend site describes sealed Late Archaic contexts in Stratum 7 which were defined by scatters of fire-cracked rock and rock-filled basins associated with Savannah River type bifaces, as well as banner stones, abraders and drill cores. Chapman (1981) and Davis (1990) suggest that the site functioned as a logistical and infrequently occupied camp site, possible related to lithic manufacture and hunting activities. Chapman (1981:40) proposes a third millennium B.C. date for this context based on radiocarbon dates of 4390±155 ^{14}C BP and 4070±70 ^{14}C BP and notes "no soil development in Stratum 7… [I]t would appear that aggradation had been fairly rapid up to the present land surface". Davis's (1990:226) settlement model for this phase exhibits similarities with the patterning among Middle Archaic period sites, namely the low site density in the valley and some indications of high mobility among groups that in all likelihood utilized a broad region extending far beyond the LTRV.

Iddins Phase (3750-2950 cal BP)

The Iddins phase denotes later and terminal Late Archaic contexts in the LTRV area found in association with the Ledbetter or Iddins Undifferentiated Stemmed type bifaces (Davis 1990:128; Chapman 1981). Such contexts appear throughout the valley, including the Iddins (40LD38), Patrick (40MR40), Icehouse Bottom (40MR23), Harrison Branch (40MR21), and Rose Island (40MR44) sites (Chapman 1973, 1975, 1977, 1981; Schroedl 1978). Assemblages A6 through A9 at the base of Stratum 7 at the Patrick site yielded large surface scatters of fire-cracked rock associated with debitage, net-sinkers and stemmed bifaces. Assemblage A7 also included Long Branch and Watts Bar type ceramics, and steatite, an overlap that may have been the result of mixture within an environment of soils characterized by little deposition (Schroedl 1978:185-186). Similar assemblages of steatite bowl fragments, net-sinkers, and stemmed points were found in association with rock-filled fire pits and surface scatters of fire-cracked rock just across the river at Icehouse Bottom (Chapman 1973).

Two other sites dating to the Iddins Phase of the Late Archaic period were located to the west along the Tennessee River. At the Higgs site (45LD1), 13.5 miles downriver from the Iddins site, McCollough and Faulkner (1973:58) report a compacted "compacted accretive-midden floor and an irregular arc of six postholes at the southern (riverward edge of the floor). This Late Archaic living surface was identified in Stratum IV and interpreted to represent a distinct domestic area that was occupied by a "small terminal Archaic group [that]… practiced floodplain horticulture".

Evidence of horticulture in this Late Archaic context comes from Feature 11, a stratified basin-shaped pit containing chenopod (n=360), acorn (n=60), and domesticated sunflower (n=110) (McCollough and Faulkner 1973:144). A radiocarbon sample from Feature 11 returned an age of 2850±85 ^{14}C BP or 2980 cal BP (median at 2σ), and a radiocarbon sample from Feature 12, a shallow basin in Stratum IV, was dated to 2730±110 ^{14}C BP or 2859 cal BP (median at 2σ) (McCollough and Faulkner

1973:65; see Appendix A.2). These dates indicate a terminal Archaic period or Early Woodland affiliation.

Net-sinkers and evidence of steatite vessels were not observed in this stratum, and a paucity of shellfish remains were recovered. Further down the Tennessee River, Calabrese (1976) reports steatite bowl fragments and stemmed bifaces occurring in Level 5 of excavations at the Watts Bar site (40RH6), located near the Watts Bar Nuclear Plant in East Tennessee. Radiocarbon samples associated with this context returned dates of 3020±260 and 3280±190 ^{14}C BP or 3208 and 3524 cal BP (median at 2σ) respectively, apparently earlier that the contexts in Stratum IV at the Higgs site, (Calabrese 1976:63; see Appendix A.2).

The best sampled contexts that define the Late Archaic in the LTRV were those documented at the Iddins site (40LD48), a stratified alluvial site located on the T-1 by the Little Tennessee River at River Mile 3.8. The site is characterized by “a linear concentration of rock filled hearths along the front edge of the first terrace” (Davis 1990:58). An appreciably high density of features was noted in Stratum III, consisting primarily of rock-filled fired hearths, of which 101 were identified within the 238.76 m^2 horizontal excavation area. Artifacts from this Late Archaic context include materials such as notched net-sinkers, steatite bowl fragments, and Iddins Undifferentiated Stemmed type bifaces. Also present were abundant scatters of fire-cracked rock and charcoal, as well as two concentrations of notched and trimmed net-sinkers (Chapman 1981:42-148). No structural features were identified. Chapman (1981) cites the thickness of the Stratum III midden, density of features and artifacts, and interprets the materials and features in Stratum III to be reflective of an Iddins phase residential base.

Floral remains from this context include a “striking” abundance of walnut and butternut, as well as wild sunflower (n=1 whole), chenopod (n=12 whole, n=35 fragments), maygrass (n=1 whole), and grape (n=59 whole, n=450 fragments) (Chapman 1981:129, 139; Chapman and Shea 1981:71.) The latest dated context from Stratum III, Feature 13, dates to 3205±145 ^{14}C BP, with a calibrated age of 3428 cal BP (median at 2σ) (Chapman 1981:141; see Appendix A.2). An earlier date of 3655±135 ^{14}C BP, or 3998 cal BP (median at 2σ), was returned from wood charcoal and carbonized nutshell from Feature 3 (Chapman 1981:140; see Appendix A.2.).

Late Archaic Settlement and Subsistence

The logistical organization of Late Archaic peoples in the valley appears to have consisted of residential base camps with satellite logistical or hunting camps, similar to Binford’s (1980) collector model. The distribution and feature density of some residential and task-oriented sites in the area indicate longer and more intensified seasonal occupation of the river terraces, relative to the preceding Middle Archaic period. Paleoethnobotanical and feature data from Iddins phase contexts suggest that the T-1 was utilized during the summer and fall months. The presence of logistical camps in tributary valleys and upland settings indicates that Late Archaic peoples were targeting upland terrestrial foods, perhaps during spring and winter months as part of a seasonal round (Chapman 1973, 1981; Davis 1990:226).

Artifact assemblages, features and paleoethnobotanical data related to subsistence practices provide strong evidence that to some degree, fishing and horticulture had become an integral part of seasonal subsistence practices, making full use of the various resources that the river shoals and floodplains had to offer. Chapman (1981:148) suggests that the Coytee Shoals next to the Iddins site would have been an idea location for fishing during the spring, while the presence of squash and bottle gourd indicate river terraces may have been used during the fall as well. This multi seasonal subsistence pattern likely augmented foraging of herbaceous plants, fruits and seeds and hunting.

Carbonized wood in Late Archaic contexts in the valley appear to indicate an increase in successional tree taxa such as pine and cedar. Chapman (1975:151) argues that this is a result of human impact on the T-2 and T-1 terraces and suggests land clearing activities associated with increased use of the terraces and higher populations. Chapman and Shea (1981:69) note that in Late Archaic period contexts, there is an increased abundance of food plants that thrive in such environments, particularly walnut, chenopod, and maygrass, suggesting an increase in mixed deciduous forests and disturbed riparian ecosystems. Zeanah (2017) argues that increases in carbonized walnut remains in associated with Late Archaic sites in the Southeast signal population stress, given the high cost of processing black walnut relative to hickory or acorn. The appearance of such foods in archaeological contexts in the LTRV stands in stark contrast to earlier periods which are thought to have been characterized by preference for hickory and apparently lacked the variety of weedy seed-bearing taxa documented in Late Archaic and Woodland contexts.

The earliest evidence of fully domesticated plant foods and cultigens in the LTRV was recognized in Late Archaic contexts at the Bacon Bend and Iddins sites. In the Savannah River phase contexts at Bacon Bend, carbonized squash rinds (*Cucurbita* *pepo)*, maygrass (*Phalaris caroliniana)* and other members of the Poaceae family were indirectly dated to 4390±155 ^{14}C B.P, which returned a median calibrated date of 5024 cal BP (median at 2σ) (Chapman 1981:41; see Appendix A.2.). This marks not only the first appearance of domesticates in the valley, but also demonstrates an increased exploitation of maygrass (only one seed had been recovered from earlier Archaic contexts for comparison) (Chapman and Shea 1981:70). Iddins phase contexts at the Iddins site yielded squash, as well as wild sunflower (*Helianthus annuus*), and chenopod *(Chenopodium* sp.*)*. Fully domesticated sunflower first appears in the region at 2850±85 ^{14}C BP at the Higgs site (Chapman and Shea 1981:72), though evidence from the Hayes site in Middle Tennessee suggests a much greater antiquity for domesticated sunflower (Crites 1993:147). These plant foods, in addition to bottle gourd (*Lagenaria siceraria)* and grape *(Vitus* sp.*)* also begin to begin to occur with greater frequency at sites in the valley during the Late Archaic, a pattern that intensifies during the Early Woodland (Chapman 1985:151; Chapman et al. 1982:118; Chapman and Shea 1981:69-71; Schroedl 1978).

While the importance of early domesticates in Late Archaic diets may never be fully understood, the increased ubiquity of such taxa in associated feature contexts suggests that some degree of horticulture was a part of local subsistence strategies during by this time (Chapman 1981:39, 131). Late Archaic peoples may very well have utilized the well-drained and easily turned silty soils on the open T-1 terraces for the purposes of gardening, foraging and hunting. Wild edible plants such as maygrass, marshelder (*Iva annua*), and other medicinal herbs would almost certainly have been most readily available on the lower river terrace and forest edge environments. The timing for the appearance of domesticates and cultivated plants in the LTRV is typical, if not late for the Southeast, as the production and consumption of cultigens clearly appears at this time and slightly earlier elsewhere in the Eastern Woodlands and interior Southeast (Smith 2006; Yarnell 1993:15).

Stemmed bifaces suggest a continuation of hunting traditions targeting deer, elk, and smaller game animals. The increased ubiquity of net-sinkers has been interpreted to represent an increase in fishing activities during this time which may reflect an intensification of Middle Archaic subsistence patterns practices and certainly demonstrates a growing dependence on aquatic resources. Interestingly, there is little evidence of the shellfish exploitation found to be typical of Late Archaic cultures such as those in the western and middle Tennessee River Valley, the Green River in Kentucky, and the middle Savannah River (Anderson and Sassaman 2012; Chapman 1985:150; Lewis and Kneberg 1959; Sassaman 2010). Chapman (1981:155) speculates that shellfish may have been an unnecessary addition to the Late Archaic diet in the presence of more easily obtained and calorically richer foods such as terrestrial game and plant foods. An additional possibility is that increased sediment loads in the river environment prior to or during this time may have negatively affected bivalve populations and aquatic productivity during this time (Delcourt 1980:121; Jones et al. 2011:13-14; Little 2003).

The Early Woodland Period (2950-2150 cal BP)

The regional phase assigned to the earliest ceramic-manufacturing cultures in the LTRV is referred to by Davis (1990) as the Watts Bar phase. Wetmore (2002:257) refers to this time period within the broader Southern Ridge and Valley as the Bacon Bend phase, dating from 2850 to 2300 cal BP. For the lower Little Tennessee River Valley, Davis suggests a slightly wider timeframe of 2950 cal BP to 2150 cal BP. The earliest viable dates associated with ceramic-making cultures in the area come from the Phipps Bend site (40HW45), located northwest of the LTRV on the T-1 and T-2 terraces adjacent to the Holston River. Lafferty (1981:498) reports Early Woodland contexts there based on the association of Swannanoa and Watts Bar Fabric Impressed quartz-tempered ceramics, indirectly dated between 2940±105 ^{14}C BP to 2380±80 ^{14}C BP.

Woodland I – Watts Bar Phase (2950-2150 cal BP)

The Early Woodland Watts Bar phase contexts in East Tennessee are defined by the co-occurrence of sand-tempered and quartz-tempered ceramics of the Watts Bar Fabric Marked varieties (Calabrese 1976:79; Wetmore 2002:256). This ceramic variety has been described as being generally thinner than the contemporaneous quartz-tempered Swannanoa Fabric Marked variety identified at Phipps Bend and elsewhere, though there is some debate regarding their association as they do appear to occur in the same contexts there (Lafferty 1981; Gerald Schroedl, personal communication 2018). At both the Camp Creek (40GN1) and the Patrick sites (40MR40), Watts Bar ceramics are associated with both stemmed and triangular bifaces, and in some cases with Long Branch Fabric Marked limestone-tempered ceramics (Lewis and Kneberg 1959; Schroedl 1978). However, neither biface is treated as a diagnostic artifact for Early Woodland period contexts, as there do not appear to be consistent associations for the phase in East Tennessee (Davis 1990:227).

The highest concentration of Watts Bar phase camps in the LTRV is located between the Patrick site and Calloway Island, though there are also base camps downstream such as the Martin Farm site (40MR20), and upstream at the Bacon Bend site (Chapman 1979; Schroedl 1978; Schroedl et al. 1985). The earliest dated Watts Bar phase component was documented in Trench 6 at the Bacon Bend site (40MR25), located upstream from the Calloway Island (40MR41) and Patrick sites (Salo 1969). The deposits there are characterized by a thick midden buried in the T-1 that contained Watts Bar sherds and fire-cracked rock, as well as an abundance of lithic artifacts including stemmed and stemless triangular points, net-sinkers, hammer stones, slate gorgets, a pestle, abraders, and debitage. A combined sample of charcoal scattered throughout this context returned a date of 2500 cal BP (median at 2σ) (Salo 1969:179; see Appendix A.2.).

A 1-foot-thick Early Woodland midden deposit in Zone 4 at the Martin Farm site suggests intensive site use, evidenced by abundant fire-cracked rock, net-sinkers, stemmed bifaces found in association with a shallow fire pit, surface fires, and three small refuse pits. Several post holes were found at the site, but no structural boundaries were defined. Salo (1969:135) suggests this site was used as a fishing camp. At the Rose Island site, Early, Middle and Late Woodland components were defined by stratigraphic positioning, the presence of ceramics, and a relative increase in feature diversity including “small charcoal filled pits”, basins and pits filled with rocks, refuse pits and “pottery deposits”, surface concentrations of rocks (inferred to be represent fire-places), as well as tool caches and post holes (Chapman 1973:32-35).

Early Woodland Subsistence and Settlement

Davis's (1990) settlement model of the Early Woodland is based on a total of 52 Watts Bar Phase sites that have been identified within the river valley. The principle taxonomic apparatus for differentiation of Early Woodland from Late Archaic sites is the presence or absence of pottery. Of these sites, 22 were large base camps positioned along the T-1 and the edge of the T-2 landforms with close proximity to the river. Both small and large base camps are defined by the presence of morphologically distinct ceramics and stratigraphic positioning. The distribution and content of Early Woodland residential sites suggest a seasonal utilization of the T-1 terraces similar to the patterns observed among Late Archaic sites. Intensified regional occupation is demonstrated by an increase in large seasonal residential sites associated with dense middens and increases in the intra-site density of habitation features (Davis 1990:230,262). Smaller Early Woodland logistical or task sites are typically associated with subsistence activities such as fishing and raw material processing, similar to those represented in Late Archaic sites throughout the valley, though botanical evidence suggests that horticulture may be inferred as an activity associated with the both smaller and larger lowland Early Woodland sites (Chapman and Shea 1981:71, 73; Schroedl 1978).

The subsistence practices reflected by site location, features and artifacts indicate a similar pattern to that of the Late Archaic with one important distinction: an increased occurrence of domesticates and both wild and cultivated plant food (Chapman and Shea 1981:71). Quantities of hickory are appreciably higher in Early Woodland contexts at the Patrick site in contrast to the low quantity identified in Archaic contexts at the Iddins site. Acorn use apparently remains stable during this time period the LTRV, but there is a significant decrease in carbonized walnut remained relative to the high amounts found in Late Archaic contexts, suggesting an increasing reliance on hickory (Chapman and Shea 1981:69; Schroedl 1978:218).

Chapman and Shea (1981:77) note a relative increase abundance of cultigens and domesticates in Early Woodland period contexts, including chenopod, cucurbits, maygrass and marshelder. To illustrate; counts of chenopod from all documented Archaic versus those in Early Woodland contexts is 1 to 1000 seeds (Chapman and Shea 1981:77). This trend correlates with evidence of domestication and cultivation of sunflower and sumpweed elsewhere in the Southeast. At Salts Cave site in Kentucky, chenopod, amaranth, and maygrass seeds were recovered in abundance and within a single deposit (Yarnell 1974). The importance of chenopod among Woodland period subsistence traditions is further documented in sites along the Elk and Duck rivers in middle Tennessee (Crites 1987). Other subsistence related trends suggest continuity with Middle and Late Archaic traditions. Abundant nets-sinkers in Early Woodland contexts at the Calloway Island, Patrick, and Bacon Bend sites reflect that fishing continued to play a part in seasonal subsistence strategies in the LTRV, an activity that likely supplemented the hunting of terrestrial game animals (Salo 1969; Schroedl 1978).

The Middle Woodland Period (2150-1350 cal BP)

Davis (1990:56) subdivides the Middle Woodland culture period into the Woodland II or Patrick phase, and a subsequent Woodland III or Icehouse Bottom phase. The Patrick phase was initially subdivided into two phases based on differences of pottery type frequencies at the Patrick site. Schroedl (1978) identified two separate components: one dominated by Long Branch limestone-tempered wares, and another characterized by a mixture of quartz-tempered Watts Bar and Long Branch ceramics. Davis (1990:56) combines the two components identified by Schroedl (1978) into a single “Patrick” phase dating between 2150 cal BP and 1650 cal BP. The subsequent Icehouse Bottom phase is assigned to contexts bearing Candy Creek and Connestee ceramics, as well as Bradley Spike and Connestee triangular bifaces (Kimball 1985; Wetmore 2002:265).

At the Icehouse Bottom site, contexts associated with this Middle Woodland phase were located in the uppermost strata beneath the plow zone. The earliest evidence of maize (*Zea mays*) cultivation in the LTRV and trade with Hopewellian cultures is associated with the materials in this stratum. Kimball (1985:277) suggests that the Icehouse Bottom phase is transitional to the Late Woodland, marking the advent of maize cultivation and evidence of an altered pattern of mortuary ceremonialism. Regionally, the Middle Woodland period is associated with increases in extra-regional interaction, the appearance of Hopewell exchange, and changes in mortuary practices, all patterns exhibited during the Icehouse Bottom phase (Anderson and Mainfort 2002:9-10). At the Patrick site, the Icehouse Bottom phase component is inferred based on materials from the disturbed plow zone context and radiocarbon dated features that are intrusive in to the fill beneath the plow zone and for the purposes of this study, this particular phase is not addressed in detail (Schroedl 1978).

Woodland II - Patrick Phase (2150-1550 cal BP)

Excavations at the Patrick (40MR40), Calloway Island (40MR41), and Martin Farm (40MR20) sites were instrumental in defining and dating the Patrick phase in the LTRV (Chapman 1979; Schroedl 1978; Schroedl et al. 1985). Excavations at the Phipps Bend site to the north on the Holston River yielded the earliest radiocarbon dates associated with Long Branch ceramics for the region, placing the advent of limestone-tempered wares in the Ridge and Valley province around 2,510±90 ^{14}C BP and 2,455±275 ^{14}C BP (Lafferty 1981:139-140). Similarly dated contexts associated with the early Long Branch series were documented at the Westmoreland Barber site, dated to 2,355±85 ^{14}C BP, as well as the Higgs site along the Tennessee River, dated to 2,254±105 ^{14}C BP, and the Calloway Island site in the LTRV dated to 2180±125 ^{14}C BP (Chapman 1979:164; Faulkner and Graham 1966:113-114; McCollough and Faulkner 1973:77).

The dense midden deposits of Stratum 7 at the Patrick site are the best documented contexts from this phase in the LTRV. Schroedl (1978:21-44, 232-235) describes Stratum 7 deposits as dense accumulations of cultural materials and features, indicative of numerous overlapping visitations and occupations. The Patrick phase contexts at the Patrick site yielded numerous habitation features, triangular and stemmed bifaces, and a wealth of macrobotanical remains. Features included dense charcoal concentrations, scatters of fire-cracked rock, earth ovens, hearths, and numerous post molds. A large number of post molds were identified in Stratum 7, though no structural outlines or distinct habitation areas were defined (Schroedl 1978:72-78). Twelve primary inhumation burials, eleven of which were articulated, were located beneath the plow zone and were tentatively associated with the Middle Woodland component. Two dog burials were also associated with this context (Schroedl 1978:45-71).

Similar contexts were identified at the nearby Rose Island and Calloway Island sites, but investigations of the Patrick phase components at both were very limited and yielded far less data than the excavations at the Patrick site (Davis 1990:231). Mortuary artifacts associated with the Woodland component at the Calloway site included non-local material and groundstone conical pipes, suggesting the possibility of contact with Adena cultures. Strata I and II at the same site correspond to three bell-shaped to cylindrical storage pits, providing evidence for a greater degree of sedentism and increased organizational complexity associated with the repeated use of the same location (Chapman 1979; Davis 1990:231). At the Icehouse Bottom site, sub-plow zone deposits associated with the Patrick phase yielded evidence of a semi-permanent residential site consisting of between seven and eight living surfaces. Significantly, the first evidence of maize in the valley was documented at the base of Stratum II in Feature 609 and dated to 1775±100 ^{14}C BP. Non-local materials and artifacts recovered at the Icehouse Bottom site that are directly associated with the Hopewell culture include prismatic blades, Hopewell rocker stamped sherds, and cut mica (Chapman and Crites 1987:353; Cridlebaugh 1981; Wetmore 2002:262).

Woodland II Subsistence and Settlement

Patrick phase feature and midden contexts at the Patrick site contained a wide variety of native domesticates and cultigens. Hickory comprised over 80% of the macrobotanical assemblages from this component, associated with a marked decrease in walnut remains relative to the Late Archaic and Early Woodland contexts in the valley (Schroedl 1978:218). Other important plant foods recovered from feature contexts include chenopod, maygrass, sumpweed, honey locust, sumac, persimmon, and grape, as well as domesticated squash and sunflower. Faunal materials at the Patrick site include bear, white-tailed deer, elk, mountain lion, turkey, bobcat, duck, turtle, four species of fish, and the occasional mussel shell (Schroedl 1978). Subsistence evidence indicates a wide diet breadth including cultivated plants that supplemented terrestrial game and fish.

The paleoethnobotanical evidence at Patrick phase sites in the LTRV and at the Phipps Bend site demonstrate an intensified reliance on a wide range of wild plants and a strong reliance on hickory (Lafferty 1981; Schroedl 1978; Wetmore 2002:261). The steadily increasing ratio of disturbance taxa pollen to maize pollen in lacustrine cores from Tuskegee Pond suggests increased land clearing associated with cultivation and occupation continued during this time (Chapman et al. 1982; Cridlebaugh 1981). Though maize is first associated with the Middle Woodland period at the Icehouse Bottom site, it did not overtake the already well-established array of domesticates and cultigens being cultivated on the floodplain, unlike the pattern we see in the Late Woodland and Early Mississippian periods of the LTRV (Scarry 2003; Yarnell 1993).

The vast majority of residential sites associated with this period are located on lower alluvial terrace areas, with an increase in density and number of sites in comparison to preceding Watts Bar phase (Davis 1990:233). This arrangement reflects a gradual intensification of Early Woodland and preceding Late Archaic settlement strategies, with seasonal occupations of increasing duration and intensity occurring primarily on the T-1 terraces. There is continued presence of upland activity sites related to hunting and foraging subsistence practices (Davis 1990:230-234). Though these camps may have been seasonal, the increase in post molds, pottery, storage pits, and cultigens suggests a relatively unrivaled level of commitment to the lower floodplain areas in contrast to previous culture periods, with evidence of greater organizational complexity and increasingly sedentary communities.

Horticulture in the Valley

Paleoethnobotanical data from Late Archaic and Early Woodland period in the Little Tennessee River Valley provide strong evidence that peoples were actively foraging wild plants and very likely cultivating domesticated plants on the lower terraces of the river (Chapman and Shea 1981). This pattern becomes particularly apparent during the Early Woodland, if we consider the number of macrobotanical remains to be an adequate metric for such activities. Increases in the macrobotanical remains of food plants and successional tree species appears to coincide with the development of thick middens at nearly every mile of the river. Whether or not the increase in carbonized remains of successional species reflects human land clearing, preference for certain types of wood, increased disturbance of the floodplain by fluvial activity or all of the above, remains unknown (Chapman et al. 1982:118). The apparent increase in domesticates, fruits and wild edible seed-bearing plants during the Late Archaic and Woodland periods parallels a longstanding reliance on upland mast fruit and tree nuts in the region. Cultivated plants may very well have been supplemental to this more substantial and perhaps more reliable resource, as was the case in other parts of the Southeast (Chapman 1981; Winterhalder and Goland 1997:143; Yarnell 1993:15).

Land Use During the Late Archaic and Early Woodland Periods

Kimball's settlement model suggests "no clear preference" for Woodland Period occupation or site location (1985:324). However, this model is somewhat problematic as it appears to lump all Woodland phases together, obscuring the variability during this period in favor of a more gradualist perspective. Davis's (1990:226-238) model seems to emphasize a floodplain preference among the Watts Bar and Patrick phases as indicated by the increase in site frequency and content relative to the Iddins phase of the Late Archaic period. This may correlate with increases in population, but it also may reflect a changing subsistence strategy with an emphasis on operating near the main river channel.

The general pattern visible in the LTRV is an increased use of the T-1 terrace beginning in the Late Archaic and intensifying during the Early and Middle Woodland periods. The dense Early and Middle Woodland midden deposits overlying Late Archaic contexts at the Patrick site reflect a change in land-use patterning characterized by more frequent and intensive use and habitation, higher frequencies of artifacts and habitation features, and abundant pottery. An increase in seasonal occupancy and use of the floodplain has major implications for the lifeways of premodern peoples in the valley. That this change occurs during the same time that ceramics appear, and horticulture becomes highly recognizable, begs at least an exploration of some causal link.

CHAPTER 4. EXCAVATIONS AT THE PATRICK SITE

The first archaeological investigations of the Patrick site were carried out during the initial survey of cultural resources in the lower LTRV impoundment area in 1970. Limited testing and reconnaissance surveys were carried out by University of Tennessee archaeologists and under contract from TVA and the National Park Service, with Alfred K. Guthe as directing principal investigator. Surface collection at the downstream end of Thirty Acre Island yielded abundant cultural materials overlying noticeable dark brown areas of soil. A test unit excavation revealed close to 3 feet of buried soils containing cultural materials affiliated with the Early and Middle woodland periods. A concentrated layer of fire cracked rocks was identified at the base of these deposits (Gleeson 1971:4, Schroedl 1978:1). This limited investigation indicated that the site may have been the past location of significant Early and Middle Woodland period occupations.

University of Tennessee archaeologists determined that a more intensive excavation of the Patrick site could provide valuable Woodland period subsistence and settlement data, and hopefully clarify the material culture sequences observed across the river at the Harrison Branch (40MR21) and Icehouse Bottom sites (40MR23). It was also anticipated that 40MR40 would yield Hopewellian elements similar to those found in Stratum II at Icehouse Bottom (Schroedl 1978:5). Dr. Gerald Schroedl and crew carried out excavations at the Patrick Site in summer and fall of the years 1972 and 1973.

The 1972 and 1973 Excavations

Schroedl's strategy was to identify Early to Middle Woodland components thought to be located immediately beneath the plow zone, as the deeply buried Archaic deposits at the site were yet unknown. His research design emphasized locating discrete activity areas when possible and determining the geomorphology and chronological sequences of the deposits. Excavations began with seven 24-inch-wide backhoe trenches, typically cut perpendicular to the river and at lengths of thirty to fifty feet long and depths of ten to twelve feet deep (Schroedl 1978:5; see Figure 5).

Trench 1 was cut into the slope near the toe of the island in order to investigate the sandy loams there which differed from the siltier soils at the center of the island. Trenches 2, 3, and 5 were cut at 120 to 140-foot intervals across the long axis of the island to delineate the extent and sequence of sub-plow zone cultural deposits. Trench 4 was cut across the sloping river bank while Trenches 6 and a 7 were cut into the slough side of the island. The stratigraphy in each trench was mapped and described in order to guide hand excavation of units (Schroedl 1978:5).

Vertical columns of soil and sediment, referred to here as soil "monoliths", were collected from Trenches 2, 4, 5, and 6 (see Appendix B.1; Gerald Schroedl, personal communication 2018). Trenches 2, 3 and 5 revealed an Ap-A1-B2t-B3-C stratigraphic sequence along the higher, central portion of site. Abundant cultural material was identified in the roughly one-foot plow zone (Ap), suggesting much of the occupational sequence of the island had been heavily disturbed. An abrupt boundary separated the plow zone from the undisturbed, stratified primary deposits containing Woodland and

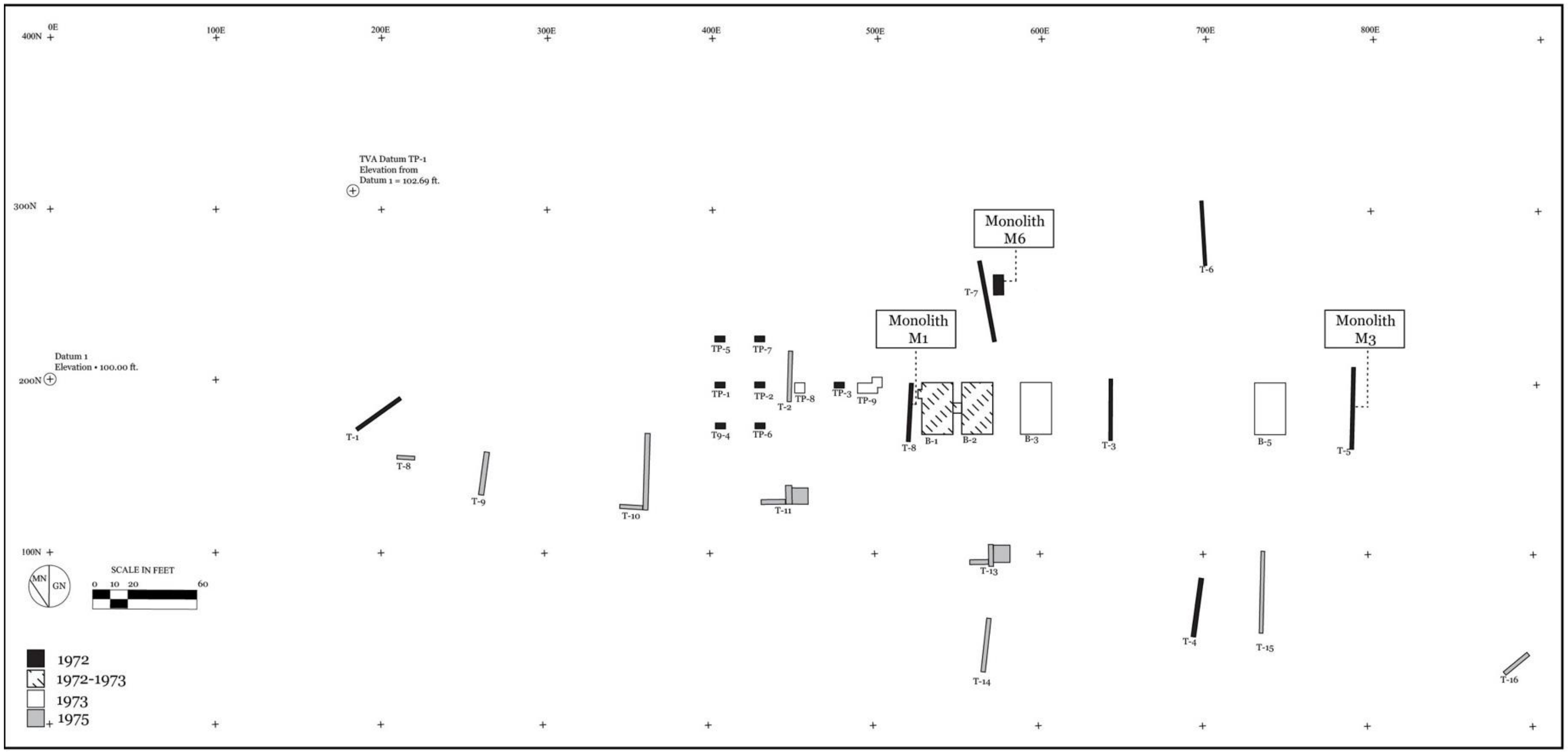

Figure 5 Patrick site plan of excavation, including backhoe trenches and test pits from excavations conducted in 1972, 1973, and 1975 (adapted from Schroedl 1978:6-7).

Late Archaic cultural material and features that were identified beneath the plow zone (Schroedl 1978:14-18).

Trench 7 revealed deeply buried Woodland deposits between seven and nine feet below surface directly above where the island begins to slope down towards the slough (Schroedl 1978:10-14). The lowermost cultural material bearing deposit, Stratum 10G, directly overlay direct the unmodified sediments in Stratum 12 at the base of the unit. A series of redeposited midden interspaced by sandy loams overlie Stratum 10G. Schroedl (1978:10,12) interprets this configuration to be reflective of multiple depositional events related to activity closer to the center of the site, given this midden deposit's apparent similarity with those at the center of Stratum 7 within the site's center.

Fifteen test pits of contiguous six-foot and three-foot units were hand-excavated into the deposits. Four of these test pits were 18-foot-by-30-foot excavation blocks, mapped to a north/east oriented grid off a datum point of 200N/0E located at the downstream tip of the island. Grid north was aligned to "Magnetic north 36 degrees east" (Schroedl 1978:6). Vertical elevations at the site were measured from an arbitrary base elevation of 100 feet set at the same datum point (Schroedl 1978:6).

During the 1972 field season, seven three-by-six-foot units were excavated west of Trench 2, and one six-by-twelve-foot unit was excavated immediately to the east of Trench 7 at coordinates 254-266N/576-582E. Two 18-by-30-foot units, Block 1 at 10-200N/528-546E and Block 2 at 170-200N/552-570E, were excavated along the long axis of the island between backhoe Trenches 2 and 3. Plow zone deposits were excavated in a single level and "shovel sorted" (Schroedl 1978:6). The underlying primary deposits were excavated in 0.4 foot (12.192 cm) arbitrary levels. Artifacts and feature elevations and horizontal locations were recorded for each level. Primary deposit sediments underlying the plow zone were water screened through quarter-inch mesh. Feature fill was water-screened through sixteenth-inch mesh. Five features were selected from the 1972 units for flotation sampling, adding to a total of 50 flotation samples from feature context assemblages A2-A7 in Stratum 7, as well as samples from A9, A13, A15, A17, and B8. Three monoliths were collected from the east profile of unit 254-266N/576-582E. Radiocarbon dates (n=4) were obtained from wood charcoal and nutshell samples within feature contexts (Schroedl 1978:190; see Appendix A.1).

During the following field season in the summer of 1973, two additional 18-foot-by-30-foot excavation blocks, Block 3 at 170-200N/588-606E and Block 5 at 170-200N/730748E, were excavated along the long axis of the island between backhoe Trenches 2, 3, and 5. Two additional test pits were excavated at 194-200N/450-456E and 194-200/488-500E. The 1973 excavations followed a similar protocol to that of the 1972 excavations with two exceptions. First, the plow zone was screened through quarter-inch mesh. Second, unit excavation levels were reduced from 0.4 to 0.2 feet in depth in an attempt to gain better control of the vertically separated occupational deposits (Schroedl 1978:8-9).

The 1975 Excavations

A subsequent excavation at the site was conducted in 1975 under the direction of Jefferson Chapman (1977). Nine additional backhoe trenches (Trenches 8-16) were cut into the sloping bank at the river’s edge. Trenches 10, 11, and 13 were excavated with a right-angle branch in order to observe changes in the angle of the strata. Test pits and elevations were mapped from Schroedl's 1972 datum at the downstream tip of the island (Chapman 1977:143). Two 10-foot-by-10-foot test pits were excavated beside Trench 11 and Trench 13 at 129.3-139.3N/448.3-458.3E and 95-105N/571-581E, respectively. Test pits were excavated according to natural stratigraphy as defined in backhoe Trenches 8-16. A total of 15 natural levels were excavated. All material was water screened through quarter-inch mesh (Chapman 1977:143).

Radiocarbon dates (n=2) were obtained from wood charcoal scattered throughout associated Archaic strata (Chapman 1977:161; Schroedl 1978:190; see Appendix A.1). Chapman succeeded in locating and documenting deeply buried Middle and Early Archaic contexts that time and lack of resources did not allow Schroedl to sample. Stratigraphy and anthropogenic features observed at the site indicated successive occupations bracketed by flood deposits as far back as 10708 cal BP (median at 2σ), a date from charcoal from Stratum 16 (Chapman 1977:16; see Appendix A.1, sample GX4122).

Chapman's 1975 excavations went deep below the surface to locate buried Archaic period deposits. This excavation defined a total of five components that spanned the Middle to the Early Archaic period. As this thesis is primarily focused on the Woodland and Late Archaic deposits at the Patrick site, Chapman's 1975 investigations (Chapman 1977) are not discussed further.

Analysis

Schroedl's analysis of the 1972 and 1973 excavation data considered materials from Blocks 1, 2, 3, and 5 and test pit 254-266N/576-582 (1978:150). Artifact and feature data were grouped into discrete assemblage groups for analysis. Cultural material and feature data from Blocks 1, 2, 3, and 5 were assigned assemblages A1 through A19 (Schroedl 1978:156,150). Each assemblage was correlated to a stratum defined in Trench 2, 3, and 5. Data from test pit 254-266N/576-582, located adjacent to Trench 7, were assigned assemblages B1 through B9 and correlated to stratigraphy defined in the east profile of the unit (Schroedl 1978:150,156). Analytical units among A1-A19 and B1-B9 were grouped into six components based on similarities in artifact and feature content, elevation, and stratigraphic positioning. Stratigraphic boundaries were described on the basis of differences in texture, composition, color, and positioning (Schroedl 1978:10-20). Along the central axis of the island in Blocks 1, 2, 3 and 5, seven distinct strata were defined (see Figure 6).

Assemblages A1 through A19 are assigned to these strata, and in most cases multiple assemblages are defined within each stratigraphic unit. Stratum 1 is the plow zone context. Stratum 7 is a primary context bearing multiple components and numerous indistinct occupation surfaces associated with the Middle Woodland Patrick phase, Early Woodland Watts Bar phase, and Late Archaic Iddins phase (Schroedl 1978:188-197). Concentrated scatters of fire-cracked rock, hearths, ovens, and burials occur within this stratum. Numerous postmolds were also found in association with the layers of fire-cracked rock near the base of Stratum 7. The underlying Strata 13 through

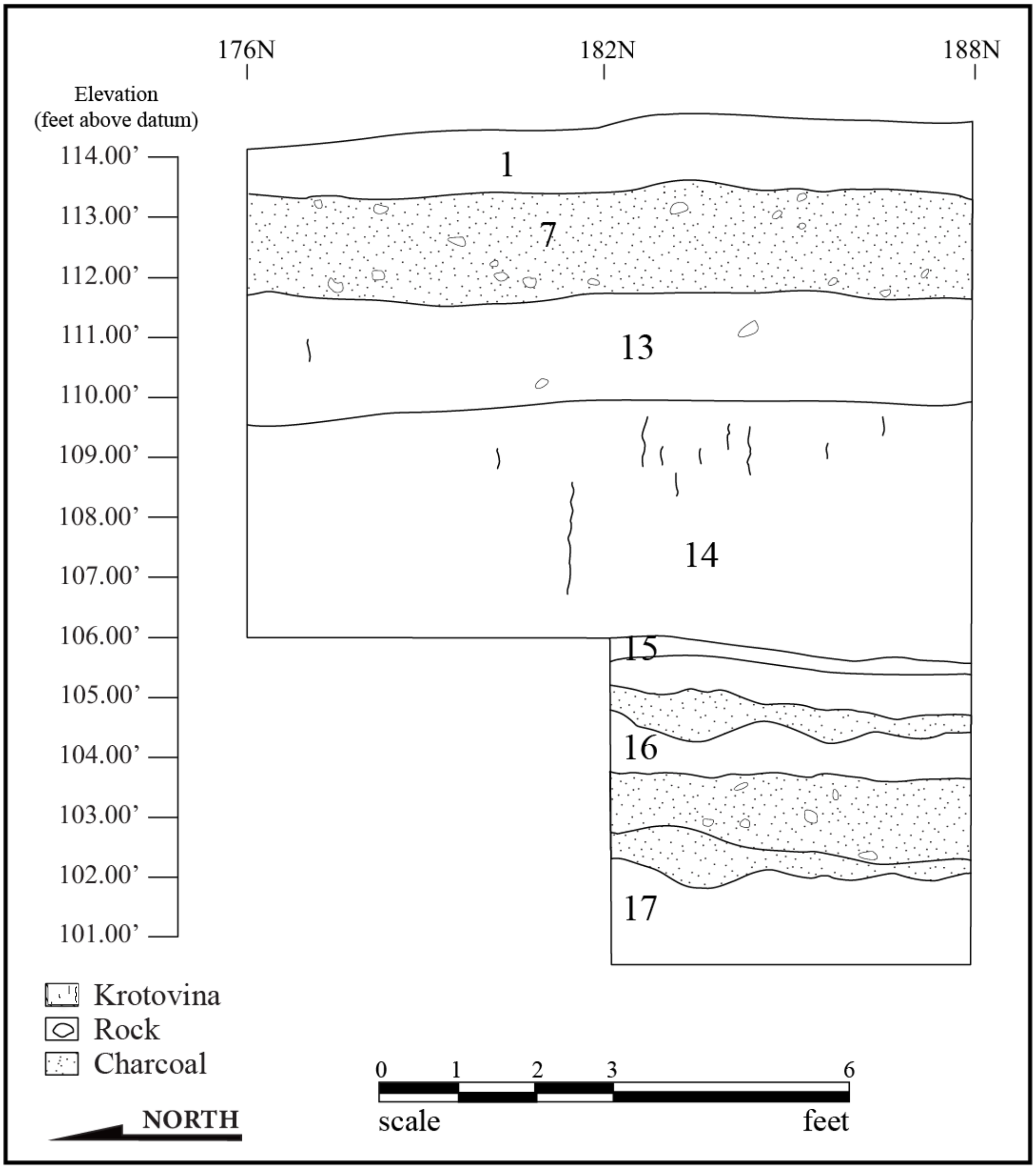

Figure 6. The east profile of Block 1 with stratigraphy and associated features, 176N-188N/528E (adapted from Schroedl 1978:16). Refer to discussion below for descriptions of each strata.

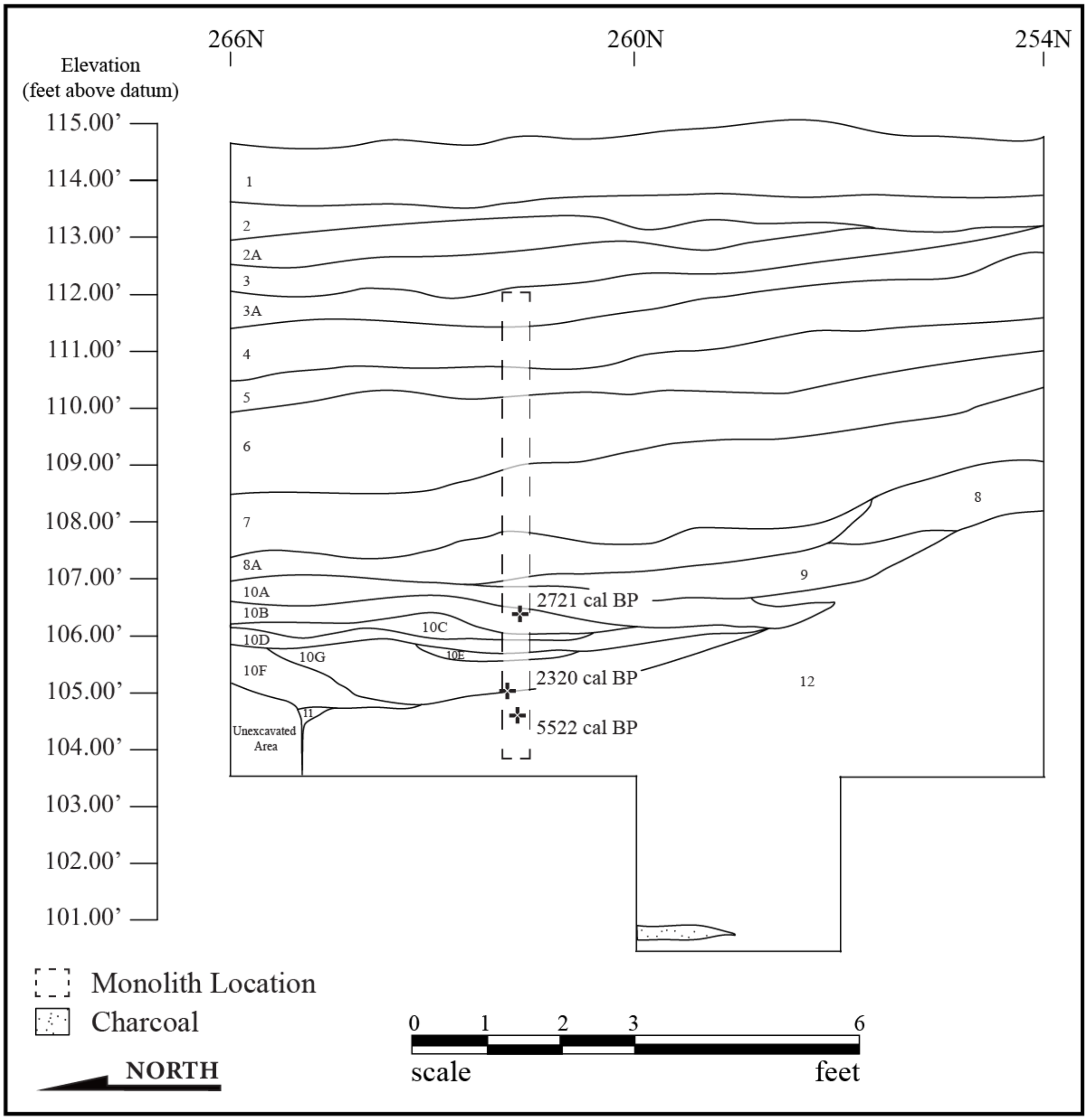

Figure 7. The east profile of test units 254-266N/582E with stratigraphy and monolith M6 location (adapted from Schroedl 1978:13).

17 consist of graded beds of alluvium with little to no cultural materials (Schroedl 1978:10-20, 75-76).

Within the profile of test pit 254-266N/576-582 and Trench 7, 15 strata were defined. Assemblages B1 through B9 were assigned according to natural level, with strata 8A through 10F corresponding to A9 strata (see Figure 7). Strata 8A through 10G represent what Schroedl refers to as a "trash" deposits, interspersed between lenses of alluvium (Schroedl 1978:10). The overlying Stratum 7 is thought to correspond to the silt loam deposits at the center of the island. Strata 6 through 2 are characterized as fine sandy loams and silt containing materials similar to those found in the Stratum 1 plow zone at the center of the island. Stratum 1 in 254-266N/576-582 is the plow zone bearing a mixture of Late Woodland and Mississippian material culture (Schroedl 1978:10, 12-14).

Results From the 1972, 1973, 1975 Excavations

Eleven components were defined at the Patrick site, six of which were represented by groupings of assemblages from the 1972 and 1973 excavations of test pit 254-266N/576-582 and Blocks 1, 2, 3 and 5 on the central axis of the island. Assemblages A12 through A19 correspond to Strata 14 through 17. A mixture of a Mississippian and Middle Woodland components was identified in the plow zone, primarily on the basis of ceramic types. Shell-tempered ceramics and the occurrence of small triangular bifaces characterize Component 1. Two to three burials that intrude from the base of the plow zone into Stratum 7 suggest a Dallas phase association with the component. Component 2 is associated with the Middle Woodland, Icehouse Bottom phase, evidenced by the occurrence of Connestee, sand-tempered Swift Creek-like complicated stamped, Long Branch Fabric Marked, and a variety of other limestone-tempered ceramics in the plow zone (Schroedl 1978:179).

Component 3 is characterized by ceramic assemblages dominated by Long Branch Fabric Marked limestone-tempered, Wright Creek Check Stamped and Mulberry Creek Plain ceramics. A similar assortment and frequency of limestone-tempered ceramics were reported in contexts at the Camp Creek site, identified to be associated with the Middle Woodland Candy Creek phase (Lewis and Kneberg 1957). Schroedl (1978:179-180) cites this similarity as reason enough to associate his Component 3 with the Candy Creek phase. Davis (1990:59) and Kimball (1985:210-217) have since associated comparable frequencies of materials recovered at Icehouse Bottom site with what they call the "Icehouse Bottom phase". The majority of artifacts for this component at the Patrick site were recovered within the plow zone, and include debitage, ceramics, utilized flakes, and lithic cores (Schroedl 1978:179).

Component 4 represents a Long Branch phase association. This component is referenced by Davis as corresponding to the Patrick phase. Schroedl identifies (1978:180) an abundance of Long Branch Fabric Marked pottery that comprises more than 90% of the associated ceramics in assemblages A3, A4, B7, and B8. Artifacts include triangular projectile points, pieces esquillees flakes, gorgets, celts and utilized flakes (Schroedl 1978:183). Component 4 is also associated with a high density of cultigens such as chenopod, wild medicinal and edible plants, and early domesticates including sunflower, gourd, and squash.

Component 5 is similarly affiliated with the Patrick phase with a high percentage of Long Branch Fabric Marked pottery (61%), but it also contains (26.4%) Watts Bar Cord Marked and Fabric Marked quartz-tempered ceramics. A large number of net-sinkers are associated with this component, in addition to straight and contracting stemmed bifaces. Schroedl cites the frequency of net-sinkers and Watts Bar pottery as indicative of an early Long Branch phase component (Schroedl 1978:184). Hickory nutshells appear in abundance in both Components 4 and 5, indicating an emphasis on hickory use during the Early to Middle Woodland. Component 4 shows an increase in acorn, and walnut increase in Component 5 contexts relative to Component 4.

Schroedl (1978:184) tentatively associates Component 6 with the Late Archaic period, though he does not suggest a specific phase. This component is defined by a reduced number of ceramics, suggested to be intrusive or due to anthropogenic mixing, and abundant notched net-sinkers. Schroedl relates stratigraphic occurrences in these contexts to the Middle and Early Archaic period components defined by Chapman's 1975 excavations (Chapman 1977; Schroedl 1987:187). These components yielded little to no carbonized nutshell (Schroedl 1978:212). Two features associated with Component 6 and the Late Archaic period contained 99% walnut shell. This abundance is reflected by similar contexts at the Bacon Bend and Iddins sites, where walnut comprised between 89 and 57% of the total sample material collected. Chapman and Shea (1981) suggest that this pattern may indicate a greater number of walnut trees growing in the area as a result of increased floodplain disturbance during the late Archaic. Component 7 is assigned to the Middle Archaic and components 8, 9, 10, and 11 are associated with the Early Archaic period. Assemblages A12 through A19 are roughly correlated with these components based on data from the 1975 excavations and deep testing (Chapman 1977:141-160; Schroedl 1978:187).

Comparison of all components shows little difference in the variety of associated faunal remains. White-tailed deer remains appear in abundance, with elk coming in second place. Other small mammals, amphibians, and fish appear to have been targeted, and turkey appears to have been the most favored avian species. Fish remains appear in highest quantities within Component 4 contexts, but the overall dataset suggest little use of fish and mollusks (Schroedl 1978:209). However, these less durable taxa may have been present if not abundant during the site's occupations. Based on the high number of net-sinkers found in association with the rock pavements near the base of Stratum 7, it is no stretch to assume that fishing was a principal activity during the Late Archaic and perhaps the Early Woodland periods. Taphonomic processes such as trampling and decay, and excavation bias introduced by water screening, may be responsible for the lack of fish bones associated with such contexts.

Summary

The 1972 and 1973 excavations at Patrick site yielded a wealth of data and materials related to Late Archaic and Woodland groups in the LTRV. Thirty Acre Island appears to have been utilized throughout the last 10,000 years through time periods characterized by both rapid aggradation and stability, a pattern that is typical for the T-1 of the LTRV (Chapman 1978:142) and in other the fluvial environments of Interior Appalachian Plateau (Brakenridge 1984; Turner and Klippel 1989; Schuldenrein 1996:5). Artifact and feature data from the Patrick site indicate a pattern of repeated use of the downstream end of the island as an activity locus and open-air habitation site beginning in the Late Archaic period. A relatively large number of net-sinkers suggest fishing was an important subsistence activity carried out at or near the site, in addition to hunting and foraging. Fluvial sands exposed in backhoe Trench 1 suggest the downstream end of the island may have had a sandy beach, sloping down to where the slough meets the river. This micro-habitat and confluence point would have been an optimal location for fishing and foraging.

Land-use patterns associated with Late Archaic and Early Woodland contexts appear to change in step with the appearance of ceramics and the accumulation of midden materials. Post-molds associated with Early Woodland contexts indicate seasonal habitation on the island and gardens in the vicinity of the occupations. Fishing likely remained a part of the subsistence traditions during this time as it was during the Late Archaic, but increased faunal material and plant remains provide archaeologists with a window into what appears to have been a very wide and diverse diet breadth of nuts, cultivated plants, fish and animals. An increase in settlement intensity during the Early and Middle Woodland periods is evidenced by an abundance of artifacts, particularly ceramics.

Schroedl's (1978) detailed study of the Patrick site offers a framework for the analyses of this study. Detailed stratigraphic descriptions and curated monoliths have made it possible to re-visit the Patrick site to ask questions about the depositional history of the island and the chronological sequence and land-use patterns of its occupants. The remaining chapters detail my analysis of two of the monoliths collected from backhoe trenches at the site in 1972.

CHAPTER 5. METHODOLOGY

During the 1972 excavations at the Patrick site, archaeologists mechanically excavated seven 2-foot-wide trenches in order to delineate the vertical and horizontal extent of buried cultural deposits. Backhoe trenches were dug to a depth of 10 to 12 feet and measured 30 to 50 feet long running north to south and perpendicular to the river channel. All trenches were numbered consecutively in order of excavation. Stratigraphic sequences exposed in the trench profiles were described in the field and utilized to inform subsequent unit and block excavations (Schroedl 1978:5).

Schroedl and crew recorded and mapped macro-stratigraphic sequences visible in the trench profiles, assigning Strata numbers between visible horizons. Detailed descriptions of these strata were recorded and marked on corresponding backhoe trench profile maps. Vertical lengths of soil profile (n=5), measuring 14 cm wide with lengths ranging between 70 to 264 cm, were cut away from the surrounding matrix at the point of detailed description in the east profile walls in Trenches 2, 4, 5, 6 (see Appendix B.1 for inventory). These soil “monoliths” were then coated with a liquid solution of polyvinylite resin (PVR) and acetone (Gerald Schroedl, personal communication 2017), allowed time to cure, then cut away from the context as a single semi-lithified section of sediment and soil, referred to as a monolith (see Day 1968 for description of a similar procedure). Monoliths (n=3) were also collected from and within Test Units 254-266N/576-582. Wooden boards were used to brace and transport the monoliths back to the laboratory and later to the McClung Museum, where they were curated and stored for 44 years. Each monolith was wrapped in burlap, canvas or linen, and secured with twine. In 2015, all seven monoliths were transferred to the University of Tennessee's Archaeological Research Laboratory (ARL) for analysis.

Inventory and Stabilization of the Monoliths

In order to assess the condition of the samples, it was necessary to stabilize and brace the profiles so that the base boards could be removed and the profiles exposed for inspection. First, all assigned lab numbers and proveniences listed for each were recorded. The cloth wrappings were carefully removed, exposing the monoliths lying on their base boards. Wooden frames were fitted to each sample and secured to the base boards, creating a tight box to contain the materials. The exposed back sides of the monoliths (opposite of profiles) were coated with a polyvinyl acetone mixture (Elmer's Glue® and acetone) and allowed to cure for 48 hours. The box frames were then filled with insulation foam, locking the soil and sediment into place. A wooden lid was then secured to the box frame in order to flip the monoliths over, remove their original base boards, and expose the profiles for inspection.

The preservation of these samples after 44 years of storage was quite remarkable. Skimming off the original dried coating of PVR revealed intact stratigraphy in nearly every monolith. Varying degrees of cracking and fracturing had occurred in all specimens, but each retained much if not all of its original (in situ) appearance. All seven monoliths in the collection were cleaned and examined in order to select two for analysis. All monoliths were given lab numbers M1 through M7 (see Appendix B.1). Lab number M8 was assigned to curated soil samples collected at one-foot (30.5cm) increments from surface to the basal Stratum 17 within Test Unit 133N/458.3E, directly adjacent to Backhoe Trench 11, on the sloping river bank of the island.

Sample Materials

This study uses data from two monoliths: monolith M1 excavated from the east profile within Backhoe Trench 2, and M3 collected from the east profile of Trench 5 (see Figures 8 and 9). The two trenches were dug approximately 551.181 feet (168-m) of horizontal distance apart and as Figures 2.3 and 2.4. show, surface elevations of the two soil profiles are similar with a vertical difference of 1.08 feet (33 cm). Monoliths M1 and M3 were selected for detailed analysis due to their similarity in topographic position, stratigraphy, and good condition. Additionally, these contexts represent primary deposits associated with areas of high activity as defined in Blocks 1, 2, 3, and 5 (Schroedl 1978). Both monoliths appeared to be in excellent condition with little cracking and clear stratigraphy. Importantly, both contexts had similar stratigraphy with contexts related to Late Archaic and Early Woodland period occupations. Such similarities were key factors in relating stratigraphy, geomorphology, and cultural materials to previous excavations at the Patrick Site.

Monolith M1 was collected from the eastern profile of Trench 2 at approximately 187N/522E (see Figure 5). The profile measures 14 by 170 cm in length, beginning at ground surface elevation of 114.64 feet above datum and base elevation of 109.8 feet above datum (see Figure 8). The stratified deposits represented in this column are identified in Schroedl's report (1978). These include Schroedl's (1978:17-18) Stratum 1, which corresponds to his defined Components 1 and 2; and Stratum 7 which

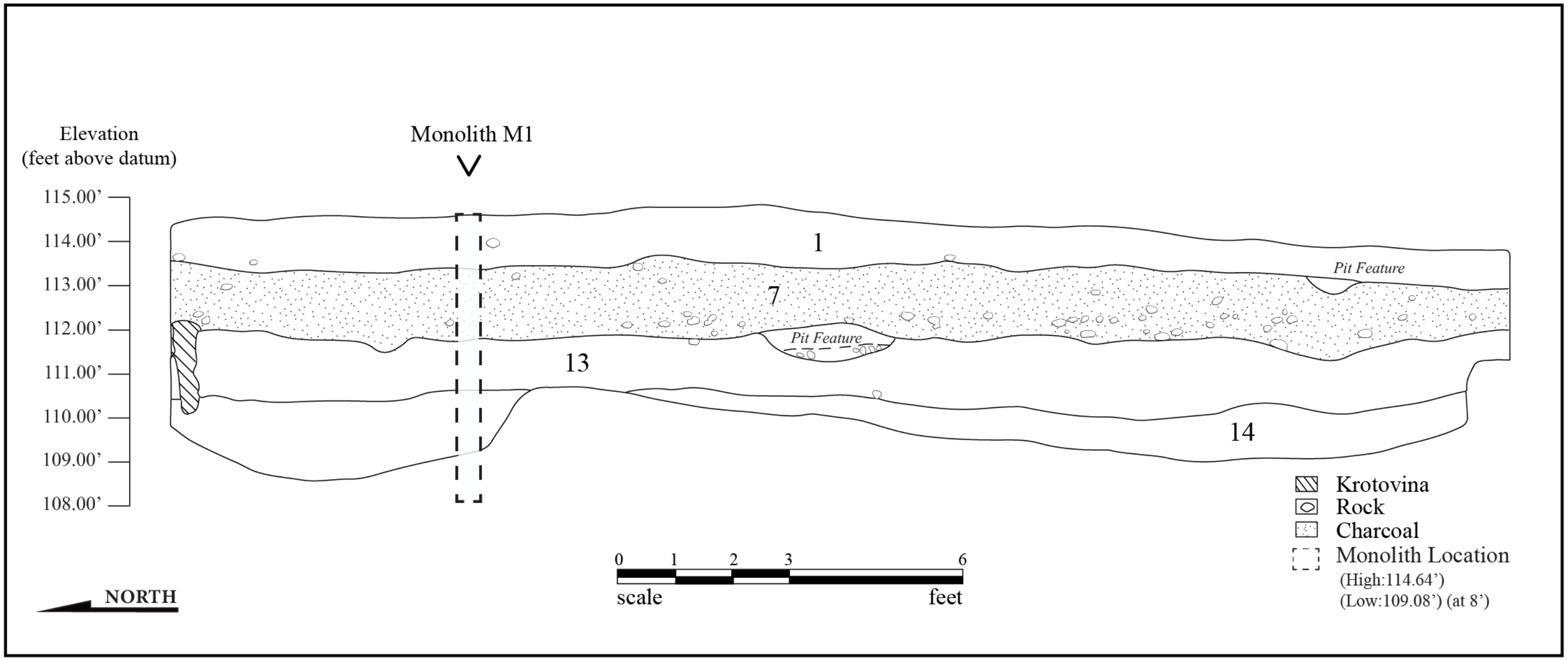

Figure 8. Backhoe Trench 2 east facing profile with monolith M1 location (Adapted from 40MR40 1972 field notes, McClung Museum Archive).

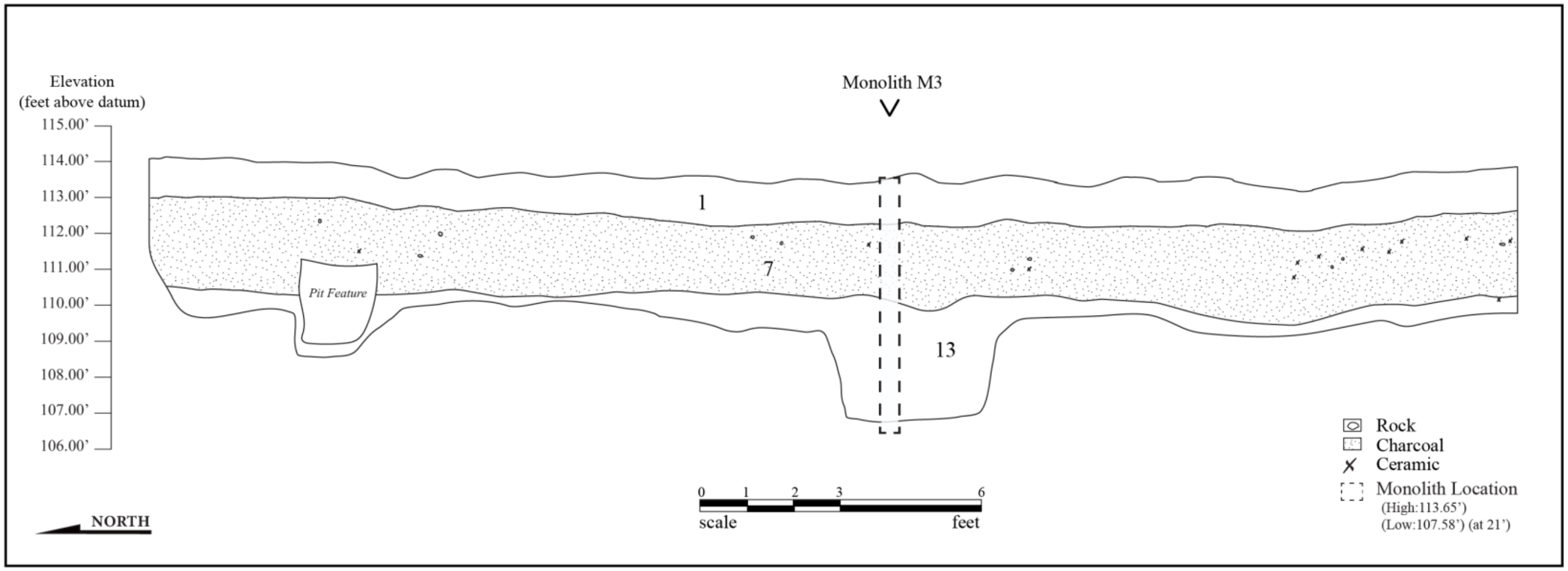

Figure 9. Backhoe Trench 5 east facing profile with monolith M3 location (Adapted from the 40MR40 1972 excavation field notes, McClung Museum Archive).

corresponds to Components 3, 4 and 5. Deposits from Strata 13 and 14, which contained little to no cultural material, are also represented (Schroedl 1978:179-187). This monolith was selected for microartifact and macrobotanical subsampling due to its location next to Blocks 1 and 2; excavations which yielded higher densities of artifacts and features relative to Blocks 3 and 5. This provenance was expected to yield a representative vertical distribution of microartifacts and macrobotanical remains for the site.

Monolith M3 was collected from the eastern profile of Backhoe Trench 5 at approximately 170N/580E (see Figure 5). The monolith measures 14 cm by 185.8 cm in length, with a surface elevation of 113.56 feet and a base elevation of 107.5 feet above datum (see Figure 9). Monolith M3 was selected due to the primary deposits it represents and its proximity to areas of higher human activity relative to the monoliths collected on the slopes of the site. This profile was not subjected to total sampling, but rather was only subsampled for particle size and organic matter content analysis, leaving the majority of the profile fully intact for future research.

Two additional contexts were investigated to a limited degree; monolith M6 and the M8 curated soil samples. Monolith M6 is a 7.33-foot (223.35 cm) section of profile collected from the east profile of 254-266N/576-582, on the slough side of the island and adjacent to Trench 7. The monolith represents a deep sequence of stratified deposits and is a good candidate for micro-stratigraphic studies. Monolith M6 was cleaned, mapped, and sampled for radiocarbon dates. However, it was not in the interest of this study to further destroy the sample so no further action was taken. Macrobotanical remains from two M8 soil samples, one corresponding to Strata 1, and the other corresponding to both 5 and 6, were selected for radiocarbon determination.

Stratigraphic Description

Visual observations of the M1 and M3 monolith profiles in laboratory conditions were recorded using standard horizon and sediment-soil terminology outlined by the Soil Survey Division Staff (1993) and Holliday (2004:4-6). The recorded properties include Munsell color, texture, structure, consistency, horizon boundary characteristics, as well as the presence and characteristics of redoximorphic features such as root casts, voids, and micaceous material. Age determinations are assigned on the basis of radiocarbon dated carbonized macrobotanical remains within the sediment and soil. Stratigraphic profiles were mapped in centimeters extending below a fixed datum point located in the top left corner of each monolith box parallel with ground surface level of the profile. Depths are recorded as centimeters below surface, or cmbs.

Sedimentary “Units” were defined within each profile, and assigned Roman numerals (I, II, III, IV, and V). Within each unit, discrete soil horizons referred to here as “Zones” were identified and described (see Appendix C). Numerical horizon prefixes representing these zones (1Ap, 1AP2, 1B, 2Ab, 2B, 3abw, 3Bw, 4Abw, 4C, 5C), reflect the depositional sequence and not a change in the parent material (Birkland 1999; Kocis 2011:34). The superscripts “b” (buried), “p” (plow zone), and “w” (weakly developed or little illuviation) were also used as modifier prefixes (Holliday 2004:4-6). Illuvial or “t” horizons were not defined, as the desiccated and highly fragmentary nature of the monolith did not lend itself to identification of clay skins, ped surfaces and cutans.

Profiles were mapped by hand, described, and then photographed with a Canon I-5 digital camera prior to subsampling.

Sedimentation rates were not estimated for this study using an age of depth model and instead, were estimated on the basis of vertical distance between dated Zones. Radiocarbon samples from monoliths M1 (n=6) and M3 (N=3) were determined to be too few to allow for an accurate age of depth model. Further, linear interpolation of sediment age between horizons was deemed highly problematic in this environmental setting. Age depth models are not always applicable for alluvial sediments given the scarcity of carbonized materials in over-bank deposits, variability in sedimentation, and the removal of material through processes of erosion present in any floodplain setting.

Organic Matter Analysis

Organic matter is defined in this study as any carbonaceous substance found in both soil and sediment such as humus or decomposed and decomposing flora, fauna, and microorganisms (Brady and Weil 2000). Fluctuations in organic content are often indicative of soil development processes, landform stability, and site use. Increases in organic matter could suggest both deposition and downward migration organic matter through processes of bioturbation and root decay. Such an increase may occur as the result of human activity and/or increased deposition of faunal and plant refuse resulting in midden formation (Stein 1992).

Organic matter concentrations in both monoliths M1 and M3 were measured at UT's GPSC. The loss on ignition technique outlined by Broadbent (1965) was used to determine the stratigraphic variability of organic materials. Organic matter subsample locations (n=17) were plotted on a stratigraphy map of monolith M1 and assigned individual lab numbers. Subsample locations (n=23) were plotted and numbered for monolith M3 in an identical fashion. Subsample locations were selected on the basis of proximity to soil horizons, as well as the degree to which a sample might represent the organic content of a targeted stratum. Buried A horizons, or "Ab" zones were sampled most extensively in an attempt to capture variation among depositional episodes related to human land-use.

Subsamples (n=40) weighing approximately 20.1 grams were collected at each location by excavating 4-cm-by-2-cm square units at the exact locations marked on the corresponding maps. These materials were homogenized using mortar and pestle, placed in pre-weighed ceramic crucibles, then dried overnight at 105°C in a muffle furnace. The dried samples were then weighed, heated to 375°C for eight hours, then re-weighed. Differences in the pre-burn versus post-burn weights are estimations of the organic content at the location from which each sample was collected.

Particle Size Analysis

Particle size analysis (PSA) was conducted at UT's GPSC using a Malvern Mastersizer 3000 with a Hydro LV wet dispersion system. The Mastersizer 3000 system uses laser diffraction to collect data on the average grain size within a suspended sample. Identifying size variation of mineral grains within a soil or sediment provides high-resolution data related to soil formation processes and inferred depositional environments. Recent research of paleo-flood deposits along the Little Tennessee River suggest that measures of variability in the sand and silt content of fluvial deposits serve as reliable indicators of overbank deposition or landform stability, and high percentage of sand in proximal floodplain settings can be attributed to increased precipitation (Cyr 2010; Kocis 2011; Larsen 1982; Leigh 2018).

In monoliths M1 and M3, particle size analysis was conducted first by collecting 0.2-0.3 grams of material at the exact locations marked for samples collected for the organic matter concentration analysis. Subsamples were collected from the base of the cavities left by this previous analysis, approximately 2 cm into the medial axis of the monoliths. This precaution was undertaken in order to mitigate or eliminate possible contamination of the samples from the resin that was applied to their surface during the initial collection from the site in 1972. Each subsample was weighed and pretreated for organic matter using sodium hypochlorite. Following this pretreatment, samples were suspended in a solution of ultra-purified water and sodium hexametaphosphate deflocculant in order to disperse soil colloids into their grain constituents. The samples were then passed through the particle size analyzer, and the resulting high-resolution textural data were exported into Microsoft Excel for comparison.

Magnetic Susceptibility Analysis

The measurement of magnetic susceptibility in a soil profile can capture variation in magnetic minerals that may be present within the deposits. Magnetic minerals form as the result of a number of natural and anthropogenic processes (Crowther 2003). Cooking, heating and firing in the presence of organic matter thermally reduces weakly magnetic hematite and other iron oxides to a highly magnetic form of such as magnetite (Weston 2002). High concentrations of organic matter in midden deposits, hearths, and top soils provides a source of nutrition for microbial life and electrons required for the chemical reduction of iron oxides, increasing the magnetic susceptibility of a deposit. Shifting dry and wet cycles in organic soils also have the capacity to affect the magnetic susceptibility of a deposit, as the decay of organic matter in wet conditions can reduce hematite to magnetite which then may then be re-oxidized in dry conditions, forming maghaemite (Crowther 2003; Weston 2002).

Magnetic susceptibility measurements were recorded at the GPSC using a Bartington Instruments MS3 meter with a MS2E sensor in dimensionless International System of Units (SI). The MS2E sensor measures magnetic susceptibility in a 10.5-mm diameter area to a depth of 3.8 mm with a resolution of $2x10^{-6}$ SI. Measurements were recorded in 3 cm increments, beginning at 5 cm below surface in monoliths M1 and M3. Data were collected using the Bartsoft v4_2 x64 for Windows and transferred to Microsoft Excel for visualization and analysis.

Microartifact Analysis

Microartifacts are defined as artifacts less than 6 mm (0.25 in) in length and are often used to identify buried cultural deposits and surface horizons, as well as to delineate activity areas and clarify complex formation processes within archaeological settings (Dunnell and Stein 1989; Metcalf and Heath 1990; Sherwood et al. 1995; Shott 1994; Simms and Heath 1990; Stein and Teltser 1989). Identification of microartifacts is typically conducted under magnification (10x - 40x) using a binocular stereomicroscope. I analyzed microartifacts from subsamples (n=42) that were collected in arbitrary levels within the stratigraphic zones identified in monolith M1. Analysis of these materials focused on the identification of five material types: fired clay, lithics, shell, bone, and charcoal. Fired clay includes both ceramic and daub materials in order to account for the uncertainty in differentiating such materials below the 2-mm level. All fired clay materials are treated as anthropogenic, though I fully recognize (albeit small) chance that some may be the result of in-situ burning during wildland fires.

Ceramic and daub were identified based on the presence of thermally altered clay both with and without temper. Thermally altered clays were identified solely on the basis of color, texture, and shape. Lithics were identified as flaked stone related to human activities such as lithic reduction and use wear, or taphonomic processes such as trampling. Lithic microartifacts were identified by a combination of attributes including flake thinness and angularity, as well as visible reduction features such as conchoidal fractures, bulbs of percussion and absence of patina. Shell fragments were distinguished by their white to grey color, texture, and surface morphology. Bone fragments were identified based on general morphology, internal structure and porosity, white to tan or blue color due to burning, and texture. Charcoal is defined as any carbonized plant material and may include a variety of materials such as burned wood, rind, seed, or stem fragments.

Samples examined for microartifacts were collected according to natural levels and were assigned unique provenance identification numbers (PINs) (see Appendix D.1). Zones with thickness greater than 5 cm were subdivided into 2.5-cm arbitrary levels. Materials within the upper 8 cm within the plow zone of the monolith profile were not analyzed. Approximately half of all excavated sediment and soil from monolith M1 was analyzed, reserving the remaining material for future analysis. Monolith M3 was not subsampled for microartifacts and macrobotanical analysis in an effort to leave the maximum amount of sample material for future studies.

Soil and sediment samples from monolith M1 were placed into double-lined 40-μm fine nylon filter bags and immersed for 48 hours in a liquid deflocculant solution of water and sodium hexametaphosphate (40 g of $(NaPO_3)_6$ to 1 liter of H2O) according to standard microartifact analysis procedure (Sherwood et al. 1995:440-441). The remaining materials were air dried for an additional 48 hours. Each sample was then passed through a set of nested sieves in order to separate materials into 2-mm, 1.7-mm, and 1-mm size grades for easier viewing. Due to the unreliability of microartifact identification in fractions less than 1 mm, only materials larger than 1 mm were included in this analysis. Carbonized plant remains were set aside for macrobotanical analysis.

Microartifacts were counted and tabulated using the MMCount 2 software developed by Sherwood and Ousley (1995). Data collected with this program were transferred into Microsoft Excel in order to visualize variation and patterning in microartifact quantities from each level. All materials (including unanalyzed fractions) were collected and stored in separate plastic bags according to their corresponding level PINs.

Macrobotanical Analysis

Carbonized macrobotanical remains can be used to identify natural and anthropogenic processes at the site level. When plants are fired they are typically reduced to elemental carbon, remaining within the sedimentary record for long periods of time. While carbonized plant remains can be ubiquitous on just about any forested landscape, they can also inform us about human activities related to subsistence, settlement, industry and culture. Wood charcoal, seeds, stems, nutshell, and other plants were collected and analyzed from monolith M1 in order to measure vertical changes in these important signatures with specific emphasis placed on the presence or absence of subsistence-related plants through time.

Macrobotanical remains are defined here as any plant material, such as wood, seeds, or nutshell, that has been carbonized and reduced to its elemental carbon compounds. Uncarbonized plant materials were not analyzed given the high probability that such materials are modern contaminants. Macrobotanical remains from the 42 subsamples collected from zones in monolith M1 were set aside for analysis following the tabulation of microartifacts. Analysis and identification were carried out using standard paleoethnobotanical techniques outlined by Pearsall (2000) and under the guidance of Dr. Hollenbach.

All materials were passed through a set of nested sieves in order to isolate materials by size. Macrobotanical remains were analyzed using a 10x - 40x power binocular stereomicroscope. All macrobotanical remains from the 2 mm, 1.4 mm, and 1 mm fractions were identified, counted and weighed. The remaining 0.71 mm and 0.5 mm fraction materials were scanned for seeds and fragile acorn shells. Any identifiable taxa from the sub-1-mm fractions were added to taxa found in the 1-mm fraction. All macrobotanical remains from monolith M1 were identified with the help of Dr. Hollenbach, as well as the use of comparative collections housed at the ARL, and photos and descriptions in the Martin and Barkley's (1961) *Seed Identification Manual*.

Specimens were grouped by taxa, counted, and weighed for quantitative analysis. All provenance and subsample data were recorded in Microsoft Excel for visualization and further analysis.

AMS Radiocarbon Determination

A total of fifteen radiocarbon samples were selected for direct dating using accelerator mass spectrometry (AMS). Thirteen of these samples were carbonized nutshell or wood from deposits represented in monoliths M1, M3, M6 with the explicit intention of dating Woodland and Late Archaic contexts at the Patrick site. Sample materials were selected from macrobotanical remains from subsampled levels Units I, II, III, IV and V in monolith M1. Radiocarbon samples from monolith M3 were selected from macrobotanical remains in dry screened 3-by-4-by-4-cm subsamples collected from Units II, III, and IV.

Two radiocarbon samples of carbonized hickory nutshell were collected from sediments in the M8 soil samples excavated at 133N/458.3E, a unit placed adjacent to Backhoe Trench 11 on the sloping south bank of the island during the 1975 excavations at the Patrick site. Radiocarbon samples were collected from curated soil samples that were collected at depths of 1.0-2.0 ft (UCIAMS-202564) and 5.4 to 5.9 ft (UCIAMS-202565) below surface. These samples were dated in an effort to determine the age of Late and Middle Archaic strata defined by Foley and Chapman (1977:158).

Macrobotanical remains were also collected from monolith M6, a soil profile collected at 263N/582E on the northeastern, slough side of the Patrick Site (see Figure 5 for stratigraphy and Figure 7 for location). Radiocarbon samples of carbonized nutshell were collected from Stratum 10B and Stratum 10G, and carbonized wood was collected from Stratum 12 at the base of the profile (see Figure 7). AMS radiocarbon dates from these deep contexts on the slough side of the island offers a *terminus post quem* date for the deposition of Woodland period midden material into the slough, and a *terminus ante quem* for the deposition of the Stratum 12 sediments (see Figure 7).

Nutshell and other short-lived taxa were targeted for radiocarbon dating based on the assumption that such taxa represent only one to two years of growth, while a fragment of wood can include several growth rings and may represent heartwood that began its radiocarbon decay years before a tree or timber was felled and burned. Direct radiocarbon determinations of carbonized nutshell or seeds are considered to be absolute dates for the associated depth within an associated zone and unit. Direct dates from carbonized wood are less certain but valuable as they can provide a terminus post quim for the associated depth within a zone, cut, feature or living surface.

All radiocarbon samples were pretreated, processed and analyzed by the Keck Carbon Cycle AMS Facility, Earth System Science Department, UC Irvine (UCIAMS) under the direction of Dr. John Southon. Radiocarbon concentrations are presented as fractions of the modern standard, $\Delta^{14}C$, and conventional radiocarbon age, following the conventions of Stuiver and Polach (1977:335). Sample preparation backgrounds have been subtracted, based on measurements of ^{14}C-free wood. All results were corrected for isotopic fractionation according to the conventions of Stuiver and Polach (1977), with $\Delta^{13}C$ values measured on prepared graphite using the AMS spectrometer. These can differ from $\Delta^{13}C$ of the original material and are not shown. Samples were treated with acid-base-acid (1N HCl and 1N NaOH, 75°C) prior to combustion. Radiocarbon age determinations were calibrated with OxCal software v4.3.2 (Ramsey 2017) with the IntCal13 dataset (Reimer et al. 2013).

Data Management Plan

All maps, photos, and any other hardcopy documents associated with these analyses were digitally scanned and saved as .pdf or, when appropriate, as .tiff files. Scanned documents, digital Microsoft Excel data, and hard copies of all data were curated in the McClung Museum digital data archive and storage facility, as well as the ARL facility network storage and physical library. Though Monolith 1 was completely partitioned into subsamples, one half of each of the defined levels was placed in curation-quality plastic bags along with plastic tags bearing all corresponding PIN and provenance information. All remaining soil and sediment samples, microartifacts, macrobotanical remains, and unanalyzed materials are currently stored at the ARL facility along with the remaining six monoliths.

CHAPTER 6. RESULTS

This chapter presents the results of the analyses carried out on monoliths M1 and M3. Also presented here are the radiocarbon age determinations from contexts in monoliths M1, M2, M6 and the M8 curated soil samples. A total of five allostratigraphic units and ten soil horizon zones were defined in the M1 and M3 profiles. Stratigraphy was not described for monolith M6 or the M8 curated soil samples, as both relate to relatively older or redeposited contexts located on the distal edges of Thirty Acre Island. Grain size distribution, organic matter concentration, magnetic susceptibility, microartifacts and macrobotanical remains were analyzed for monolith M1. Only minimally destructive analyses were carried out on monolith M3, including grain size analysis, organic matter analysis, and magnetic susceptibility analysis. Raw data from each analyses are presented in Appendices E through I.

Particle Size

The sediments represented in monoliths M1 and M3 are primarily silt loam alluvium with lesser amounts of very fine to fine sand and clay (see Figures 10 and 11). The distribution of particle sizes between the two contexts demonstrates clear differences in patterns of deposition across the site. Quantitative variation in cumulic percentages of clay, silt and sand content represented in the profiles exhibit periods of aggradation between periods of stability reflective of a typical floodplain environment.

Monolith M1, located closer to the downstream end of the island, exhibits more energetic depositional regimes evidenced by a disconformity at the base of Unit III and, relative to monolith M3, with more sand throughout the soil profile and a more

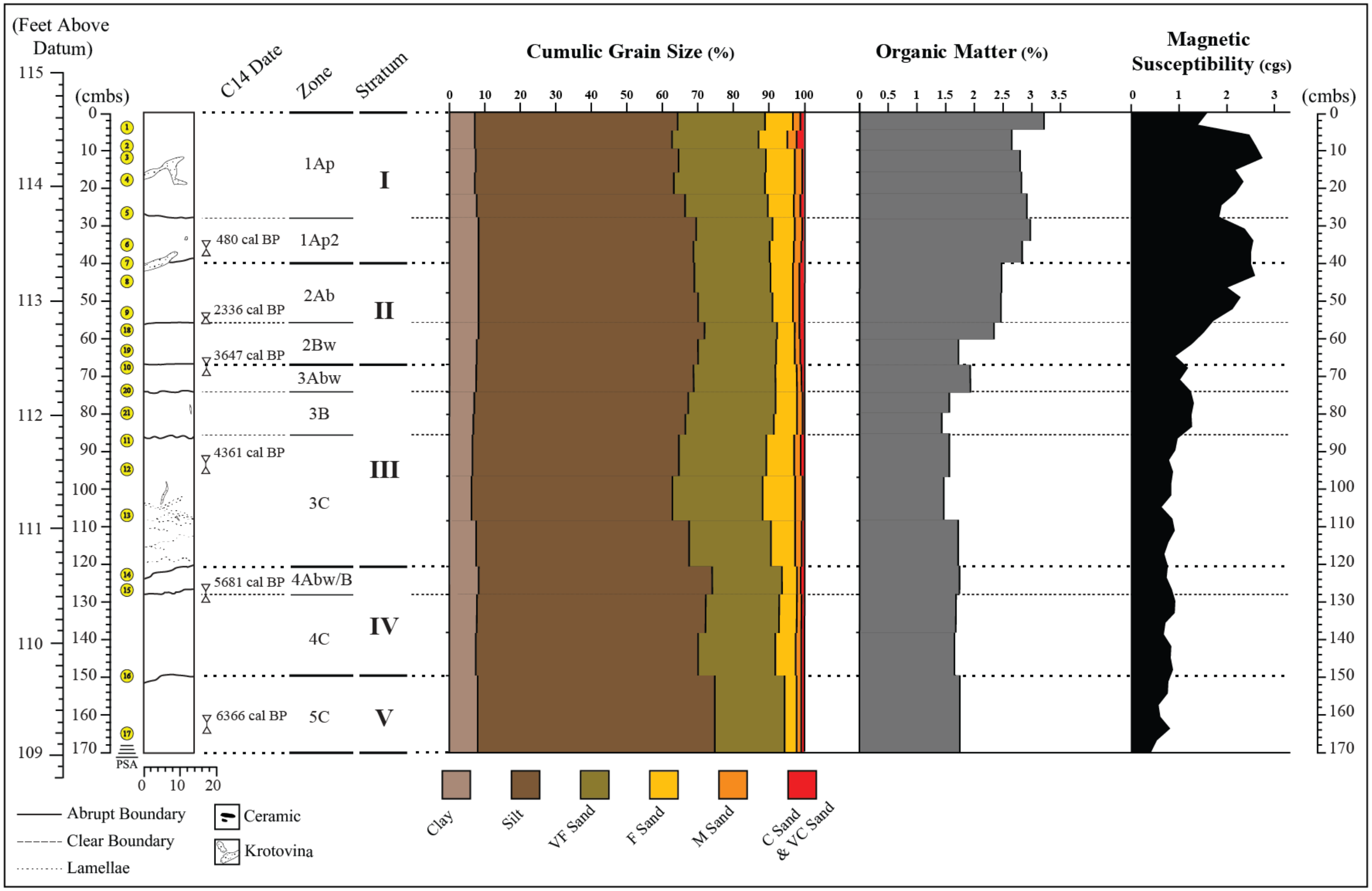

Figure 10. Monolith M1 - Laboratory data with stratigraphy, radiocarbon determinations, grain size distribution, organic matter, and magnetic susceptibility.

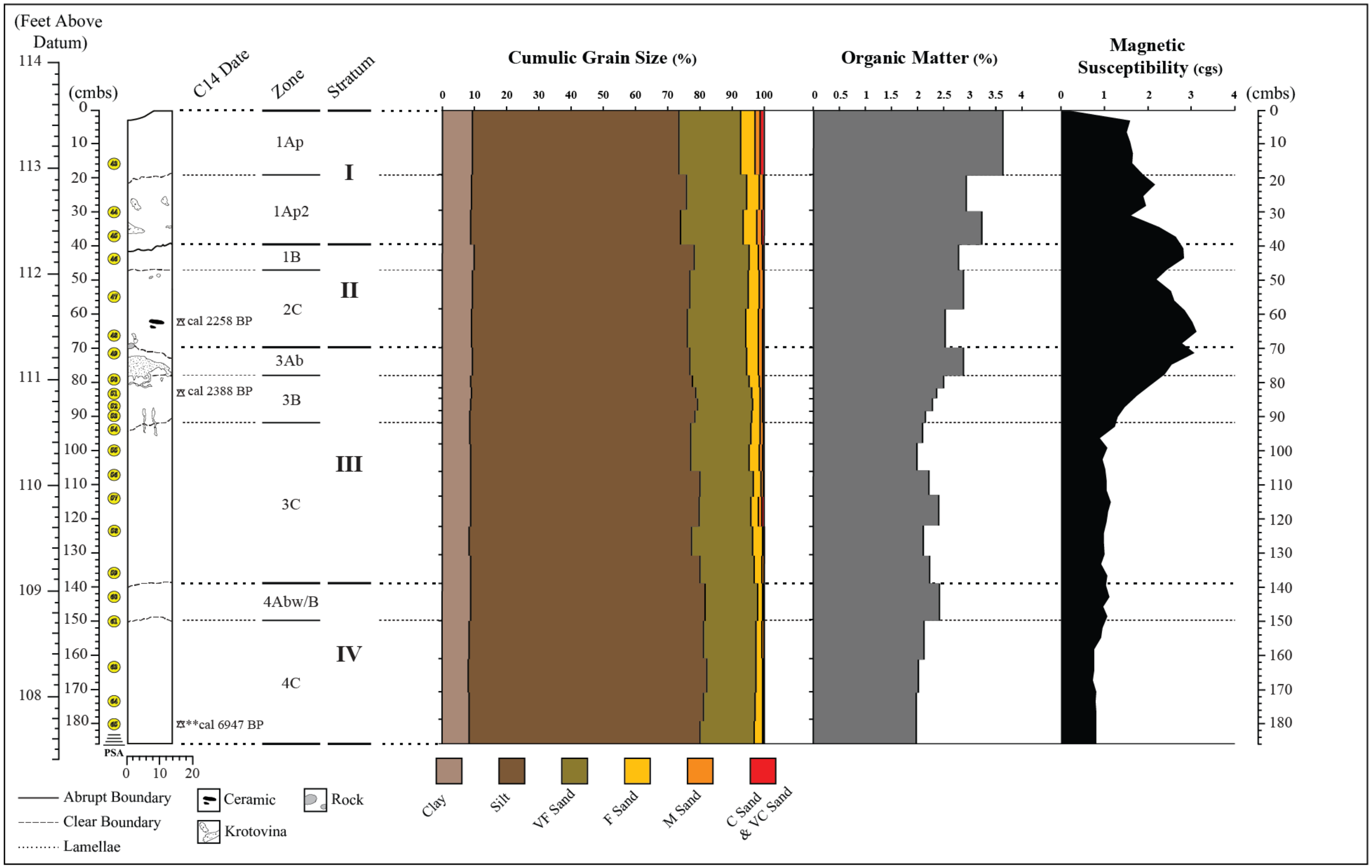

Figure 11. Monolith M3 - Laboratory data with stratigraphy, radiocarbon determinations, grain size distribution, organic matter, and magnetic susceptibility.

condensed sequence of horizons that may reflect the removal of materials during high discharge events. The relatively high silt content of 66.99% in Unit V of monolith M1 suggests that Zone 5C represents the upper portion of a fining-upward sequence of alluvium extending below the base of the profile at 170 cmbs. Unit IV represents a second fining-upward sequence beginning as a sandy to fine sandy-loam at the interface between Zone 5C and 4C and grading into a siltier loam within which a weak soil formed (Zone 4Abw/B). Unit IV was buried by multiple higher energy floods represented in Unit III. This is signaled by an increase in sand content from 26.37% in the underlying Zone 4Abw/B, to 32.77% sand at the base of Zone 3C, peaking at 37.55% sand. The texture of the Unit III fines upward, with silt content increasing and peaking within Zone 3Abw.

The sediment characteristics in the overlying Unit II reflect a stable and seasonal flooding regime indicated by a high silt content and low sand. A marked increase in coarse particles beginning at the base of Unit II, Zone 2Bw, may suggest the introduction of sand grains from seasonal overbank deposition, but more likely reflects cultural processes such as an increase in anthropogenic debris and coarse sands transported by movement of peoples between the river bank and the site (Stein 1982:32, 1987). The particle size distribution of samples from Unit I indicate a shift back to a more active flood regime, with the introduction of more sand and flooding comparable to those represented in Zone 3C of Unit III.

Particle size analysis of contexts within the monolith M3 soil profile suggests that a gentler depositional environment characterized the upstream end of the site (see Figure 11). This is indicated by stratigraphic units dominated by silt size particles, ranging from 64.52% to 74.30%, with far less sand relative to contexts in monolith M1. Apparently minor changes in grain size down profile reflect a more predictable sequence of overbank deposits with deposition of silts throughout the 180-cm length of the profile, with the exceptions of increased very fine and fine sands between 140 to 120 cm and 94 to 104 cm in Zone 3C. There appears to be no evidence of erosive surfaces within this profile. Unit IV at the base of the profile shows little variation and may represent a series of stacked fining-upward sequences with a soil forming at 4Abw/B. As observed in monolith M1, Unit III suggests a shift to a more active and energetic flood regime with multiple peaks in sand relative to Unit IV. These coarse sand deposits fine upward from sand into more silty deposits, suggesting multiple fining-upward sequences representing a pattern of deposition and weak soil formation that remains consistent into Unit II. The greatest increase in coarse to very fine sands occurs within the base of Unit I in Zone 1Ap2. Taking into consideration the increased fluvial activity represented in Unit I of monolith M1, I interpret this increase to suggest a dramatic increase in flood energy that may be related to Late Mississippian or Historic period land-use and erosion.

Discussion

Particle size analysis of the soils and sediments in monoliths M1 and M3 allow us to examine the depositional history of Thirty Acre island from vantage points: one near the downstream end of the site (M1), and another location 168 m upstream (M3). The overbank deposition of coarse materials in monolith M1 and a more compacted sequence of horizons suggests that for the last >6000 cal years, this area of the site has been characteristically more active and sandy than locations further upstream. During the Late Archaic and Early Woodland periods, dense vegetation that might have occupied the interior of the island may have been absent at this location, perhaps offering a favorable location for logistical camps associated with fishing at the confluence of the slough and the main river channels, or horticulture where the island gradually slopes into the water.

In contrast, the consistently high silt content and relatively lower percentage of sands in monolith M3 offer little evidence of major flooding events marked by major increases in coarse grained materials. Increases of coarse grained materials at this position on the landscape likely reflect some of the most energetic periods of river discharge. It is possible that this area of the island was more vegetated, preventing the erosion and that is clearly visible closer to the periphery.

Organic Matter

The pattern of vertical fluctuation of organic matter concentrations is generally consistent between monoliths M1 and M3 with values ranging from up to 3.65% to as low as 1.7% (see Figures 10 and 11). Organic matter increases up profile in both contexts in sync with soil formation in Units II and III. Monolith M3 reflects a quantitatively higher concentration of organic matter and pedogenic horizons throughout the soil profile relative to those observed in monolith M1, a pattern that indicates a consistently more stable position at the site. Conversely, organic matter concentrations in monolith M1 suggest that the downstream end of the site experienced relatively less pedogenesis with an average value of 2.15% compared to 2.40% among the deposits represented in monolith M3, suggesting a more active depositional environment.

The lower units of monolith M1, Unit V and IV, have fairly low organic matter values with an average of 1.69%. Unit III decreases from 1.70% at the base of Zone 3C to 1.41% at the base of 3Bw, then increases sharply to 1.92% in 3Abw indicating a period of stability where the rate of deposition was outpaced by the introduction of organic matter and soil formation. From 1.92% in 3Abw, the organic matter concentration drops back to 1.71% at the base of Unit II, possibly indicating an increase in the rate of deposition at this locale. The percentage of organic matter the rises precipitously from the surface of 2bw through 2Ab, and peaks at 3.20% at the surface of Unit I.

Organic matter in Unit IV of monolith M3 is relatively low and gently rises from 1.96% to 2.11% and peaks at 2.41% within Zone 4Abw/B. Values fluctuate within the overlying Unit III, beginning with a value of 2.21% in 3C, rising up to 2.39%, decreasing again to 1.98% only to rise gradually through 3B to peak at 2.86% in 3Ab. At the boundary of Unit III and Unit II, organic matter drops to 2.52% at the base of 2Ab before peaking at 2.77% just beneath 1B. The highest concentration of organic matter occurs within Unit I, ranging from 3.22% to 3.63%.

Discussion

This analysis allowed the identification of weakly developed, buried soils, possibly reflecting periods of stability that are were not readily visible to the naked eye. The zonation of these buried soils indicates successive periods of stability and instability throughout the island’s geomorphic history. The most interesting shift in organic matter concentration occurs at the upper surface of Unit III in both monoliths M3 and M1. Increases in organic matter at these depths suggests cumulic soil formation was occurring to a degree that was not present during the previous 3000 cal years. This fact has significant implications for the prehistory of this valley and elsewhere in the region. The development of soils at the Patrick site at approximately 3600 cal BP suggests that the river had indeed incised its channel, forming the T-0 and creating a far more predictable open landscape for utilization by Late Archaic Iddins phase peoples, setting the stage for the intensified occupations characteristic of the following Woodland period.

Magnetic Susceptibility

Trends in the magnetic susceptibility of soils and sediments appear consistent between monoliths M1 and M3 (see Figure 10 and 11). Values between both monoliths vary between a high of $3.11E^{-04}$ in Unit II of monolith M3 to the lowest value of $7.38E^{-05}$ near the base of Unit IV in the same monolith. Magnetic susceptibility remains low in Units V and IV, then grades upward within Unit III in monolith M1 and in Unit II in monolith M3, reflecting a strong correlation between midden contexts and magnetically susceptible minerals. Measurements among the deposits do not, however, remain consistent and tend to fluctuate.

Analysis of the magnetic susceptibility in Units V and IV in monolith M1 indicates low values that fluctuate between $4.26E^{-05}$ and $9.73E^{-05}$ with no perceived pattern in variation. Values then increase to $1.28E^{-04}$ in Zone 3B of Unit III before dropping back down just above the base of Zone 2B in Unit II. Magnetic susceptibility values then increase rapidly from Zone 2B through 2Ab and into Zone 1Ap2 of Unit I.

Magnetic susceptibility is low at the base of monolith M3 in Zone 4C of Unit IV, beginning with a value of $8.06E^{-05}$ that slightly decreases up profile to $6.17E^{-05}$ before rising to $1.11E^{-04}$ near the surface of Zone 4Abw/B. Values remain relatively constant and low in Zone 3C of Unit III beginning with a value of $1.07E^{-04}$ at the base and gradually decreasing to $8.84E^{-05}$. Magnetic susceptibility increases from the base of Zone 3B and peaks at $3.96E^{-04}$ at the surface of Zone 3Ab. Values dip slightly at the contact between Units III and II and then climb back to $3.11E^{-04}$ in Zone 2Ab. Within Unit II, Zone 2Ab, magnetic susceptibility values drop from the high of $3.11E^{-04}$ to a low of $2.20E^{-04}$. In Zone 1B, values peak at $2.82E^{-04}$ and gradually decrease through Unit I.

Zones 3B through 3Abw in monolith M1 and Zones 3B through 3Ab in monolith M3 show a spike in magnetic susceptibility values, interpreted here to be reflective of increased accumulation of thermally altered materials, the byproducts of intentional firing and burning associated with Iddins phase occupations at the site (see Figures 10 and 11). The dramatic increases in magnetic susceptibility in Unit II at both locations suggests an intensification of site use and successive seasonal occupations during the Woodland period Watts Bar and Patrick phases. Variability in the elevation and level of magnetic susceptibility within Unit II of monoliths M1 and M3 may reflect differential site use through time, and overall higher levels of magnetic susceptibility in Units III, II, and I in monolith M3 may indicate a higher level of activity and/or occupation further away from the downstream end of the site (see Figures 10 and 11). The results of this analysis demonstrate that site use increased as the floodplain became more stable, exponentially so during the Watts Bar and Patrick phases.

Microartifacts

Monolith M1 was partitioned into subsamples (n=42) collected in arbitrary levels bounded by defined soil zones. Vertical differences in the combined density, which is a total count of microartifacts/(subsample volume/1000), of bone, ceramics, daub, debitage, and charcoal less than 2 mm in size from deposits in monolith M1 suggest that the downstream end of the Patrick site was utilized throughout the Late Archaic period as early as 4361 cal BP (median at 2σ), with an increase in microartifact density beginning within Unit II, Zone 2B during the Early Woodland period, circa 2336 cal BP (median at 2σ; see Figure 12). This pattern may suggest changes in soil formation, landform stability, and human use.

Microartifacts first occur within the base of Zone 4Abw in Unit IV, with a single flake of debitage. Sparse occurrences of one or two fragments of fired clay and debitage occur up profile through Unit III but do not exceed one to two artifacts in any given sample, with density values ranging from 2.22 to 14.29. Microartifacts increase from a density value of 26.67 (three pieces of fired clay and one piece of bone) at the base of Zone 2B, Unit II, to a density value of 888.00 in 2Ab of the same unit, indicating an increase in microartifacts in concert with midden formation. Microartifacts abruptly decrease to a density value of 651.43 within the base of Zone 1Ap2 and continue to fluctuate in what appears to be a random pattern through the plow zone, indicating a heavily mixed context rather than discrete surfaces.

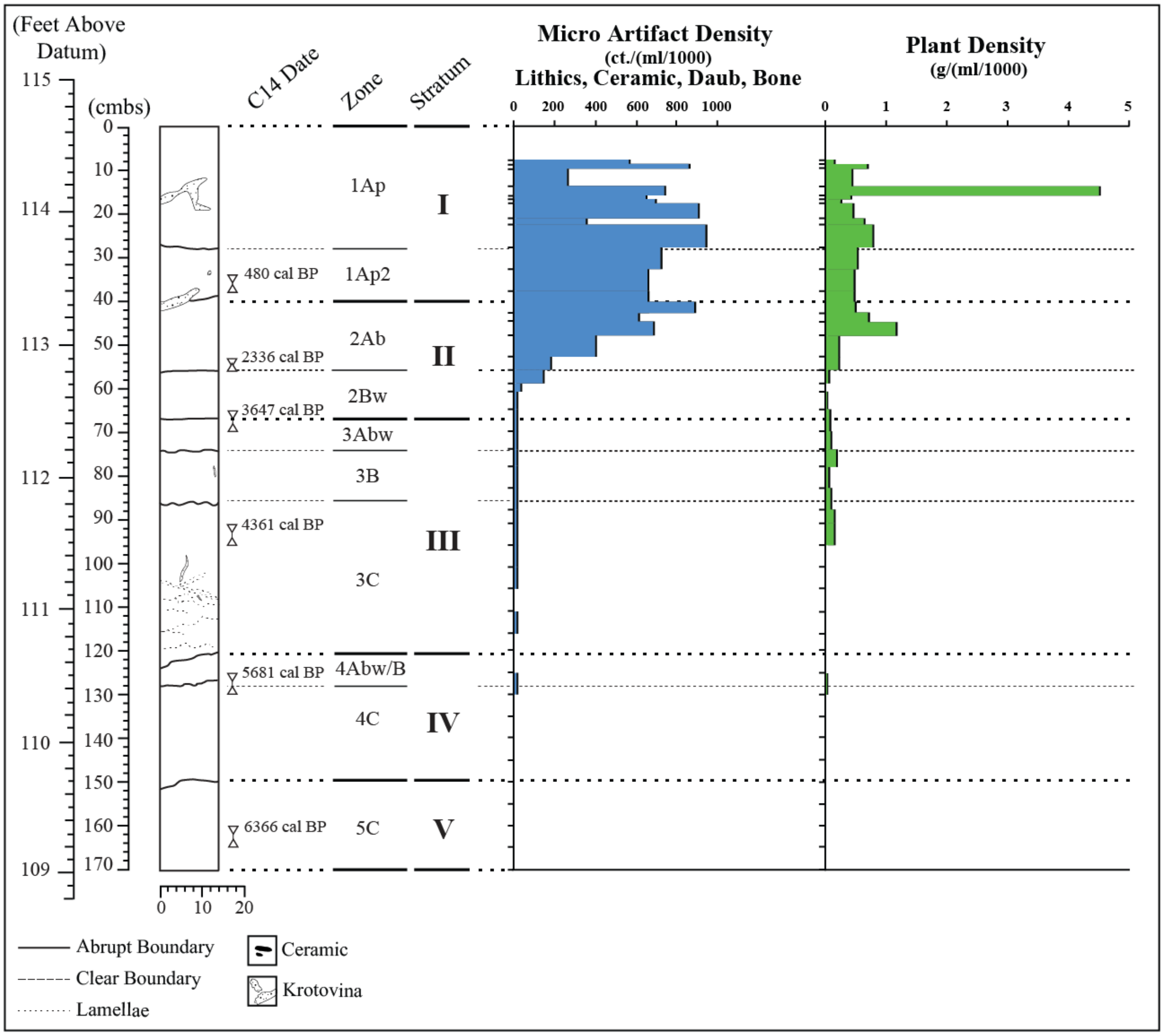

Figure 12. Monolith M1 - laboratory data with stratigraphy, radiocarbon determinations, microartifact densities and macrobotanical remains densities.

Discussion

Microartifacts were only analyzed in contexts from monolith M1, and as such, the data presented here can only speak to changes occurring closer to the downstream end of the site. This is an important point to make, because it is entirely possible that the occupational sequence represented by densities of microartifacts at other locations at the Patrick site (such as the M3 context), may reflect different patterns of site use occurring at varying time-scales and degrees of intensity. Still, much can be said about the data from monolith M1.

Microartifacts increase in quantity through Zone 3C, despite the coincidence of coarse sand deposits that are interpreted as high energy discharge deposits. Microartifacts from Zone 3C are sparse and may represent limited use of the downstream end of the site by foraging groups, rather than prolonged or seasonal occupation. The dramatic increase in microartifact density apparent in Zone 2Ab of Unit II may indicate that this location at the site was occupied or at least utilized at a higher frequency and degree of intensity during the late Early Woodland Watts Bar and Middle Woodland Patrick phases.

Plant Remains

Botanical analysis of 42 subsamples from monolith M1 recovered approximately 2.08 g of plant material, 0.58 g (28%) of which was wood. Direct radiocarbon dates from carbonized nutshell and seeds associate these materials with subsistence practices that span the late Middle Archaic (5681 cal BP, median at 2σ) through the Dallas phase of the Mississippian period (480 cal BP, median at 2σ) (Davis 19909:56; see Figure 1).

Among the variety of taxa recovered from deposits in monolith M1, 13 definitive species were identified. The vertical distribution of plant taxa (see Table 2 and Figure 12) appears to be consistent with local patterning among Archaic and Woodland period suggested by Smith and Cowan (2003:106) and Gremillion (2004:215-233) for this time period in the interior Southeast (see also Fritz 1993). Appendix I presents each subsampled context and associated macrobotanical remains as well as a complete list of all carbonized materials that were identified.

Carbonized acorn, hickory nutshell and vitrified tree sap, referred to here as "pitch", were recovered between 125 and 140 cmbs within Zone 4C and Zone 4bw/B of Unit IV. Carbonized hickory nutshell from Zone 4bw/B returned an AMS date of 5681 cal BP (median at 2σ), suggesting intermittent use of the Patrick site during the late Middle Archaic during a period of increased stability marked by increased organic matter, a silty loam, and the presence of calcined bone. No macrobotanical remains were recovered for the lower 25 cm of the overlying Zone 3C within Unit III.

Density measures, defined as a sample's total plant weight/(subsample volume/1000), were used to quantify the distributions of macrobotanical remains and are used here as a measure of occupational deposition. The density of macrobotanical remains increases within the upper 8 cm of Zone 3C, where carbonized acorn, black walnut, hickory, and bedstraw were among the taxa identified. A radiocarbon sample of carbonized hickory nutshell from the top of Zone 3C returned a date of 4361 cal BP (median at 2σ). The appearance of carbonized nuts within Zone 3C marks the onset of a steady increase in both the diversity and quantity of plant foods in deposits up profile,

Table 2. Total carbonized plant taxa by stratigraphic unit and zone from monolith M1.

Common Name	I		II		III			IV		V
	1AP	**1Ap2**	**2Ab**	**2Bw**	**3Abw**	**3bw**	**3C**	**4Abw /B**	**4C**	**5C**
Acorn	45	69	25	7		3	1	1		
Acorn cf.		4	6							
Bedstraw							5			
Black walnut	1		13		1	2	1			
Cane						4	2			
Chenopod	1		6							
Chenopod cf.	3		1	1						
Maize cupule		2								
Maize cupule cf.	1	2								
Maize glume		1								
Grape	2	1								
Grape cf.	1		1							
Hickory	177	142	75	15	7	18	9	1	2	
Hickory cf.							1			
Maygrass	3	2	2	1						
Maygrass cf.	2									
Persimmon cf.		2								
Wild Sunflower			1							
Walnut family	20		1		4	9				

beginning during the Late Archaic period Savannah phase (Davis 1990:56; see Figure 12 and Table 2).

The density of macrobotanical remains increases within Zone 3B and the overlying Zone 3Abw within Unit III. Materials in Zone 3B include chenopod cf., black walnut, hickory nutshell and acorn. Plant density values for Unit III peak within the boundary of Zone 3B and 3Abw at 0.17 g/L (see Appendix I.1.). Plant density decreases through Zone 3Abw to 0.8 and 0.6 g/L. Maygrass, chenopod cf., black walnut, acorn and pine cone cf. occur in Zone 3Ab, and a radiocarbon determination from carbonized hickory nutshell returned a date of 3647 cal BP (median at 2σ), indicating a Late Archaic occupation coeval with the Iddins phase (Chapman 1981:143; Davis 1990:56).

Chenopod infrequently occurs among Early Archaic contexts in the LTRV, but it increases in frequency during the Late Archaic Iddins phase and is found in relative abundance among Woodland and Mississippian contexts (Chapman and Shea 1981:70). This pattern conforms to regional models of chenopod cultivation (Smith and Cowan 2003). AMS radiocarbon dates of thin-testa, uncarbonized chenopod from the Newt Kash and Cloudsplitter rockshelters in east Kentucky returned dates of 3640 cal BP and 3700 cal BP respectively (Smith 2006:12225). Maygrass first appears in abundance locally in Late Archaic Savannah River phase contexts at the Bacon Bend site, and also increases during the Iddins phase and subsequent Woodland period (Chapman and Shea 1981:38-39). The increasing appearance of these plants at the Patrick site, within deposits dating to the Iddins phase, suggests that occupants of the site by this time were engaged in some degree of horticulture on or near the T-1 floodplain.

Carbonized plant density decreases slightly in the overlying Zone 2Bw of Unit II, ranging between 0.06 g/L and 0.0 g/L. Plant density increases dramatically from 0.20 g/L at the base of Zone 2Ab in Unit II, to 1.14 g/L and 0.69 g/L within the upper 5 cm of the zone. Carbonized acorn shell within the lower 3 cm of Zone 2Ab returned a radiocarbon date of 2336 cal BP (median at 2σ), suggesting a late Early Woodland Watts Bar phase association for this level of the midden (Davis 1990:56). Fluctuations in plant density within Zone 2Ab range from 0.20 g/L to 1.14 g/L, likely indicating successive seasonal occupations occurring within a stable depositional environment. Taxa from this zone include wild sunflower, chenopod, acorn, hickory, black walnut, grape, and maygrass, a fairly typical assortment of plant foods associated with Late Archaic and Early Woodland contexts in the valley (Chapman and Shea 1981:61-84). The occurrence of such taxa is in direct association with the moderately well-formed soil and Early Woodland midden that occur within the upper 20 cm of Unit II.

The vertical distribution of plant densities corresponding to deposits within Zones 1Ap2 and 1Ap of Unit I shows an increase in the variety of plant taxa in contexts related to both Woodland and Mississippian occupations. Taxa recovered from the plow zones include all previously listed taxa for the underlying zones in addition to persimmon and maize, reflecting a shift in subsistence patterns to include towards maize agriculture.

Discussion

This analysis indicates that the hickory nut was an important source of food throughout the Late Archaic and Early to Middle Woodland periods at the Patrick site (see Table 2). Hickory appears to have been supplemented by acorn and to some extent by black walnut, which occurs in strata associated with both the Late Archaic and Early to Middle Woodland periods. Nuts would have been available in abundance at higher elevations surrounding the Little Tennessee River Valley, and their procurement may have been a major activity for populations living in the area well into the Early Archaic period.

Domesticates, cultigens, and starchy/oily seeds occur in greatest abundance within the Unit II which is associated with the Early and Middle Woodland periods (see Table 2), with the highest quantities found in Unit I, which constitutes a mixture of

Mississippian and Middle to Late Woodland contexts (components 1, 2 and 3; Schroedl 1978:179-180). This pattern reflects increased investment in horticulture and wild edible seed-bearing plants at the Patrick site during the Early Woodland period, though evidence of the use of such plants occurs much earlier in the valley in Late Archaic period contexts at the Bacon Bend (40MR25) and Iddins sites (40MR23) (Chapman 1981). This pattern is in agreement with the floral assemblages recovered from Woodland features contexts at the Patrick site (Chapman and Shea 1981; Schroedl 1978:212-231). It may have been the case that the Patrick site was a location used for horticulture or as a base for forays into the uplands to harvest nuts, but this dataset is too small to make any such conclusions.

Stratigraphic Analysis

The allostratigraphic units and soil zones appear to conform well to the general topography of the downstream end of Thirty Acre Island and reflect an intermittently active floodplain depositional setting. Stratigraphic analysis indicates that the upper two meters of the island center are characterized by a deep plow zone overlying stacked, graded beds of alluvium within which A-B and A-C horizon sequences have formed over the last seven millennia. Cultural materials within monolith M1 are restricted to the upper 130 cm of the soil profile and concentrated within the well-developed soils in the upper 60 cm of the profile. Figure 13 illustrates all units and zones defined in monoliths M1 and M3 in addition to correlations with the 1972-1973 stratigraphic sequence defined by Schroedl (1978:16-17).

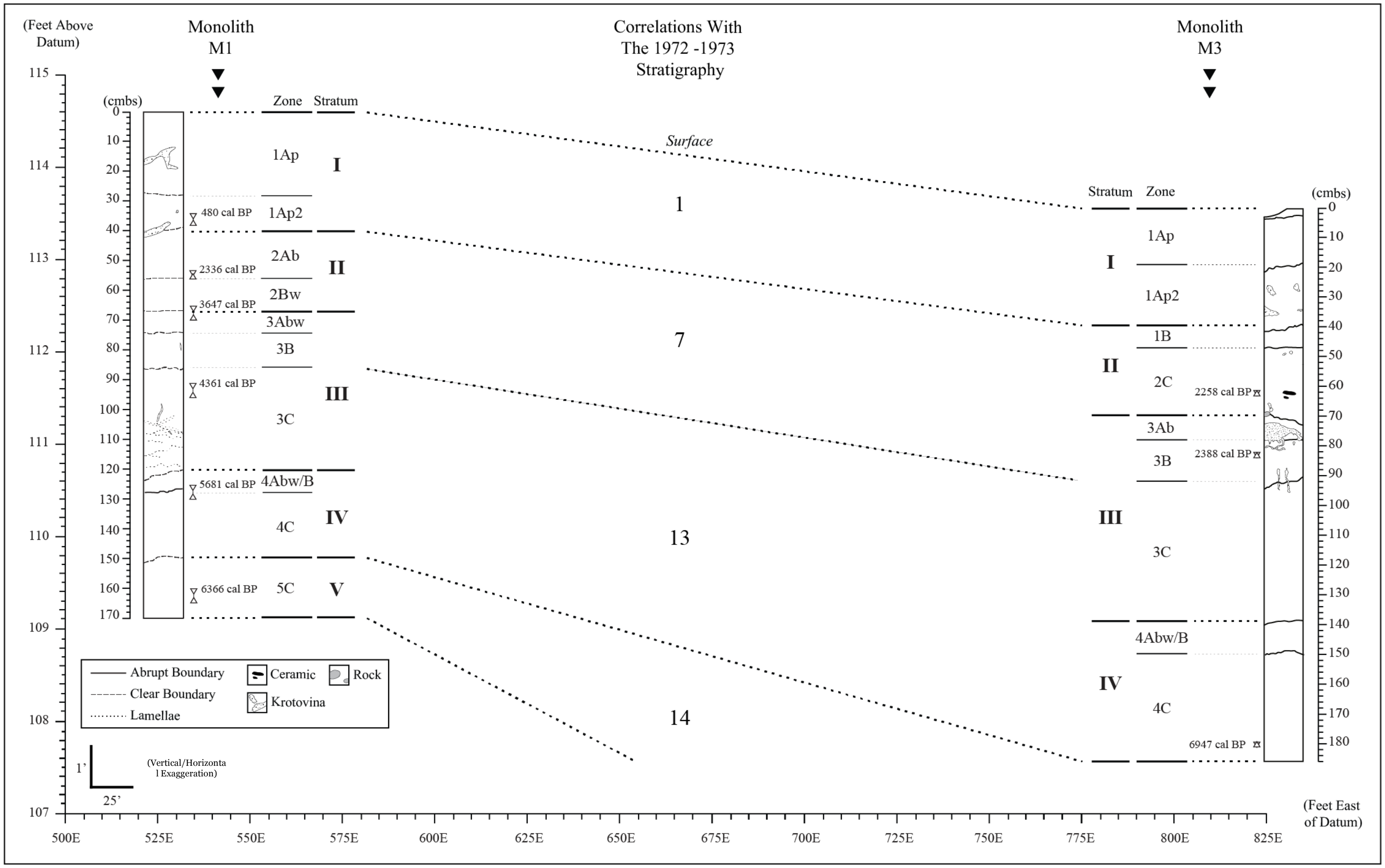

Figure 13. Stratigraphy and correlations among monoliths M1 and M3. Stratigraphy is correlated with strata described in Schroedl (1978:16-17).

Unit V is the basal allostratigraphic unit represented in the monolith M1 profile represented by Zone 5C. This soil horizon consists of unmodified yellowish-brown silt loam alluvium. Carbonized wood from this zone dates to the Middle Archaic at 6366 cal BP (median at 2σ). Zone 5C may represent the upper 20 cm of a fining-upward sequence that extends well below the range of the soil profile. Unit V and Zone 5C appear to align with Schroedl's Stratum 14 (1978:16-17; Figure 6 and 13).

Above Unit V is Unit IV which contains two soil horizons, Zones 4C and the overlying Zone 4Abw/B. Unit IV conforms to Schroedl's Stratum 13 (1978:16-17; Figure 6 and 13), both of which are present in the monoliths M1 and M3 profiles. Zone 4C consists of yellowish-brown fine sandy to silty loam that has massive structure and represents and fining-upward sequence of alluvium. Zone 4Abw/B is a very weakly developed soil formed within the upper surface of Zone 4C that dates to the Middle Archaic at 5681 cal BP (median at 2σ). Within monolith M1, Zone 4Abw/B is characterized by a dark yellowish-brown fine sandy clay loam mottled with dark yellowish-brown silty clay loam. Cross-bedded lamellae and mottling in this zone within monolith M1 may indicate disturbed soil at the onset of a high-energy fluvial stage that resulted in the initial deposition of the overlying Zone 3C.

Larsen's (1982) study of sediments at the Haw River site (31Ch29) in central western North Carolina includes a detailed study of lamellae observed between and amongst graded beds of alluvial sediments. He concluded that cross-bedded lamellae represent illuvial clays that have infiltrated and, in some cases, replaced disturbed alluvial sediments (Larsen 1982:190). Lamellae are post-depositional features that typically occur beneath sandy deposits, usually at the base of a fining-upwards sequence, where clays can pass through the more coarse, sandy matrix to accumulate at the bedform where fine-grained silts might block further vertical movement (Larsen 1982:182-192).

In this context, it remains unclear as to whether or not the lamellae at the base of 3C indicate a disturbed surface indicative of erosion, or simply the onset of a relatively energetic stage of fluvial activity. Chapman (1978:19-20) noted "pronounced lamellae" occurring in the sediments of Strata II, III, and IV at the Bacon Farm site (40LD35) located roughly 9 River Miles downstream from 40MR40, as well as at the Icehouse Bottom site (40MR23) across the river from the Patrick site (Chapman 1973). Zone 4Abw/B in monolith M3 contains filled voids that appear to penetrate through this zone into the parent Zone 4C material, indicating some degree of stability circa 5681 cal BP (median at 2σ).

Overlying Unit IV is Unit III. This sedimentary unit represents a distinct shift in the depositional environment to a more active stage with greater flood magnitude occurring between 5681-4361 cal BP (median at 2σ). Unit III appears to represent a series of higher energy depositional events as evidenced by a marked increase in sand within both profiles, which reduce in width from the monolith M3 location downstream towards monolith M1, located further downstream relative to modern topography. Three soil horizons constitute Unit III: Zones 3Abw, 3Bw, 3B and 3C. Zones 3Abw and 3Bw are present in monolith M1. Zone 3Ab and 3B occur in monolith M3, respectively. Zone 3C is a brown to dark yellowish-brown fine sand to silt loam representing the base of a fining-upward sequence of alluvium. In monolith M1, Zone 3C forms abruptly at the surface of 4Abw/B and numerous lamellae are visible in the profile between 120 cm and

104 cm. Lamellae are not present in Zone 3C within the monolith M3 context, which may suggest that one or numerous flooding events deposited more coarse sand at the M1 location, further downstream. Zone 3C appears to correlate with Stratum 13, with the overlying Zones 3B and 3Abw correlating stratigraphically to Stratum 7 (Schroedl 1978:16-17; see Figure 6 and 13).

In monolith M1, Zone 3C is overlain by Zone 3Bw, a weakly developed B horizon, characterized by a silt loam that is dark greyish-brown mottled with brown alluvium, little clay content and some evidence of root casts. An earth oven feature dating to 4744 cal BP (median at 2σ) was identified in Block 1 at the same depth as Zone 3B of monolith M1 (Schroedl 1978:181; see Appendix A.1, sample GX5244). In contrast, Zone 3C in monolith M3 is overlain by a much more clayey Zone 3B, which is defined by a brown silty clay loam with earthworm trails and root casts. Within monolith M3, a sample of carbonized hickory nutshell from Zone 3B returned a date of 2388 cal BP (median at 2σ). This date appears far too young relative to the stratigraphy in monolith M1, where the carbonized hickory nutshell from Zone 3Abw surface of Unit III was dated to 3647 cal BP (median at 2σ). The radiocarbon sample material from Zone 3B in monolith M3 was collected from deposits 3 cm below a rodent burrow, which raises the possibility that the dated material was transported down profile through bioturbation (see Figure 6 for location).

In both monoliths M1 and M3, Zones 3C and 3Bw are overlain by Zone 3Abw. This soil formed at the top of Unit III and is characterized by a dark to very dark greyish-brown silt loam soil with sparse debitage and charcoal. A higher density of organic matter, microartifacts and macrobotanical remains in Zone 3Abw, suggests pedogenesis associated with landform stability occurs here during the Late Archaic at 3647 cal BP (median at 2σ), a divergence from the preceding depositional regimes (see Figures 10 and 11). Zones 3Bw, 3B, and 3Abw appear to correlate stratigraphically with Stratum 7 (Schroedl 1978:16-17; see Figures 6 and 13).

Zone 3Abw and Unit III are overlain by Unit II, within which a cumulic soil formed. Within Unit II there are three zones: 2Bw and 2Ab in monolith M1, and 2Abw underlying 1B in monolith M3. Zone 2Bw in monolith M1 is characterized by a brown silt loam mottled with a dark greyish-brown silty clay loam. Within this zone there are abundant cultural materials including calcined bone, debitage, and fired clay or daub. In monolith M3, Zone 3Abw is overlain directly by Zone 2Ab, a well-developed dark brown silty loam cumulic soil containing pottery, a rounded river cobble, calcined bone, charcoal, fired clay or daub, as well as debitage. Two horizontally oriented Long Branch limestone-tempered fabric-marked sherds are embedded within this zone at 62 cm and 64 cm below surface. A radiocarbon date from hickory nutshell collected at 61 to 63 cm below surface returned a date of 2258 cal BP (median at 2σ), suggesting that Zone 2Ab in monolith M3 formed during the Early Woodland period. Zone 2Ab within monolith M1 is a well-developed dark brown silty loam cumulic soil bearing abundant cultural material and pottery. Carbonized acorn from Zone 2Ab in monolith M1 returned a date of 2336 cal BP (median at 2σ), further solidifying the correlation of this Early Woodland midden among both soil profiles.

Above Zone 2Ab in monolith M3 lies Zone 1B, a very dark greyish-brown silty clay loam bearing abundant cultural material including calcined bone, fired clay or daub, crushed sand-tempered ceramic, charcoal, and debitage. Zone B1 likely represents the base of the base of the truncated sedimentary unit from which Zones 1Ap2 and 1Ap were formed. Zones 1B, 2Ab, and 2Bw of Unit II correlate stratigraphically to Stratum 7 as defined by Schroedl (1978:16-17; Figure 5 and 13).

Overlying Unit II are the two plow zones, Zone 1Ap2 and Zone 1Ap, which comprise Unit I and correspond to Schroedl's Stratum 1 (1978:16-17; see Figures 6 and 13). 1Ap2 is a dark brown silt loam with abundant cultural material that represents an early, or perhaps only the deepest plowing episode. Subsequent flooding and sedimentation deposited additional material over Zone 1AP2. The combination of new sediments and the plowed midden parent material of Zone 1AP2 were likely plowed again, forming a second, vertically distinct Zone 1Ap plow zone. Zone 1Ap is a dark brown silt loam to fine sandy loam and represents the most recent plowing episode. Zone 1Ap represents an undulating plow zone of varying thickness that extends down to an average depth of approximately 20 to 30 cm below surface and covered the full extent of the site surface. Cultural materials within this zone represent disturbed midden contexts of Mississippian and Woodland period origin, as evidenced by a mixture of diagnostic ceramics and bifaces in assemblage A1 (Schroedl 1978:151-152). A carbonized maize glume collected at the base of this stratum was dated to 480 cal BP (median at 2σ), well within the Mississippian period Dallas phase (Davis 1990:56; see Table 1).

Discussion: Correlation of Stratigraphy and Assemblage Data

Assemblages A1 through A13 defined by Schroedl (1978:72-76) were plotted according to elevation in order to superimpose the vertical distribution of associated groups of artifacts and features onto the stratigraphy represented in monoliths M1 and M3. This was highly problematic, as there appears to have been a significant overlap between the elevations of Assemblages A2 through A9 which comprise the majority of the Early Woodland and Late Archaic features identified at the site. This should come as no surprise since the assemblages defined in the analysis following the excavations in the 1970's represent several millennia of occupations compressed within the upper two to three feet of the site (see Schroedl 1978:73-74, 150-175 for detailed analysis of assemblages). Matters are further complicated by the fact that Late Archaic and Woodland period assemblages are represented by groupings of features and artifacts dispersed unevenly between excavation blocks spanning over 200 feet of horizontal difference and at least one foot of vertical elevation difference. Despite these difficulties in correlating assemblages with the stratigraphy, I was able to reach several broad conclusions about the changes in land-use patterns based on the variation among features and artifacts related to the Late Archaic and Early Woodland period use of the Patrick site.

Late Archaic occupation features including postmolds, hearths, ovens, refuse pits, and burials correspond to Zone 3B in Unit III of monolith M1 and 3Ab in Unit III of monolith M3. This pattern demonstrates an intensification of land use during the Late Archaic. The duration and arrangement of Late Archaic occupations remains unclear due to lack of evidence. What the features occurring at the level of Zone 3B do indicate is that the Patrick site was being utilized to a greater degree during the Late Archaic period relative to the preceding periods and during what I have inferred to be an active phase in the island's depositional history.

Large scatters of fire-cracked rocks described by Schroedl (1978:74) as "pavements" occur throughout the stratigraphic column as far back as the Early and Middle Archaic periods. The frequency and area of these scatters increases precipitously within Assemblages A9 and A8 beginning at elevations congruent with the upper 5 cm of Zone 3C of Unit III. The stratigraphically lowest of these area features (Features 80 and 99) were found in association with an "intensely fired clay hearth" and rock-filled oven, as well as stemmed projectile points, charcoal, net-sinkers, and debitage (Schroedl 1978:42). The uppermost rock pavement features associated with assemblage A6 (Features 47, 61, 63, 69, and 105) occur within Zone 2BW of monolith M1 and were found in association with both Watts Bar quartz-tempered pottery of the cord marked and fabric marked types, as well as Long Branch Fabric Marked pottery and two burials. I infer the successive layers of rock pavements to reflect numerous occupations dating from the Late Archaic to the Woodland period, apparently increasing in size and density during the Early Woodland Watts Bar phase, an occupation pattern that appears to parallel soil and midden development.

Schroedl (1978:155) reports occasional sherds of Long Branch or Watts Bar ceramics in among Assemblages A12 through A10. It is impossible to know whether or not these sherds were associated with these Middle and Late Archaic assemblages, and their association may be the result of bioturbation or downward movement through trampling. Pottery increases from seven sherds in Assemblage A9 to 28 in A8 and 35 in A7, the dominant types being residual plain, Watts Bar, and Long Branch types.

There is a clear decrease in Watts Bar type ceramics within A5 and a simultaneous increase in Long Branch ceramics. This shift occurs at an elevation congruent with Unit II in monoliths M1 and M3. Assemblage A5 overlaps with Assemblage A4, a major occupation assemblage that includes 79 post molds, nine refuse pits, two ovens, a hearth and one burial. Carbonized wood and nutshell from Feature 101 at this level returned a date of 1744 cal BP (median at 2σ), indicating a Middle Woodland Patrick phase association. The increase in feature density reflects an intensified use of the site occurring during a period of long-term stability in the depositional environment.

The vast majority of features uncovered at the Patrick site occur within the Early to Middle Woodland Assemblages A4, A3, and A2 associated with Unit II in monoliths M1 and M3, particularly just beneath the plow zone at the surface of Zone 2Ab (Schroedl 1978:73-74). Many of these features appear to have been intrusive into Zone 2Ab, as indicated by dates of 1278 cal BP and 1350 cal BP (median at 2σ) from carbonized materials in Features 86 and 103, respectively (Schroedl 1978:181; see Appendix A.1). This suggests a further intensification of site use and perhaps higher density of occupation during the Middle Woodland Icehouse Bottom phase.

Radiocarbon Dates

Table 3 presents the AMS radiocarbon dates (n=15) determined for samples of carbonized macrobotanicals from deposits represented in monoliths M1, M3, M6 and the M8 curated soil samples. Radiocarbon dates from monoliths M1 and M3 are discussed in the previous sections and are given no further treatment here.

Table 3. AMS Radiocarbon Dates from 40MR40 monolith M1, M3, M6, and the M8 curated soil samples. Radiocarbon age determinations were calibrated with OxCal software v4.3.2 (Ramsey 2017) with the IntCal13 dataset (Reimer et al. 2013).

UCIAMS Lab no.	**Sample no.**	**Provenance**	**Material**	**D^{14} C (‰)**	**±**	**^{14}C age (BP)**	**Median cal age BP (±2σ)**	**^{14}C age BP, calibrated (±2σ)**	
								from	%
202552	M6_C14_1	M6 (166-168 cm)	Acorn nutshell	-271.1	1.3	2540±15	2721	2745-2520	95.5
202553	M6_C14_2	M6 (208-210 cm)	Acorn nutshell	-246.2	1.2	2270±15	2320	2345-2184	95.4
202554[a]	M6_C14_3	M6 (215-226 cm)	Wood	-447.4	1.1	4765±20	5522	5585-5470	95.4
202555	M3_C14_4	M3 (61-63 cm)	Nutshell cf.	-238.3	1.3	2185±15	2258	2307-2134	95.5
202556	M3_C14_5	M3 (82-84 cm)	Wood	-256.4	1.5	2380±20	2388	2461-2346	95.4
202557[b]	M3_C14_7	M3 (179-181 cm)	Chenopod	-531.1	1.3	6085±25	6947	7144-6882	95.4
202558	M1_C14_8	M1 (34-36 cm)	Maize glume	-47.1	1.6	390±15	480	505-335	95.4
202559	M1_C14_9	M1 (53-56 cm)	Acorn nutshell	-248.4	1.2	2295±15	2336	2350-2313	95.4
202560	M1_C14_10	M1 (65-70 cm)	Hickory nutshell	-345.3	1.2	3400±15	3647	3694-3593	95.4
202561	M1_C14_11	M1 (91-96 cm)	Hickory nutshell	-386.0	1.2	3920±15	4361	4424-4291	95.4
202562[c]	M1_C14_12	M1 (160-165 cm)	Wood	-501.3	2.6	5590±15	6366	6451-6294	95.4
202563	M1_C14_13	M1 (125-130 cm)	Hickory nutshell	-460.2	1.0	4955±15	5681	5731-5612	95.4
202564	M8_C14_14	M8 (1.0-2.0 ft)	Hickory nutshell	-460.5	1.2	4955±15	5681	5731-5612	95.4
202565	M8_C14_15	M8 (5.4-5.9 ft)	Hickory nutshell	-594.7	0.8	7255±20	8078	8159-8010	95.4

[a] Small sample size (.20 mg of C)
[b] Small sample size (.22 mg of C)
[c] Small sample size (.071 mg of C)

The M8 Soil Sample Dates

Sample UCIAMS-202564 (1.0 to 2.0 ft below surface) returned a date of 5681 cal BP (median at 2σ), suggesting that Chapman's Stratum 1 dates to the Middle Archaic rather than the Woodland Period (Chapman 1977:147; Schroedl 1978:19). Sample UCIAMS-202565 (5.4 to 5.9 ft below surface) dates the sediments at the base of Chapman's Stratum 5 and upper surface of Stratum 6 to circa 8078 cal BP (median at 2σ). Chapman (1977:164) reports a date of 7810 ±175 ^{14}C BP for sample GX4121 collected at 5.5 ft below surface within his Stratum 6. This sample was calibrated to 8668 cal BP (median at 2σ). The 8078 cal BP and 8668 cal BP (median at 2σ) dates suggest an Early Archaic Kanawha and Stanly phase association for these deposits (Davis 1990:56).

The radiocarbon-dated macrobotanicals from M8 demonstrate that the Patrick site was occupied intermittently during the Early and Middle Archaic periods. The 5681 cal BP (median at 2σ) date from carbonized hickory nutshell only one to two feet below the surface suggests that much of the Late Archaic and Woodland sediments that correspond the Units III, II, and I in monoliths M1 and M3 have been eroded away on the southern side of the site. Up river and on the adjacent bank, stratigraphy near the river's edge at the Icehouse Bottom site reflects a similar erosive stage in the river's development. There, a radiocarbon sample collected from Stratum B in the upper 1.0 to 2.0 feet of the profile in unit L455 returned an even earlier date of 6995±245 ^{14}C BP, or a median calibrated date of 7846 cal BP (median at 2σ) (sample GX4124, Chapman 1977:164). The Middle Archaic period dates collected from near surface sediments at both the Icehouse Bottom and Patrick sites suggest a highly active and erosive fluvial environment characterized the T-1 floodplain circa 5700-3600 cal BP, a situation that may explain the lack stratified contexts dating to the Middle Archaic Guilford and Sykes phases (6950-4950 cal BP), and relatively few definitively Late Archaic Savannah River phase (4950-3750 cal BP) base camps (N=5) identified in the Little Tennessee River Valley (Davis 1990:58, 220).

The Monolith M6 Dates

Sample UCIAMS-202554 was comprised of carbonized wood from Schroedl's Stratum 12 at the base of monolith M6 and dated to 5522 cal BP (median at 2σ) (see Figure 7). Stratum 12 is separated from the overlying redeposited midden material of Stratum 10G by an abrupt boundary with apparent wet sediment deformation visible at the interface. Carbonized acorn shell from the base of Stratum 10G, sample UCIAMS-202553, was dated to 2320 cal BP. An additional radiocarbon sample of carbonized acorn shell was collected from the overlying Stratum 10D, sample UCIAMS-202552, and yielded a calibrated date of 2721 cal BP (median at 2σ).

The 5522 cal BP (median at 2σ) date for Stratum 12 indicates a late Middle Archaic affiliation. This apparently unmodified sediment was likely cut by water passing through the slough during high periods of river flow. This cut may be indicative of the same erosive episode(s) represented in the M8 samples and across the river in Stratum B at the Icehouse Bottom site (Chapman 1977:164). This augments my earlier assertion that an erosive environment characterized the T-1 floodplain between 5681-3647 cal BP (median at 2σ).

The Stratum 10G sediments that directly overlie Stratum 12 appear to have been deposited onto a wet surface which is evidenced by clear wet sediment deformation features in the upper surface of Stratum 12. This configuration of Early Woodland material making contact with Middle Archaic sediments may reflect a failure of the island bank, resulting in the collapse of developed soils upslope and the re-deposition of Early Woodland midden material into the slough no later than 2320 cal BP (median at 2σ). A later 2721 cal BP (median at 2σ) date for the overlying Stratum 10D suggests repeated episodes of the same process or, as Schroedl (1978:10) suggests, the anthropogenic redisposition of midden fills from the interior of the island during pre-historic occupations.

CHAPTER 7. CONCLUSION

The results of my analysis portray a complex geomorphological history for the Patrick site landscape that has been the setting of human occupation and activity for thousands of years. This interfacing of environmental processes and archaeological signatures affords several inferences that inform our understanding of human-environment interactions and the impact of climate change during the Late Archaic and Early Woodland period in the lower Little Tennessee River Valley.

A period of high-energy fluvial activity that occurred from 5000-3500 cal BP (median at 2σ) is evidenced by fluvial scouring in the upper one to two feet of M8 and in Stratum 12 at the base of monolith M6. This coincides with the arrival of Subboreal climatic conditions but predates the especially wet and cool period at 3200-2600 cal BP defined by Kidder (2006). This shift to a more active depositional environment is most apparent in monolith M1, where a dramatic influx of coarse-grained alluvium occurs within Unit III, and to a lesser degree in Unit III of monolith M3. Lamellae at the base of Unit III may indicate high-energy fluvial activity, possibly including scouring that disturbed the upper surface of Unit IV. Vertical distributions of microartifact and macrobotanical remains from monolith M1 demonstrate that the Patrick site location was continually utilized during this period, though a lack of associated features suggests only intermittent use in the areas investigated, perhaps as a logistical camp or activity area.

An increase in silts and organic matter within the upper 20 cm of sediments in Unit III in both monoliths suggest that the depositional environment was active to a lesser degree than before, and weakly developed soils began to form in association with the earliest indications of regular occupation at the site during the Late Archaic. Kocis (2011:52) identities a similar pattern of slow cumulic deposition and stabilization of the floodplain along the Tennessee River occurring after 3000 cal BP. Occupational features occurring at this depth suggest some degree of stability, and perhaps the onset of a predictable seasonal cycle of flooding that becomes more apparent in upper horizons. Midden accumulation and strong soil formation occur in Unit II of monoliths M1 and M3, becoming highly visible in at 3647-2388 cal BP (median at 2σ). Microartifacts, macrobotanical remains, and pottery increase greatly within these deposits, and an increase in occupational features such as postmolds, hearths, ovens and stratified refuse pits suggest a shift in land-use practices from the intermittent occupation and use of the Patrick site during the Late Archaic, to a longer and more intense occupation of the site during the Early Woodland period.

These observations identify diachronic and spatial patterns that compare favorably to the established models of Late Archaic and Early Woodland period subsistence and settlement patterns defined by Davis (1990). The marked increase in landform stability also aligns with the models of landscape development presented by Chapman and colleagues (1982) and Delcourt (1980). It would appear the river did in fact incise its main channel into the T-1, forming the T-0, sometime prior to 3647 cal BP (median at 2σ). The cause of this change is unclear based on the present dataset, but I suggest that changes in precipitation regimes and sediment load caused the river to adjust towards a new state of equilibrium; a state that was achieved sometime during the Late Archaic. Another possibility is that a change in base level resulting from the Subboreal drop in sea level effectively increased the gradient of the river, forcing the river into an erosive stage resulting in channel incision. Unfortunately, the current body of data cannot definitively assign cause to a single process, event, or combination of the above.

In summary, it would appear that a wetter and cooler climate during the Archaic-Woodland transition did not have a disruptive effect on populations living the LTRV, though the Patrick site may have been less hospitable during much of the Late Archaic Savannah phase relative to the following Iddins and Early Woodland Watts Bar phases. Evidence of a highly active fluvial environment during the late Middle Archaic and Late Archaic Savannah phase may account for the lack of associated components in the valley (Davis:1990). It would appear that despite adverse or simply less than optimal conditions on the floodplain during this time, Late Archaic populations persisted and continued to use the channel bars and river terraces.

The Little Tennessee River Valley would have presented a tremendous range of raw materials and foods for Late Archaic and Early Woodland peoples to work with. It seems unlikely that their resource bases here were undercut by climate change, and the increase in use of cultigens and domesticates during the Late Archaic suggests that people were making full use of the open and seasonally disturbed floodplains of the T-1. There does not appear to be a hiatus or dispersal during this transitional period. Rather, we see an intensification of Late Archaic subsistence and settlement patterns during the Early Woodland, with the notable exception of changes in material culture, namely the appearance of pottery in the LTRV around 2500 cal BP (median at 2σ) (Salo 1969; see Appendix A.2.).

Climate change during the Archaic to Early Woodland period may very well have had an ameliorating affect locally, affording populations more time throughout the year to use of the floodplains for horticulture and hunting activities, and create a more hospitable location for communities directly adjacent to the river, a possibility that may have facilitated increased trade and exchange during the Middle Woodland Icehouse Bottom phase.

My conclusion is that long-term and more general landscape trends during the Archaic-Woodland transition played an absolutely critical role in the emergence of organizational complexity, economic intensification, and the rise of agriculture among the cultures that define the history of the Little Tennessee River Valley. I want to make it clear that I do not wish to equate correlation with causation. There is strong correspondence between changes in the depositional environment at the Patrick site with qualitative and quantitative changes visible in the associated archaeological record. However, a causal or deterministic relationship cannot be inferred from these parallels alone. As with all other studies of this nature, the disentangling of natural processes from the wide variety of cultural process that might underlie the changes that we see during the Late Archaic to Early Woodland transition presents a monumental problem and will undoubtedly require further research and discussion to be resolved.

Future Research

This study employed modern and more traditional tools of environmental archaeology to demonstrate the scientific utility of high-resolution integrative datasets collected from minimally invasive small-diameter stratigraphic columns from archaeological sites, whether monoliths, column samples or core. I firmly believe that this practice should augment all archaeological investigations of alluvial sites, particularly those on first and second terraces. A research program designed to examine floodplain development as it relates to human occupations in the Interior Southeast would undoubtedly shed light on the long-term relationships between humans and the environment, not just at the Archaic-Woodland transition.

The Tellico Archaeological Project generated a wealth of data, supplemented with a well-studied record of radiocarbon dates. Larry Kimball's (1985) tremendous work to synthesize radiocarbon dates from the East Tennessee region has long served as the backbone of prehistoric studies of the Southeastern prehistory. However, the dates and cultural sequences outlined therein are calibrated with outdated atmospheric data and require re-calibration in order for us to accurately discuss changes visible in the archaeological record. This would be fairly simple task and may raise some fascinating new issues requiring further examination and re-evaluation of previous research.

I spent the summer of 2017 building wooden frames for all seven of the Patrick site monoliths, and the condition of the remaining six should remain quite stable for the next 46 years and beyond. All samples are essentially primed and ready for analysis, should someone choose this undertaking. Future studies of the monoliths could include geomorphological and microstratigraphic studies, microartifact analysis, isotopic analysis, and macrobotanical analysis. Monolith M6 from the slough side of the island would make for an especially promising study, as it contains an appreciably high number of discernable micro-strata and botanical remains, much of which apparently dates to the Early and Middle Woodland periods.

The unique partnership between the Frank H. McClung Museum of Natural History and Culture, the Tennessee Valley Authority and the University of Tennessee offers researchers the opportunity to revisit and research the collections from the Tellico Archaeological Project. I believe that the effort to revisit legacy collections should continue, and that the next generation should remain aware of the need to reanalyze the vast amounts of materials and data collected during the last century in lieu of adding materials to an increasingly costly archive. The scale of the Tellico Archaeological Project and the quality of the data it yielded has allowed this thesis project to complement long-term anthropological themes of the program as cultural chronology, paleoenvironmental studies, paleoethnobotany, and geoarchaeology (Schroedl 2009). Modern theoretical and technological tools of analysis make this experience especially fruitful, both for student research and for our collective understanding regarding past human responses to climate change.

REFERENCES

Adelsberger, Katherine A., and Tristram Kidder
2007 Climate Change, Landscape Evolution, And Human Settlement in the Lower Mississippi River Valley, 5500-2400 cal B.P. In *Reconstructing Human-Landscape Interactions,* edited by Lucy Wilson, Pam Dickinson and Jason Jeandron, pp. 84-108. Cambridge Scholars Publishing, Newcastle, United Kingdom.

Anderson David G.
2001 Climate and Culture Change in Prehistoric and Early Historic North America. *Archaeology of Eastern North America* 29:143-186. Eastern States Archaeological Federation.
2010 The End of the Southeastern Archaic: Regional Interaction and Archaeological Interpretation. In *Trend Tradition and Turmoil, What Happened to the South Eastern Archaic?,* edited by D. H. Thomas and M. C. Sanger, pp. 273-298. Anthropological Papers 9(3). American Museum of Natural History, New York, New York.

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

Anderson David G., and Kenneth E. Sassaman (editors)
1996 *The Paleoindian and Early Archaic Southeast*. The University of Alabama Press, Tuscaloosa, Alabama.

Anderson, David G. and Kenneth E. Sassaman
2012 *Recent Developments in Southeastern Archaeology: From Colonization to Complexity*. Society for American Archaeology Press, Washington, DC

Baillie, M.G. L.
1988 Irish Oaks Record Volcanic Dust Veils Drama. *Archaeology Ireland* 2(2):71-74.

Ballard, Joanne P., Sally P. Horn, Zheng-Hua Li
2017 A 23,000-year microscopic charcoal record from Anderson Pond, Tennessee, USA. *Palynology* 41(2): 216-229

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45(1):4-20.

Brady, N.C., and R.R. Weil
2000 *Elements of the Nature and Properties of Soils*. Prentice Hall, Upper Saddle River, New Jersey.

Brakenridge, Robert G.
1984 Alluvial Stratigraphy and Radiocarbon Dating Along the Duck River, Tennessee: Implications Regarding Floodplain Origin. *GSA Bulletin* 95(1):9–25.

Branch, Nick, Matthew Canti, Peter Clark and Chris Turney
2005 *Environmental Archaeology: Theoretical and Practical Approaches*. Hodder Education, London, United Kingdom.

Broadbent, F. E.
1965 Organic matter. *Methods of Soil Analysis*, edited by C. A. Black, pp. 1397-1400. American Society of Agronomy, Madison.

Brown, Anthony G.
1997 Alluvial Geoarchaeology: Floodplain Archaeology and Environmental Change. Cambridge University Press, Cambridge, United Kingdom.

Brown, Paul, James P. Kennett, and B. Lynn Ingram
1999 Marine Evidence for Episodic Holocene Megafloods in North America and The Northern Gulf of Mexico. *Paleoceanography* 14:498–510.

Calabrese, F. A.
1976 Excavations at 40RH6, Watts Bar Area, Rhea County, Tennessee. Tennessee Valley Authority Publications in Anthropology No.11. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Chapman, Jefferson
1973 *The Icehouse Site, 40MR23*. Report of Investigations No. 13. Department of Anthropology, University of Tennessee: Knoxville, Tennessee.
1975 *The Rose Island Site and the Bifurcate Point Tradition*. Report of Investigations No.14. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.
1977 *Archaic Period Research in The Lower Little Tennessee River Valley- 1975: Icehouse Bottom and Harrison Branch, Thirty Acre Island, Calloway Island*. Report of Investigations No.18. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.
1978 *The Bacon Farm Site and a Buried Site Reconnaissance*. Report of Investigations No.23. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.
1979 *The Howard and Calloway Island Sites*. Report of Investigations No.27. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.
1981 *The Bacon Bend and Iddins Sites: The Late Archaic Period in The Lower Little Tennessee River Valley*. Report of Investigations No.31. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

1985 Archaeology and the Archaic Period in the Southern Ridge and Valley Province. In *Structure and Process in Southeastern Archaeology*, edited by Roy Dickens Jr. and H. Trawick Ward, pp. 137-153. University of Alabama Press, Tuscaloosa, Alabama.
1994 *Tellico Archaeology: 12,000 Years of Native American History,* revised edition. University of Tennessee Press, Knoxville, Tennessee.

Chapman, Jefferson (editor)
1980 *The 1979 Archaeological and Geological Investigations in the Tellico Reservoir*. Report of Investigations No. 29. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Chapman, Jefferson, and Gary Crites
1987 Evidence for Early Maize (*Zea mays*) from the Icehouse Bottom Site. *American Antiquity* 52:352-354.

Chapman, Jefferson and Andrea B. Shea
1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. *Tennessee Anthropologist* 6(1):61-84.

Chapman, Jefferson, Paul A. Delcourt, Patricia A. Cridlebaugh, Andrea B. Shea, and Hazel R. Delcourt
1982 Man-Land Interaction: 10,000 Years of American Indian Impact on Native Ecosystems in the Lower Little Tennessee River Valley, Eastern Tennessee. *Southeastern Archaeology* 1:115-21.

Cridlebaugh, Patricia A.
1981 *The Icehouse Bottom Site (40MR23): 1977 Excavations*. Report of Investigations No. 35. Department of Anthropology, University of Tennessee: Knoxville, Tennessee.
1984 *American Indian and Euro-American Impact upon Holocene Vegetation in the Lower Little Tennessee River Valley*. Ph.D. dissertation, Department of Anthropology, University of Tennessee, Knoxville, Tennessee

Crites, Gary D.
1987 Middle and Late Holocene Ethnobotany of the Hayes Site (40ML139): Evidence from Unit 990N918E. *Midcontinental Journal of Archaeology* 12(1):3-32.
1993 Domesticated Sunflower in Fifth Millennium B.P. Temporal Context: New Evidence from Middle Tennessee. *American Antiquity* 58(1):146-148.

Crowther, J.
2003 Potential Magnetic Susceptibility and Fractional Conversion Studies of Archaeological Soils and Sediments. *Archaeometry* 45:685-701.

Cyr, Howard J.

2010 Geoarchaeological Analysis of the Widows Creek Site. In *The Widows Creek Site: A Contextual Study of Site Chronology, Formation and Use*, edited by Keith Little, Hunter B. Johnson, and Russell Holloway, pp.377-412. Tennessee Valley Archaeological Research, Special Investigation No.2.

Cyr, Howard J., Esther Rimer, Stephen Carmody, Kandace Hollenbach, Keith Little, and Hunter Johnson

2016 It is the Little Things That Count: Micro-Artifact Analysis and the Importance of Multiproxy Data at The Widows Creek Site, Alabama. *Southeastern Archaeology* 35(1):51-64.

Damon, P. E., A. Long, and E. I. Wallick

1972 Dendrochronologic Calibration of the Carbon-14 Time Scale. In *Proceedings of the Eighth International Radiocarbon Dating Conference,* Vol. 1, edited by T. A. Rafter and T. Grant-Taylor, pp. 44-59. Lower Hutt, New Zealand.

Damon, P. E., C. W. Ferguson, A. Long, and E. I. Wallick

1974 Dendrochronologic Calibration of the Radiocarbon Time Scale. *American Antiquity* 39:350-366.

Davis, Stephen R.

1990 *Aboriginal Settlement Patterns in the Little Tennessee River Valley*. Report of Investigations No.50. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Day, John H.

1968 Making Soil Monoliths. *Canada Department of Agriculture Publications* (1372):3-14. Ottawa.

Dean, Walter. E., Thomas S. Ahlbrandt, Roger Y. Anderson, and J. Platt Bradbury

1996 Regional Aridity in North America During the Middle Holocene. *The Holocene* 6:145–155.

Delcourt, Hazel R.

1979 Late Quaternary History of the Eastern Highland Rim and Adjacent Cumberland Plateau of Tennessee. *Ecological Monographs* 49(3):255–280.

Delcourt, Paul A.

1980 Quaternary Alluvial Terraces of the Little Tennessee River Valley, East Tennessee River Valley, East Tennessee. In *The 1979 Archaeological and Geological Investigations in the Tellico Reservoir,* edited by Jefferson Chapman, pp. 110-121. Report of Investigations No.29. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Delcourt, Paul A., Hazel R. Delcourt, Patricia A. Cridlebaugh, and Jefferson Chapman
1986 Holocene Ethnobotanical and Paleoecological Record of Human Impact in the Little Tennessee River Valley, Tennessee. *Quaternary Research* 25:330–349.

Driese, Stephen G., Zhenghua Li, and Larry D. McKay
2008 Evidence for Multiple, Episodic, Mid- Holocene Hypsithermal Recorded in two Soil Profiles Along an Alluvial Floodplain Catena, Southeastern Tennessee, USA. *Quaternary Research* 69:276–291.

Driese, Steven, Sally Horn, Joanne Ballard, Mathew S. Boehm, and Zhenghua Li
2017 Micromorphology of Late Pleistocene and Holocene Sediments and a New Interpretation of the Holocene Chronology at Anderson Pond, Tennessee, USA. *Quaternary Research* 87:1-14.

Dunnell, Robert, and Julie Stein
1989 Theoretical Issues in the Interpretation of Microartifacts. *Geoarchaeology* 4:31-42.

Faulkner, Charles, and J. B. Graham
1966 *Westmoreland-Barber Site (40Mi-11) Nickajack Reservoir, Season II*. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Foley, Lucy and Jefferson Chapman
1977 Appendix: Stratigraphy and Geomorphology if the Icehouse Bottom, Harrison Branch and Patrick Sites. *Archaic Period Research in the Lower Little Tennessee River Valley – 1975: Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island,* edited by Jefferson Chapman, pp. 179-206. Report of Investigations No. 18. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Fiedel, Stuart J.
2001 What Happened During the Early Woodland. *Archaeology of Eastern North America* 29:101-142.

Friesen, Beverly A., and Michael P. Stier
2016 Ridge and Valley: Land Cover Trends Project. United States Geological Survey. Available online at http://landcovertrends.usgs.gov/east/eco67Report.html#_ftn1. Accessed [2018].

Fritz, Gale J.
1993 Early and Middle Woodland Period Paleoethnobotany. In *Foraging and Farming in the Eastern Woodlands*, edited by C. M. Scarry, pp. 39-56. Ripley P. Bullen Monographs in Anthropology and History, University of Florida Press, Gainesville, Florida.

Ganopolski, Andrey, Claudia Kubatzki, Martin Claussen, Victor Brovkin, and Vladimir Petoukhov
1998 The Influence of Vegetation- Atmosphere-Ocean Interaction on Climate During the Mid-Holocene. *Science* 280 (5371):1916-1919.

Gleeson, Paul F.
1971 *Archaeological Investigations in the Tellico Reservoir, Interim Report, 1970*. Report of Investigations No.9. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Gremillion, Kristen J.
2004 Seed Processing and the Origins of Food Production in Eastern North America. *American Antiquity* 69(2):215-233.

Larsen, Clark
1982 Geoarchaeology of the Haw River. In *The Haw River Sites: Archaeological Investigations at Two Stratified Sites in the North Carolina Piedmont, Volume I.* Edited by Stephen Claggett and John S. Cable, pp.145-222. Commonwealth Associates Inc., Jackson, Michigan.

Leigh, David S.
2018 Vertical Accretion Sand Proxies of Gaged Floods Along the Upper Little Tennessee River, Blue Ridge Mountains, USA. *Sedimentary Geology* 364:432-350.

Liu, Yao, Jennifer J. Andersen, John W. Williams, and Stephen T. Jackson
2013 Vegetation History in Central Kentucky and Tennessee (USA) During the Last Glacial and Deglacial Periods. *Quaternary Research* 79:189–198.

Hardt, Ben, Harold D. Rowe, Gregory S. Springer, Hai Cheng, and R. Lawrence Edwards
2010 The Seasonality of East Central North American Precipitation Based on Three Coeval Holocene Speleothems from Southern West Virginia. *Earth and Planetary Science Letters* 295:342–348.

Holliday, Vance T.
2004 *Soils in Archaeological Research*. Oxford University Press, New York, New York.

Kidder, Tristram R.
2006 Climate Change and the Archaic to Woodland Transition (3000-2500 Cal B.P.) in the Mississippi River Basin. *American Antiquity* 71:195-231.
2010 Trend, Tradition, and Transition at the End of the Archaic. In *Trend Tradition and Turmoil, What Happened to the South Eastern Archaic?* Edited by D. H. Thomas and M. C. Sanger, pp. 201-216. Anthropological Papers 9(3). American Museum of Natural History, New York, New York.

Kimball, Larry R.
1985 *The 1977 Archaeological Reconnaissance: An Overall Assessment of the Archaeological Resources of Tellico Reservoir*. Report of Investigations No.40. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Knox, James C.
1993 Large Increase in Flood Magnitude in Response to Modest Changes in Climate. *Nature* 361:430–432.

Kocis, J. Joseph
2011 Late Pleistocene and Holocene Hydroclimate Change in the Southeastern United States: Sedimentary, Pedogenic, and Stable Carbon Isotope Evidence in Tennessee River Floodplain Paleosols. Master's Thesis. University of Tennessee, Knoxville, Tennessee.

Lafferty, Robert H.
1981 *The Phipps Bend Archaeological Project*. Research Series 1, Office of Archaeological Research, University of Alabama, Tuscaloosa, Alabama.

Lewis, Thomas M. N., and Madeline D. Kneberg
1957 The Camp Creek Site. *Tennessee Archaeologist* 13(1):1-48.
1959 The Archaic Culture in the Middle South. *American Antiquity* 25:161-183.

Little, Keith J.
2003 Late Holocene Climate Fluctuations and Culture Change in Southeastern North America. *Southeastern Archaeology* 22(1):9-32.

Martin, Alexander C., and William D. Barkley
1961 *Seed Identification Manual*. University of California Press, Berkeley, California.

Mayewski, Paul A., Eelco E. Rohling, Curt J. Stager, Karlén Wibjörn, Kirk A. Maasch, David Meeker, Eric A. Meyerson, Francoise Gasse, Shirley van Kreveld, Karin Holmgren, Julia Lee-Thorp, Gunhild Rosqvist, Frank Rack, Michael Staubwasser, Ralph R. Schneider, and Eric J. Steig
2004 Holocene Climate Variability. *Quaternary Research* 62(3):243–55.

McCollough, Major C. R. and Charles H. Faulkner
1973 *Excavations of the Higgs and Doughty Sites, I-75 Salvage Archaeology*. Tennessee Archaeological Society Miscellaneous Paper No.12. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Metcalfe, Duncan, and Kathleen. M. Heath
1990 Microrefuse and Site Structure: The Hearths and Floors of the Heartbreak Hotel. *American Antiquity* 55(4):781-796.

Pearsall, Deborah

1983 Evaluating the Stability of Subsistence Strategies by the Use of Paleoethnobotanical Data. *Journal of Ethnobiology* 3:121-137.

Powell, Christine A., G. A. Bollinger, Martin C. Chapman, Matthew S. Sibol, Arch C. Johnston, and Russell L. Wheeler

1994 Seismotectonic Model for the 300-Kilometer-Long Eastern Tennessee Seismic Zone. *Science*, *New Series* 264(5159):686-688.

Ramsey, Bronk

2017 Methods for Summarizing Radiocarbon Datasets. *Radiocarbon* 59(2):1809-1833.

Reimer, P. J., Bard, E., Bayliss, A., Beck, J. W., Blackwell, P. G., Bronk Ramsey, C., Grootes, P. M., Guilderson, T. P., Haflidason, H., Hajdas, I., HattŽ, C., Heaton, T. J., Hoffmann, D. L., Hogg, A. G., Hughen, K. A., Kaiser, K. F., Kromer, B., Manning, S. W., Niu, M., Reimer, R. W., Richards, D. A., Scott, E. M., Southon, J. R., Staff, R. A., Turney, C. S. M., and van der Plicht, J.

2013 IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0-50,000 Years cal. BP. *Radiocarbon* 55(4):1869-1887.

Salo, Lawr V.

1969 *Archaeological Investigations in the Tellico Reservoir. Tennessee 1967–1968: An Interim Report*. Report of Investigations No. 7. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Sandweiss, Daniel H., Kirk A. Maasch, and David G. Anderson,

1999 Climate and Culture: Transitions in the Mid-Holocene. *Science* 283:499-500.

Sanger, Matthew C.

2010 Leaving the Rings: Shell Ring Abandonment and the End of the Late Archaic. In *Trend Tradition and Turmoil, What Happened to the South Eastern Archaic?* edited by David H. Thomas and Matthew. C. Sanger, pp. 201-214. Anthropological Papers 9(3). American Museum of Natural History, New York, New York.

Sassaman, Kenneth E.

2010 *The Eastern Archaic, Historicized.* Altamira Press, Lanham, Maryland.

Schroedl, Gerald F.

1978 *The Patrick Site (40MR40), Tellico Reservoir, Tennessee*. Report of Investigations, No.25. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

2009 The Tellico Archaeological Project. In *TVA Archaeology: Seventy-Five Years of Prehistoric Site Research*, edited by Erin Pritchard, pp. 63-110. The University of Tennessee Press, Knoxville, Tennessee.

Schroedl, Gerald F., Roland P. Davis, C. Clifford Boyd, Arthur E. Bogan, and Cynthia M. Bogan
1985 *Archaeological Contexts at Martin Farm*. Report of Investigations No.39. Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Schuldenrein, Joseph
2006 Geoarchaeology and the Mid-Holocene Landscape History of the Greater Southeast. In *Archaeology of the Mid-Holocene Southeast*, edited by Kenneth E. Sassaman and David G. Anderson, pp. 3-27. University Press of Florida, Gainesville, Florida.

Sherwood, S. C., J. F. Simek, and R. R. Polhemus
1995 Artifact Size and Spatial Process: Macro and Microartifacts in a Mississippian House. *Geoarchaeology* 10:429-455.

Sherwood, Sarah C., and Stephen D. Ousley
1995 Quantifying Microartifacts Using a Personal Computer. *Geoarchaeology* 10:423-428.

Shott, Michael
1994 Size and Form in the Analysis of Flake Debris: Review and Recent Approaches. *Journal of Archaeological Method and Theory* 1:69–110.

Simms, Steven R., and Kathleen M. Heath
1990 Site Structure of the Orbit Inn: An Application of Ethnoarchaeology. *American Antiquity* 55(44):797-813.

Smith, Bruce D.
2006 Eastern North America as an Independent Center of Plant Domestication. *Proceedings of the National Academy of Sciences of the United States of America*, 103(33):12223-12228.

Smith, Bruce D., and Wesley Cowan
2003 Domesticated Crop Plants and the Evolution of Food Production Economies in Eastern North America. In *People and Plants in Ancient Eastern North America*, edited by Paul E. Minnis, pp. 105-125. Smithsonian Books, Washington, D.C.

Soil Survey Division Staff
1993 Soil Survey Manual. *U.S. Department of Agriculture Handbook* No.18. U.S. Government Printing Office, Washington, D.C.

Stein, Julie K.
1992 Organic Matter in Archaeological Contexts. In *Soils in Archaeology: Landscape Evolution and Human Occupation*, edited by Vance T. Holliday, pp. 193-216. Smithsonian Institute Press, Washington, D.C.

Stein, Julie, and Patrice Teltser
1989 Size Distributions of Artifact Classes: Combining Macro and Micro Fractions. *Geoarchaeology* 4:1-30.

Stuvier, Minze, and Henry A. Polach
1977 Discussion: Reporting of 14C Data. *Radiocarbon* 19(3):355-363.

Wanner, Heinz, Jürg Beer, Jonathan Bütikofer, Thomas J. Crowley, Ulrich Cubasch, Jacqueline Flückiger, Hugues Goosse, Martin Grosjean, Fortunat Joosg, Jed O. Kaplan, Marcel Küttel, Simon A. Müller, I. Colin Prentice, Olga Solomina, Thomas F. Stocker, Pavel Tarasov, Mayke Wagner, and Martin Widmann
2008 Mid- to Late Holocene Climate Change: an Overview. *Quaternary Science Reviews* 27(19-20):1791-1828.

Warrell, Kathleen F., Randall T. Cox, Robert D. Hatcher Jr., James D. Vaughn, and Ronald Counts
2017 Paleoseismic Evidence for Multiple Mw ≥6 Earthquakes in the Eastern Tennessee Seismic Zone during the Late Quaternary. *Bulletin of the Seismological Society of America* 107(4):1610–1624.

Weston, D. G.
2002 Soils and Susceptibility: Aspects of Thermally Induced Magnetism Within the Dynamic Pedological System. *Archaeological Prospection* 9:207-215.

Wetmore, Ruth Y.
2002 The Woodland Period in the Appalachian Summit of Western North Carolina and the Ridge and Valley Province of Eastern Tennessee. In *The Woodland Southeast,* edited by David G. Anderson and Robert C. Mainfort Jr., pp. 249-269. The University of Alabama Press, Tuscaloosa, Alabama.

Williams, Samuel C. (editor)
1927 *Lieut. Henry Timberlake's Memoirs*. The Watauga Press, Johnson City, Tennessee.
1928 Early Travels in the Tennessee Country, 1540-1800. The Watauga Press, Johnson City, Tennessee.

Winterhalder, Bruce, Carol Goland
1997 An Evolutionary Ecology Perspective on Diet Choice, Risk, and Plant Domestication. In *People, Plants, and Landscapes: Studies in Paleoethnobotany*, edited by Kristen Gremillion, pp. 123-160. University of Alabama Press, Tuscaloosa, Alabama.

Wylie, Poag C., and William D. Sevon
1989 A Record of Appalachian Denudation in Postrift Mesozoic and Cenozoic Sedimentary Deposits of the U.S. Middle Atlantic Continental Margin. *Geomorphology* 2(1-3):119–157.

Yarnell, Richard A.
1993 The Importance of Native Crops During the Late Archaic and Woodland Periods. In *Foraging and Farming in the Eastern Woodlands*, edited by Margaret Scarry, pp. 13-26. University Press of Florida, Gainesville, Florida
1974 Plant Food and Cultivation of the Salts Cavers. In *Archeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 113-122. Academic Press, New York, New York.
1982 Problems of Interpretation of Archaeological Plant Remains of the Eastern Woodlands. *Southeastern Archaeology* 1(1):1-7.

Taylor, Janis, L, and Rachel Kurtz
2016 Blue Ridge Mountains: Land Cover Trends Project. United States Geological Survey. Available online at https://landcovertrends.usgs.gov/east/eco66Report.html. Accessed [2018].

Telford, Richard J., Einar Heegaard, Birks, and Harry J. Banks
2004 The Intercept is a Poor Estimate of a Calibrated Radiocarbon Age. *The Holocene* 14(2), 296–298.

Thomas, David H., and Matthew C. Sanger (editors)
2010 *Trend Tradition and Turmoil, What Happened to the South Eastern Archaic?* Anthropological Papers 9(3). American Museum of Natural History, New York, New York.

Turner, William B. and Walter E. Klippel
1989 Hunter-Gatherers in the Nashville Basin: Archaeological and Geological Evidence for Variability in Prehistoric Land Use. *Geoarchaeology* 4:43-67.

Zeanah, David
2017 Foraging Models, Niche Construction, and the Eastern Agricultural Complex. *American Antiquity* 82:3-24.

APPENDICES

Appendix A: Radiocarbon Dates

Table A.1: Calibrated radiocarbon dates from the Patrick Site (40MR40) collected during the 1972, 1973, and 1975 excavations (Adapted from Schroedl 1978:190). All reported dates have been calibrated with the OxCal v4.3.2 software (Ramsey 2017) with the IntCal13 dataset (Reimer et al. 2013).

Lab No.	**Assemblage**	**Component**	**Provenience**	**^{14}C age (BP)**	**Mean cal age BP (±2σ)**	**^{14}C age BP, calibrated (±2σ)**	
						Range	**%**
GX5244	A2	2 or 3	Fea. 98	4210±160	4744	5294-4300	95.4
GX5245	A2	2 or 3	Fea. 101	1810±165	1744	2134-1375	95.4
GX5246	A4	4	Fea. 103	1430±155	1350	1696-998	95.4
GX5243	A8	6	Fea. 86	1365±145	1278	1555-969	95.4
GX4121	N/A	Stanly	Strat. 6	7810±175	8668	9127-8221	95.4
GX4122	N/A	Kirk	Strat. 16	9410±290	10708	11620-9888	95.4

Table A.2: Calibrated Archaic and Woodland period dates from East Tennessee. All reported dates from were calibrated with the OxCal v4.3.2 software (Ramsey 2017) using atmospheric data from Reimer et al. (2013).

Site Designation	**Site Name**	**Lab no.**	**^{14}C age (BP)**	**Mean cal age BP (±2σ)**	**^{14}C age BP, calibrated (±2σ)**		**Reference**
					Range	**%**	
40MR40	Patrick	UCIAMS-202558	390±15	480	505-335	95.4	This study
40MR40	"	GX5243	1365±145	1278	1555-969	95.4	Schroedl 1978
40MR40	"	GX5246	1430±155	1350	1696-998	95.4	"
40MR40	"	GX5245	1810±165	1744	2134-1375	95.4	"
40GN1	Camp Creek	M-508**	1940±200	2042	2349-1415	95.4	Lewis and Kneberg 1957
40GN1	"	M-516	2090±250	2089	2732-1552	95.4	"
40MR40	Patrick	UCIAMS-202555	2185±15	2258	2307-2134	95.5	This study
40MR40	"	UCIAMS-202553	2270±15	2320	2345-2184	95.4	"

Table A.2: Continued

Site Designation	Site Name	Lab no.	^{14}C age (BP)	Mean cal age BP (±2σ)	^{14}C age BP, calibrated (±2σ)		Reference
					Range	%	
40MR40	"	UCIAMS-202559	2295±15	2336	2350-2313	95.4	"
40MR40	"	UCIAMS-202556	2380±20	2388	2461-2346	95.4	"
40MR25	Bacon Bend	GX1570	2430±180	2500	2879-2009	95.4	Salo 1969
40HW45	Phipps Bend	DIC-805	2550±95	2603	2841-2355	95.4	Lafferty 1981
40HW45	"	DIC-981	2600±80	2702	2872-2382	95.4	"
40MR40	Patrick	UCIAMS-202552	2540±15	2721	2745-2520	95.5	Schroedl 1978
40HW45	Phipps Bend	DIC-807	2690±200	2812	3339-2344	95.4	Lafferty 1981
4LD45	Higgs	CWRU27	2730±110	2859	3166-2504	95.4	McCullough and Faulkner 1973
4LD45	"	Uga517	2850±85	2980	3208-2778	95.4	"
40HW45	Phipps Bend	UGa-2094	2920±80	3069	3332-2860	95.4	Lafferty 1981
40HW45	"	UGa-2095	2940±105	3098	3366-2850	95.4	"
40RH6	Watts Bar	GX2916	3020±260	3208	3891-2505	95.4	Calabrese 1976
40LD38	Iddins	GX4706	3205±145	3428	3828-3063	95.4	Chapman 1981
40RH6	Watts Bar	GX2915	3280±190	3524	4062-3005	95.4	Calabrese 1976
40MR40	Patrick	202560	3400±15	3647	3694-3593	95.4	This study
40LD38	Iddins	Uga1883	3470±75	3743	3959-3565	95.4	Chapman 1981
40MR25	Bacon Bend	GX5044	3580±255	3920	4785-3254	95.3	Chapman 1981
40LD38	Iddins	GX4705	3655±135	3998	4407-3644	95.4	Chapman 1981
4LD45	Higgs	CWRU84	3870±250	4300	4967-3633	95.4	McCullough and Faulkner 1973
40MR40	Patrick	UCIAMS-202561	3920±20	4361	4424-4291	95.4	This study
40MR25	Bacon Bend	Uga1879	4070±70	4585	4821-4420	95.4	Chapman 1981

Table A.2: Continued

Site Designation	Site Name	Lab no.	^{14}C age (BP)	Mean cal age BP (±2σ)	^{14}C age BP, calibrated (±2σ)		Reference
					Range	%	
40MR21	Harrison Branch	GX2607	4175±230	4711	5445-4084	95.4	Schroedl 1975
40MR40	Patrick	GX5244	4210±160	4744	5294-4300	95.4	Schroedl 1978
40MR25	Bacon Bend	GX5043	4390±155	5024	5464-4570	95.4	Chapman 1981
40MR40	Patrick	UCIAMS-202554	4765±20	5522	5585-5470	95.4	This study
40MR40	"	UCIAMS-202564	4955±20	5681	5731-5612	95.4	"
40MR40	"	UCIAMS-202563	4955±20	5681	5731-5612	95.4	"
40MR40	"	UCIAMS-202562	5590±45	6366	6451-6294	95.4	"
40MR40	"	UCIAMS-202557	6085±25	6947	7144-6882	95.4	"
40MR23	Icehouse Bottom	GX4124	6995±245	7846	8320-7439	95.4	Chapman 1977
40MR40	Patrick	UCIAMS-202565	7255±20	8078	8159-8010	95.4	This study
40MR21	Harrison Branch	GX4120	7570±250	8404	9021-7877	95.4	Schroedl 1975
40MR23	Icehouse Bottom	GX4123	7790±215	8659	9247-8182	95.4	Chapman 1977
40MR40	Patrick	GX4121	7810±175	8668	9127-8221	95.4	Schroedl 1978
40MR23	Icehouse Bottom	I9137	8525±355	9562	10483-8610	95.4	Chapman 1977
40MR21	Harrison Branch	GX4119	8545±245	9581	10221-9010	95.4	Schroedl 1975
40MR23	Icehouse Bottom	I9138	8715±140	9773	10173-9502	95.4	Chapman 1977
40MR23	"	GX4127	9175±240	10377	11103-9692	95.4	"
40MR23	"	GX4125	9350±215	10613	11231-9964	95.4	"
40MR23	"	GX4128	9380±215	10653	11236-10176	95.4	"
40MR40	Patrick	GX4122	9410±290	10708	11620-9888	95.4	Schroedl 1978
40MR23	Icehouse Bottom	GX4126	9435±270	10737	11604-9929	95.4	Chapman 1977

Appendix B: Patrick Site Monolith and Soil Sample Inventory

Table B.1: Inventory of Patrick Site Monoliths.

Context	North	East	High (ft)	Low (ft)	Date	Type	1972 Field no.	Description
M6	262	582	111.65	103	9/12/72	Monolith, Intact Profile	L6	Excellent condition, well preserved. Overlaps with M5.
M7	260.5	576.6	107.2	103.4	9/12/72	Monolith, Intact Profile	L7	Poor to Fair Condition, Loose fill.
M5	259.8	582	114.72	108.42	9/12/72	Monolith, Intact Profile	L5	Highly Fragmented, very poor condition. Overlaps with M7.
M4	N/A	N/A	116.4	110.36	9/10/72	Monolith, Intact Profile	L4	Excellent to fair condition, Backhoe Trench 6 (T6) "Point of description at 25ft mark".
M3	N/A	N/A	113.56	107.56	9/9/72	Monolith, Intact Profile	L3	Excellent Condition Backhoe Trench 5 "at 21' (T5)".
M2	N/A	N/A	111.23	108.93	9/8/72	Monolith, Intact Profile	L2	Backhoe Trench 4 (T4), "Point of description at 17ft mark".
*M1	187	522	114.64	109.08	9/8/72	Monolith, Intact Profile	L1	Backhoe Trench 2 (T2). Fragmented, but fair condition. "Point of description at 8ft mark".
M8	133	458.3	N/A	N/A	8/27/75	Column Sample	N/A	17 Individual Loose Soil Samples collected in 1975. "Point of description at 20ft mark".

*Stratigraphy is no longer intact following subsample collection for the purposes of this study.

Appendix C: Stratigraphic Descriptions

Table C.1: Stratigraphic Descriptions of Monolith M1.

Context	**Stratum**	**Zone**	**Associated 1972-1973 Strata**	**Depth (cmbs)**		**Description**
				Start	**End**	
M1	I	1AP	1	0	28	10YR 3/3 Dark brown, silt loam to fine sandy loam, moderate medium crumb, friable, slightly plastic, slightly sticky, lower boundary is gradual and smooth. Represents plow zone and recently disturbed context based on loose, poorly consolidated soil. Abundant cultural material. Represents the most recent plow zone.
M1	I	1Ap2	1	28	40	10YR 3/3 Dark brown, silt loam, sub-angular blocky, firm, slightly to moderately plastic, slightly sticky, micaceous, lower boundary is clear and smooth. Abundant cultural material. Represents the base of an earlier plow zone.
M1	II	2Ab	7	40	56	10YR 3/3 Dark brown silt loam to silty-clay loam, moderate angular blocky, slightly hard, slightly plastic, slightly sticky, micaceous with bits of fired clay, calcined bone, debitage, lower boundary is clear and smooth. Midden context with abundant cultural material, possibly containing multiple welded soils.
M1	II	2Bw	7	56	68	10YR 4/3 Brown mottled with 10YR 4/2 Dark-greyish brown, silty clay loam to silt loam, coarse angular blocky, slightly sticky, plastic, firm. Ped surfaces are 10YR 4/2 Dark grayish-brown, lower boundary is clear and wavy. Represents a weakly developed buried soil at the surface of a fining-upward sequence.
M1	III	3Abw	7	68	74	10YR 3/2 Very dark greyish-brown silt loam soil, moderate angular blocky breaking to coarse sub-angular blocky, firm, sticky, plastic, micaceous, some debitage visible but little cultural material overall, lower boundary is gradual and smooth.
M1	III	3Bw	7	74	86	10YR 4/2 Dark greyish-brown mottled with 10YR4/3 Brown, silt loam, medium massive structure, slightly sticky, slightly plastic, firm, lower boundary is clear and wavy. Lighter in color than 3Abw but with little apparent clay content. No visible cultural material. Voids and earthworm trails present.

Table C.1: Continued

Context	Stratum	Zone	Associated 1972-1973 Strata	Depth (cmbs)		Description
				Start	End	
M1	III	3C	13	86	120	10YR 4/3 Brown silt loam to fine sandy loam, sticky to slightly sticky, medium massive structure, firm to very firm, slightly plastic to sticky, micaceous, visible, lower boundary is clear and smooth. 7.5 YR 4/3 Brown sandy loam lamellae forms are visible in the lower 17 cm of this horizon, with multiple voids visible from 98 to 108 cm.
M1	IV	4Abw /B	13	120	128	10YR 4/4 Dark yellowish-brown mottled with 10YR 4/2 Dark greyish brown, silt clay loam to fine sandy clay loam, very firm, prismatic structure, breaking to medium prismatic, sticky, plastic, micaceous, lower boundary is clear and smooth. Represents a very weakly developed soil with mottling that may indicate an erosive episode. Formed within the surface of a fining-upward sequence of alluvium. 7.5 YR 4/3 Brown medium sand to silty clay loam lamellae present.
M1	IV	4C	13	128	150	10YR4/4 Dark yellowish-brown, silt loam to fine sandy loam, massive structure, slightly sticky, plastic, friable. Lower boundary is abrupt and smooth. Represents one or more fining-upward sequence of alluvial sediments.
M1	V	5C	14	150	175	10YR 5/6 Yellowish brown, silt loam, massive structure, slightly sticky, plastic, friable. Lower boundary is not apparent in profile. Likely the upper section of a fining-upward sequence of alluvium.

Table C.2: Stratigraphic Descriptions of Monolith M3.

Context	Stratum	Zone	Associated 1972-1973 Strata	Depth (cmbs)		Description
				Start	End	
M3	I	1Ap	1	0	19	7.5YR 3/2 Dark brown, silt loam to fine sandy loam, fine to medium crumb, friable to firm, slightly plastic, slightly sticky, lower boundary is clear and smooth, micaceous. Represents most recent plow zone.

Table C.2: Continued

Context	Stratum	Zone	Associated 1972-1973 Strata	Depth (cmbs)		Description
				Start	End	
M3	I	1Ap2	1	19	40	10YR 3/3 Dark brown, slightly clay loam to clay loam, moderate angular blocky to sub angular blocky, firm, slightly to moderately plastic, slightly sticky, micaceous, rodent burrows present, lower boundary is very abrupt and smooth. Fired clay, Charcoal, calcined bone, debitage present. Represents the base of an earlier plow zone.
M3	II	1B	7	40	47	10YR 3/2 Very dark greyish brown silty clay loam moderate angular blocky, to sub-angular blocky, firm, slightly sticky, slightly to moderately plastic, micaceous, abundant cultural material visible, lower boundary is clear and smooth. Represents the base of a cumulic soil that forms the parent unit of the Ap soil.
M3	II	2Ab	7	47	70	10YR 3/3 Dark brown silt loam cumulic soil, well developed, moderate angular blocky, slightly hard, slightly plastic, slightly sticky, micaceous with bits of fired clay, calcined bone, debitage, lower boundary is clear and smooth. Midden context with abundant cultural material including two limestone tempered Long Branch Fabric Marked sherds. May contain multiple welded soils.
M3	III	3Ab	7	70	78	10YR 4/2 Dark greyish brown silt loam cumulic soil, moderately developed, slightly sticky, medium massive structure, firm, slightly plastic, slightly sticky, micaceous, abundant charcoal, fired clay, calcined bone, large rounded river cobble, lower boundary is clear and wavy.
M3	III	3B	7	78	92	10YR 4/3 Brown silty clay loam, medium massive structure, firm to very firm, slightly plastic to sticky, micaceous, no cultural material visible, lower boundary is gradual and smooth. Root voids and earthworm trails are visible.
M3	III	3C	13	92	139	10YR 4/4 Dark yellowish-brown silt loam to fine sandy loam, massive structure, breaking to medium prismatic sticky, plastic, firm to very firm, micaceous, lower boundary is gradual and smooth. Represents and alluvial horizon with stacked fining-upward sequences. Some worm trails visible in upper 10 cm. Lower boundary is clear and smooth.

Table C.2: Continued

Context	Stratum	Zone	Associated 1972-1973 Strata	Depth (cmbs)		Description
				Start	End	
M3	IV	4Abw	13	139	150	10YR 4/4 Dark Yellowish-brown, very weakly developed fine sandy loam to silt loam soil, firm, massive structure, sticky, plastic, micaceous, lower boundary is clear and smooth. Worm trails or root voids are visible. No cultural material is present.
M3	IV	4C	13	150	185,5	10YR 5/6 Yellowish brown silt loam to fine sandy loam, firm to very firm, massive structure, sticky, plastic, micaceous, lower boundary is not visible in profile. Represents one or more fining-upward sequence of alluvial sediments.

Appendix D: Subsample Provenance and Volume

Table D.1: Subsamples from Monolith M1 for Macrobotanical and Micro-artifact Analysis Provenance with PIN (provenance identification number).

PIN	Depth (cmbs)	Total Vol. (ml)	Subsample Vol (ml)
1*	0-8	NA	NA
2	8-10	150	75
3a	10-12	150	75
3b	12-17	350	175
4	10-14	125	70
5	14-16	175	80
6	16-18	250	125
7	18-21.5	450	225
8	21.5-22.75	125	65
9	22.75-28	550	300
10	28-33	750	350
11	33-38	700	350
12	38-43	275	125
13	38-42	400	200
14	42-45	400	175
15	45-48	350	175
16	48-53	900	450
17a	53-56	550	200
17b	56-59	500	275
18	59-60.75	250	150
19a*	61.5	NA	NA
19b	60.75-65	700	350
20	65-70	750	330
21	70-74	590	240
22	74-78	600	300
23	78-83	750	375
24	83-88	620	280
25	88-91	400	225
26	91-96	750	300
27	96-101	900	450
28	101-106	750	300
29	106-111	850	400
30	111-116	750	350
31	116-120	600	300
32	120-125	900	450
33	125-130	900	450
34	130-135	850	400
35	135-140	850	400
36	140-145	750	350
37	145-150	850	400
38	150-155	850	400
39	155-160	900	450
40	160-165	875	410
41	165-170	800	400

*not analyzed (N/A).

Appendix E: Particle Size Distribution

Table E.1: Grain Size Distributions from Monolith M1.

Context	**Zone**	**Lab no.**	**Dry Sample wt. (g)**	**Texture (Absolute Percent)**					
				% clay (<2µm)	**% silt (2-50µm)**	**very fine sand (<50-150µm)**	**fine sand (<150-250µm)**	**medium sand (250-500µm)**	**coarse sand (500-1000µm)**
M1	1AP	1	0.541	6.98	57.14	24.67	7.81	2	1.4
M1	1AP	2	0.533	6.88	55.5	24.47	8.25	2.42	2.48
M1	1AP	3	0.517	7.19	57.12	24.76	8.04	2.03	0.86
M1	1AP	4	0.524	6.81	56.23	25.59	8.39	2.11	0.87
M1	1AP	5	0.502	7.38	58.76	23.43	7.38	1.77	1.28
M1	1AP2	6	0.504	7.83	61.45	21.46	6.47	1.98	0.81
M1	1AP2	7	0.507	7.79	60.68	21.64	6.72	2.05	1.12
M1	2Ab	8	0.521	7.9	60.94	21.37	6.32	1.96	1.51
M1	2Ab	9	0.501	8	61.91	20.79	5.98	1.78	1.54
M1	2Bw	18	0.498	7.96	63.73	20.46	4.95	1.41	1.49
M1	2Bw	19	0.497	7.32	62.48	21.95	5.48	1.37	1.4
M1	3Abw	10	0.499	7.05	61.53	22.94	6.07	1.45	0.96
M1	3Bw	20	0.496	6.65	60.39	24.42	6.23	1.39	0.92
M1	3Bw	21	0.499	6.46	59.62	24.94	6.71	1.46	0.81
M1	3C	11	0.501	6.12	58.25	24.56	7.99	1.86	1.22
M1	3C	12	0.498	5.82	56.63	25.48	9.17	2.04	0.86
M1	3C	13	0.498	7	60.23	22.92	7.07	1.65	1.13
M1	4Abw	14	0.499	7.83	65.8	19.74	4.13	1.22	1.28
M1	4C	15	0.497	7.34	64.47	20.78	5.05	1.37	0.99
M1	4C	16	0.495	7.06	62.69	21.96	5.75	1.52	1.02
M1	5C	17	0.501	7.56	66.99	19.71	3.49	1.13	1.12

Table E.2: Grain Size Distributions from Monolith M3.

Context	**Zone**	**Lab no.**	**Dry Sample wt. (g)**	**Texture (Absolute Percent)**					
				% clay (<2µm)	**% silt (2-50µm)**	**very fine sand (<50-150µm)**	**fine sand (<150-250µm)**	**medium sand (250-500µm)**	**coarse sand (500-1000µm)**
M3	1Ap	43	0.302	8.85	64.52	19.04	4.49	1.70	1.40
M3	1Ap2	44	0.302	8.67	66.96	18.77	4.01	1.14	0.44
M3	1Ap2	45	0.302	8.56	65.28	19.45	4.33	1.43	0.95
M3	1B	46	0.300	9.47	68.49	17.22	2.97	1.10	0.75
M3	2Ab	47	0.303	9.08	67.70	18.03	3.39	1.27	0.52
M3	2Ab	48	0.302	8.65	67.21	18.25	3.99	1.34	0.56
M3	3Ab	49	0.302	8.85	67.78	17.65	3.86	1.35	0.52
M3	3B	50	0.250	8.52	69.00	17.53	3.28	1.12	0.55
M3	3B	51	0.252	8.59	70.02	17.22	2.74	0.87	0.55
M3	3B	52	0.256	8.50	70.50	17.10	2.38	0.84	0.68
M3	3B	53	0.255	8.27	69.87	17.73	2.67	0.86	0.61
M3	3C	54	0.251	8.16	68.84	18.73	2.95	0.80	0.52
M3	3C	55	0.254	8.38	68.69	18.18	3.13	0.93	0.69
M3	3C	56	0.202	8.44	71.33	16.69	2.47	0.76	0.30
M3	3C	57	0.200	8.41	71.09	16.17	2.24	1.08	1.01
M3	3C	58	0.202	7.94	69.34	18.98	2.98	0.65	0.10
M3	3C	59	0.201	8.34	71.53	16.96	2.26	0.74	0.16
M3	4Abw/B	60	0.203	8.56	72.98	16.20	1.71	0.53	0.02
M3	4C	61	0.201	7.99	72.81	16.45	1.93	0.63	0.18
M3	4C	62	0.202	No Data	No Data	No Data	No Data	No Data	No Data
M3	4C	63	0.202	7.64	74.31	15.25	2.12	0.60	0.10
M3	4C	64	0.202	7.96	72.87	16.19	2.27	0.65	0.07
M3	4C	65	0.202	7.89	71.83	17.12	2.43	0.61	0.13

Appendix F: Organic Matter Concentrations

Table F.1: Organic Matter Concentrations from Monolith M1.

Context	Lab no.	Zone	Crucible wt. (g)	Crucible wt. + sample (g)	Post 375°C burn wt. (g)	Post Scorch wt. (g)	Organic Matter %	Inorganic Carbon %
M1	1	1AP	19.8787	39.7819	38.5094	37.5052	3.1987	2.6077
M1	2	1AP	20.5839	40.485	39.4158	38.4988	2.6410	2.3265
M1	3	1AP	20.4765	40.3613	39.2383	38.4532	2.7824	2.0009
M1	4	1AP	19.6065	39.496	38.3907	37.547	2.7985	2.1977
M1	5	1AP	20.6796	40.5503	39.3753	38.4902	2.8976	2.2479
M1	6	1AP2	20.1302	40.0172	38.8335	38.0534	2.9580	2.0088
M1	7	1AP2	21.735	41.6029	40.434	39.6596	2.8097	1.9152
M1	8	2Ab	21.0276	40.9117	39.9067	39.1486	2.4565	1.8997
M1	9	2Ab	20.0271	39.9071	38.929	38.1681	2.4509	1.9546
M1	10	3Abw	19.0936	39.0104	38.2633	37.5097	1.9151	1.9695
M1	11	3C	21.4624	41.3983	40.7591	40.0181	1.5440	1.8180
M1	12	3C	19.4538	39.3956	38.8273	38.1395	1.4425	1.7714
M1	13	3C	18.2001	38.1239	37.4775	36.7139	1.6955	2.0375
M1	14	4Abw	19.9168	39.8305	39.1435	38.3302	1.7248	2.0777
M1	15	4C	20.6615	40.5925	39.92	39.1118	1.6567	2.0245
M1	16	4C	19.6841	39.6061	38.9596	38.1811	1.6323	1.9982
M1	17	5C	20.6045	40.5434	39.8407	39.0241	1.7332	2.0497
M1	18	2Bw	21.9933	41.8344	40.8631	40.1122	2.3218	1.8376
M1	19	2Bw	24.6283	44.5021	43.7403	42.9512	1.7118	1.8041
M1	20	3Bw	23.5254	43.4035	42.7325	41.98	1.5460	1.7610
M1	21	3Bw	26.5558	46.4364	45.7806	45.0185	1.4123	1.6647

Table F.2: Organic Matter Concentrations from Monolith M3.

Context	Lab no.	Zone	Crucible wt. (g)	Crucible wt. + sample (g)	Post 375°C burn wt. (g)	Post Scorch wt. (g)	Organic Matter %	Inorganic Carbon %
M3	43	1Ap	21.9924	41.8235	40.3071	39.6096	3.6257	1.7305
M3	44	1Ap2	26.558	46.3932	45.0353	44.3272	2.9269	1.5723
M3	45	1Ap2	26.4159	45.717	44.2445	43.5082	3.2209	1.6642
M3	46	1B	24.6283	44.4588	43.2254	42.5434	2.7743	1.5778
M3	47	2Ab	23.5254	43.3526	42.1062	41.4681	2.8750	1.5155
M3	48	2Ab	25.392	45.1392	44.0018	43.3301	2.5198	1.5265
M3	49	3Ab	19.0935	38.8699	37.7567	37.0788	2.8639	1.7954
M3	50	3B	19.6059	39.328	38.3505	37.6881	2.4855	1.7272
M3	51	3B	20.4766	40.3456	39.3977	38.753	2.3495	1.6364
M3	52	3B	20.584	40.42	39.5029	38.853	2.2689	1.6452
M3	53	3B	20.1301	39.9165	39.0656	38.4052	2.1317	1.6905
M3	54	3C	20.0267	39.8719	39.0405	38.3812	2.0852	1.6888
M3	55	3C	21.028	40.8168	40.0103	39.3561	1.9759	1.6351
M3	56	3C	19.4537	39.2796	38.4149	37.7425	2.2014	1.7504
M3	57	3C	18.1994	37.9824	37.0757	36.3675	2.3872	1.9101
M3	58	3C	20.6047	40.4012	39.5542	38.8704	2.0965	1.7288
M3	59	3C	21.4632	41.2265	40.3154	39.6165	2.2100	1.7336
M3	60	4Abw/B	21.7336	41.4806	40.4825	39.7762	2.4062	1.7447
M3	61	4C	20.6617	40.4283	39.5736	38.8905	2.1141	1.7262
M3	62	4C	20.67	40.5306	39.7368	39.062	1.9585	1.6982
M3	63	4C	19.683	39.4836	38.6947	38.0165	1.9980	1.7527
M3	64	4C	19.8775	39.7005	38.9225	38.2482	1.9597	1.7324
M3	65	4C	19.9165	39.7671	38.9887	38.3175	1.9574	1.7215

Appendix G: Magnetic Susceptibility

Table G.1: Magnetic Susceptibility Data from Monolith M1.

Context	Depth (mbs)	Mag. Susc. (SI)
M1	0.02	3.27E-04
M1	0.05	1.59E-04
M1	0.08	1.40E-04
M1	0.11	2.47E-04
M1	0.14	2.62E-04
M1	0.17	2.75E-04
M1	0.2	2.18E-04
M1	0.23	2.36E-04
M1	0.26	2.19E-04
M1	0.29	1.90E-04
M1	0.32	1.85E-04
M1	0.35	2.38E-04
M1	0.38	2.56E-04
M1	0.41	2.51E-04
M1	0.44	2.51E-04
M1	0.47	2.60E-04
M1	0.5	2.02E-04
M1	0.53	2.29E-04
M1	0.56	2.13E-04
M1	0.59	1.73E-04
M1	0.62	1.52E-04
M1	0.65	1.27E-04
M1	0.68	9.28E-05
M1	0.71	1.20E-04
M1	0.74	1.03E-04
M1	0.77	1.26E-04
M1	0.8	1.32E-04
M1	0.83	1.27E-04
M1	0.86	1.28E-04
M1	0.89	9.73E-05
M1	0.92	9.28E-05
M1	0.95	7.91E-05
M1	0.98	8.80E-05
M1	1.01	8.43E-05
M1	1.04	8.41E-05
M1	1.07	6.34E-05
M1	1.1	8.70E-05
M1	1.13	9.16E-05
M1	1.16	7.80E-05
M1	1.19	7.04E-05
M1	1.22	7.77E-05
M1	1.25	7.53E-05
M1	1.28	8.50E-05
M1	1.31	9.25E-05
M1	1.34	9.13E-05
M1	1.37	7.25E-05
M1	1.4	6.92E-05
M1	1.43	8.45E-05
M1	1.46	8.37E-05

Table G.1: Continued

Context	Depth (mbs)	Mag. Susc. (SI)
M1	1.49	8.76E-05
M1	1.52	7.85E-05
M1	1.55	7.73E-05
M1	1.58	5.79E-05
M1	1.61	6.14E-05
M1	1.64	8.18E-05
M1	1.67	5.43E-05
M1	1.7	4.26E-05

Table G.2: Magnetic Susceptibility Data from Monolith M3.

Context	Depth (mbs)	Mag. Susc. (SI)
M3	0.02	3.28E+00
M3	0.05	2.32E-05
M3	0.08	1.58E-04
M3	0.11	1.51E-04
M3	0.14	1.59E-04
M3	0.17	1.66E-04
M3	0.2	1.64E-04
M3	0.23	1.89E-04
M3	0.26	2.17E-04
M3	0.29	1.90E-04
M3	0.32	1.96E-04
M3	0.35	1.61E-04
M3	0.38	2.25E-04
M3	0.41	2.64E-04
M3	0.44	2.81E-04
M3	0.47	2.82E-04
M3	0.5	2.43E-04
M3	0.53	2.20E-04
M3	0.56	2.52E-04
M3	0.59	2.61E-04
M3	0.62	2.84E-04
M3	0.65	3.02E-04
M3	0.68	3.11E-04
M3	0.71	2.78E-04
M3	0.74	3.06E-04
M3	0.77	2.54E-04
M3	0.8	2.38E-04
M3	0.83	2.04E-04
M3	0.86	1.75E-04
M3	0.89	1.46E-04
M3	0.92	1.31E-04
M3	0.95	1.24E-04
M3	0.98	8.84E-05
M3	1.01	1.07E-04
M3	1.04	9.47E-05
M3	1.07	1.02E-04
M3	1.1	1.04E-04
M3	1.13	1.04E-04
M3	1.16	1.14E-04
M3	1.19	1.08E-04

Table G.2: Continued

Context	Depth (mbs)	Mag. Susc. (SI)
M3	1.22	1.05E-04
M3	1.25	9.91E-05
M3	1.28	9.85E-05
M3	1.31	9.99E-05
M3	1.34	9.26E-05
M3	1.37	1.07E-04
M3	1.4	1.03E-04
M3	1.43	1.11E-04
M3	1.46	9.73E-05
M3	1.49	1.06E-04
M3	1.52	9.60E-05
M3	1.55	9.29E-05
M3	1.58	7.69E-05
M3	1.61	7.64E-05
M3	1.64	7.59E-05
M3	1.67	7.38E-05
M3	1.7	8.05E-05
M3	1.73	7.92E-05
M3	1.76	8.06E-05
M3	1.79	8.06E-05
M3	1.82	8.06E-05
M3	1.85	8.06E-05
M3	0.08	1.58E-04

Appendix H: Microartifacts

Table H.1: Microartifact Quantities from Monolith M1 by Sample, Fraction, and Depth.

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1000))
2	75	8-10	2mm	10	1	2	0	42	22	560.00
			1.4mm	4	4	5	5			
			1mm	13	5	11	17			
3a	75	8-10	2mm	6	1	7	3	64	35	853.33
			1.4mm	18	5	5	7			
			1mm	11	5	20	25			
3b	175	12-17	2mm	12	9	10	2	113	56	645.71
			1.4mm	28	6	10	13			
			1mm	37	5	27	41			
4	70	10-14	2mm	0	0	0	0	18	17	257.14
			1.4mm	9	2	0	2			
			1mm	9	5	4	15			
5	80	14-16	2mm	3	4	3	1	59	45	737.50
			1.4mm	13	3	5	6			
			1mm	22	3	13	38			
6	125	16-18	2mm	8	5	3	1	86	42	688.0
			1.4mm	21	7	7	11			
			1mm	33	4	14	30			
7	225	18-21.5	2mm	17	12	13	5	204	90	906.67
			1.4mm	32	9	27	21			
			1mm	61	7	68	64			

Table H.1: Continued

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1 000))
8	65	21.5-22.75	2mm	0	1	0	0	23	33	353.85
			1.4mm	3	3	0	2			
			1mm	13	5	5	31			
9	300	22.75-28	2mm	29	8	24	6	282	183	940.0
			1.4mm	29	6	37	35			
			1mm	91	10	109	142			
10	350	28-33	2mm	3	0	0	0	252	132	720.0
			1.4mm	27	11	14	12			
			1mm	111	22	119	120			
11	350	33-38	2mm	13	5	25	7	228	115	651.43
			1.4mm	41	7	34	31			
			1mm	53	13	80	77			
12	125	38-43	2mm	8	1	6	6	111	69	888.0
			1.4mm	12	3	13	15			
			1mm	30	3	50	48			
13	200	38-42	2mm	12	2	13	6	131	75	655.00
			1.4mm	12	1	24	18			
			1mm	41	2	51	51			
14	175	42-45	2mm	0	1	0	0	107	68	611.43
			1.4mm	8	0	8	7			
			1mm	37	0	70	61			
15	175	45-48	2mm	5	0	9	16	119	95	680.0
			1.4mm	14	0	18	28			

Table H.1: Continued

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1000))
			1mm	26	2	59	51			
16	450	48-53	2mm	12	3	15	6	181	108	402.22
			1.4mm	28	2	29	25			
			1mm	38	0	84	77			
17a	200	53-56	2mm	0	0	0	0	35	27	175.00
			1.4mm	0	0	0	1			
			1mm	11	1	23	26			
17b	275	56-59	2mm	4	0	8	3	40	17	145.45
			1.4mm	6	0	4	4			
			1mm	13	2	15	10			
18	150	59-60.75	2mm	0	0	1	0	4	6	26.67
			1.4mm	0	0	0	2			
			1mm	3	0	1	4			
19b	350	60.75-65	2mm	0	2	1	1	4	11	11.43
			1.4mm	0	0	0	4			
			1mm	1	0	3	6			
20	330	65-70	2mm	0	0	0	0	2	19	6.06
			1.4mm	0	0	0	0			
			1mm	0	0	2	19			
21	240	70-74	2mm	1	0	0	2	1	14	4.17
			1.4mm	0	0	1	2			
			1mm	0	0	0	10			

Table H.1: Continued

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1000))
22	300	74-78	2mm	0	0	1	4	1	22	3.33
			1.4mm	0	0	0	2			
			1mm	0	0	1	16			
23	375	78-83	2mm	0	0	0	0	2	12	5.33
			1.4mm	0	0	0	2			
			1mm	2	0	0	10			
24	280	83-88	2mm	0	0	0	1	4	27	14.29
			1.4mm	2	1	1	6			
			1mm	0	0	0	20			
25	225	88-91	2mm	0	0	0	2	1	11	4.44
			1.4mm	0	1	0	3			
			1mm	0	0	0	6			
26	300	91-96	2mm	0	0	0	0	3	31	10.00
			1.4mm	0	0	0	6			
			1mm	2	0	1	25			
27	450	96-101	2mm	0	0	0	0	2	3	4.44
			1.4mm	0	0	0	1			
			1mm	1	1	0	2			
28	300	101-106	2mm	1	0	0	0	1	2	3.33
			1.4mm	0	0	0	1			
			1mm	1	0	0	1			
29	425	106-111	2mm	0	0	0	0	0	1	0.00
			1.4mm	0	0	0	1			
			1mm	0	0	0	0			

Table H.1: Continued

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1000))
30	425	111-116	2mm	0	0	0	0	1	0	2.35
			1.4mm	0	0	1	0			
			1mm	0	0	0	0			
31	400	116-120	2mm	0	0	0	1	0	1	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	0			
32	450	120-125	2mm	0	0	0	0	0	0	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	0			
33	450	125-130	2mm	0	0	0	0	1	4	2.22
			1.4mm	0	0	0	0			
			1mm	0	1	0	4			
34	425	130-135	2mm	0	0	0	0	0	7	0.00
			1.4mm	0	0	0	1			
			1mm	0	0	0	6			
35	450	135-140	2mm	0	0	0	0	0	2	0.00
			1.4mm	0	0	0	2			
			1mm	0	0	0	0			
36	450	140-145	2mm	0	0	0	0	0	0	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	0			
37	450	145-150	2mm	0	0	0	0	0	6	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	6			

Table H.1: Continued

PIN	Vol. (ml)	Depth (cmbs)	Fraction	Ceramic and Daub	Lithic	Bone	Charcoal	Total Lithic, Ceramic, Daub, Bone	Total Charcoal	Lithic, Ceramic, Daub, Bone Density (Total/(volume/1000))
38	450	150-155	2mm	0	0	0	0	0	0	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	0			
39	425	155-160	2mm	0	0	0	0	0	2	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	2			
40	450	160-165	2mm	0	0	0	0	0	1	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	1			
41	450	165-170	2mm	0	0	0	0	0	0	0.00
			1.4mm	0	0	0	0			
			1mm	0	0	0	0			

Appendix I: Macrobotanicals

Table I.1: Plant Remains Recovered from Monolith M1 by Provenance.

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
2	1AP	8-10	0.13	0.01	0	Hickory	2	0.00
						Pitch	2	0.00
						Unidentifiable	2	0.00
						Unidentifiable seed	1	0.00
						Unidentifiable seed coat	1	0.00
						Walnut family	8	0.01
3a	1AP	8-10	0.67	0.05	0.02	Acorn	2	0.00
						Grape	1	0.00
						Hickory	9	0.02
						Pitch	5	0.01
						Unidentifiable	3	0.00
3b	1AP	12-17	0.40	0.07	0.02	Acorn	4	0.00
						Corn cupule cf.	1	0.00
						Hickory	28	0.04
						Pine cone	2	0.00
						Pitch	6	0.01
						Unidentifiable	1	0.00
4	1AP	10-14	0.43	0.03	0.01	Acorn	3	0.00
						Chenopod cf.	1	0.00
						Grape cf.	1	0.00
						Hickory	6	0.01
						Maygrass	1	0.00
						Maygrass cf.	1	0.00
						Pitch	5	0.01
						Unidentifiable	2	0.00
						Unidentifiable seed	2	0.00
5	1AP	14-16	4.50	0.36	0.02	Acorn	6	0.00
						Hickory	15	0.30

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
						Pine cone	1	0.00
						Pitch	7	0.01
						Unidentifiable	8	0.00
6	1AP	16-18	0.24	0.03	0.01	Acorn	2	0.00
						Black walnut	1	0.00
						Chenopod	1	0.00
						Hickory	18	0.02
						Pitch	5	0.00
						Unidentifiable	4	0.00
						Unidentifiable seed	1	0.00
						Unidentifiable seed coat	2	0.00
7	1AP	18-21.5	0.44	0.10	0.03	Acorn	8	0.00
						Hickory	6	0.03
						Pitch	10	0.01
						Unidentifiable	9	0.01
						Walnut family	20	0.02
8	1AP	21.5-22.75	0.62	0.04	0.01	Acorn	3	0.00
						Grape	1	0.00
						Hickory	14	0.02
						Maygrass	1	0.00
						Maygrass cf.	1	0.00
						Pitch	4	0.01
						Unidentifiable	4	0.00
9	1AP	22.75-28	0.77	0.23	0.05	Acorn	17	0.01
						Chenopod cf.	2	0.00
						Hickory	79	0.13
						Maygrass	1	0.00
						Pitch	24	0.03
						Unidentifiable	16	0.01
10	1AP2	28-33	0.51	0.18	0.04	Acorn	34	0.01

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
						Acorn cf.	2	0.00
						Corn cupule	1	0.01
						Corn cupule cf.	2	0.00
						Hickory	58	0.09
						Maygrass	1	0.00
						Persimmon cf.	2	0.00
						Pitch	14	0.02
						Spore clump	1	0.00
						Unidentifiable	7	0.01
						Unidentifiable seed	7	0.00
11	1AP2	33-38	0.46	0.16	0.02	Acorn	15	0.01
						Corn cupule	1	0.00
						Corn glume	1	0.00
						Hickory	39	0.08
						Pitch	16	0.03
						Unidentifiable	16	0.02
						Unidentifiable seed	1	0.00
12	1AP2	38-43	0.48	0.06	0.02	Acorn	9	0.00
						Acorn cf.	2	0.00
						Hickory	20	0.04
						Maygrass	1	0.00
						Pitch	4	0.00
						Unidentifiable	7	0.00
13	1AP2	38-42	0.45	0.09	0.04	Acorn	11	0.01
						Bark	3	0.00
						Grape	1	0.00
						Hickory	25	0.04
						Pitch	2	0.00
						Unidentifiable	6	0.00
14	2Ab	42-45	0.69	0.12	0.04	Acorn	12	0.01
						Chenopod cf.	1	0.00

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
						Hickory	22	0.06
						Maygrass	2	0.00
						Pitch	8	0.01
						Sunflower cf. wild	1	0.00
						Unidentifiable seed	2	0.00
15	2Ab	45-48	1.14	0.20	0.05	Acorn cf.	3	0.00
						Black walnut	12	0.08
						Hickory	27	0.06
						Pitch	8	0.01
						Unidentifiable	1	0.00
16	2Ab	48-53	0.20	0.09	0.06	Acorn cf.	2	0.00
						Black walnut	1	0.00
						Hickory	21	0.02
						Pitch	12	0.01
						Unidentifiable	6	0.00
						Walnut family	1	0.00
17a	2Ab	53-56	0.20	0.04	0.02	Acorn	13	0.01
						Acorn cf.	1	0.00
						Chenopod	6	0.00
						Grape cf.	1	0.00
						Hickory	5	0.01
						Pitch	3	0.00
						Unidentifiable seed	2	0.00
17b	2Bw	56-59	0.04	0.01	0.01	Acorn	2	0.00
						Hickory	3	0.00
						Unidentifiable	2	0.00
18	2Bw	59-60.75	0.00	0.00	0.00	Hickory	2	0.00
						Pitch	1	0.00
19b	2Bw	60.75-65	0.03	0.01	0.00	Acorn	1	0.00
						Hickory	3	0.01

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
20	2Bw	65-70	0.06	0.02	0.01	Acorn	2	0.00
						Chenopod cf.	1	0.00
						Hickory	7	0.01
						Maygrass	1	0.00
						Pine cone cf.	1	0.00
						Pitch	3	0.00
21	3Abw	70-74	0.08	0.02	0.01	Black walnut	1	0.00
						Hickory	7	0.01
						Walnut family	4	0.00
22	3Bw	74-78	0.17	0.05	0.05	Acorn	1	0.00
						Hickory	11	0.00
						Pitch	1	0.00
						Unidentifiable	3	0.00
23	3Bw	78-83	0.03	0.01	0.01	Cane	4	0.00
						Chenopod cf.	7	0.00
						Hickory	3	0.00
						Pitch	1	0.00
24	3Bw	83-88	0.07	0.02	0.00	Acorn	2	0.00
						Bark	2	0.00
						Black walnut	2	0.00
						Hickory	4	0.01
						Monocot stem	1	0.00
						Pitch	2	0.00
						Unidentifiable	1	0.00
						Walnut family	9	0.01
25	3C	88-91	0.13	0.03	0.01	Acorn	1	0.00
						Black walnut	1	0.01
						Hickory cf.	1	0.00
						Pitch	1	0.01

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
26	3C	91-96	0.13	0.04	0.02	Bedstraw Cane Hickory Pitch	5 2 8 1	0.00 0.01 0.01 0.00
27	3C	96-101	0.00	0.00	0.00	N/A		
28	3C	101-106	0.00	0.00	0.00	N/A		
29	3C	106-111	0.00	0.00	0.00	N/A		
30	3C	111-116	0.00	0.00	0.00	N/A		
31	3C	116-120	0.00	0.00	0.00	Hickory	1	0.00
32	4Abw	120-125	0.00	0.00	0.00	N/A		
33	4Abw	125-130	0.02	0.01	0.00	Acorn Hickory Pitch	1 1 2	0.00 0.00 0.00
34	4C	130-135	0.00	0.00	0.00	Hickory Pitch	1 2	0.00 0.00
35	4C	135-140	0.00	0.00	0.00	Hickory	1	0.00
36	4C	140-145	0.00	0.00	0.00	N/A		
37	5C	145-150	0.00	0.00	0.00	N/A		
38	5C	150-155	0.00	0.00	0.00	N/A		
39	5C	155-160	0.00	0.00	0.00	N/A		
40	5C	160-165	0.00	0.00	0.00	N/A		

Table I.1: Continued

PIN	Stratum	Depth (cmbs)	Plant Density	Plant Weight (g)	Wood Weight (g)	Plant Taxon	Count	Weight (g)
41	5C	165-170	0.00	0.00	0.00	N/A		

Table I.2: Total Plant Count and Weight from Monolith M1 Listed by Taxa.

Common Name	Taxonomic Name	Item Type	Seasonality	Sum of Count	Sum of Weight
Acorn	*Quercus* sp.	nutshell	fall	148	0.06
Acorn cf.	*Quercus* sp.	nutshell	fall	10	0.00
Bark		bark		5	0.00
Bedstraw	*Galium* sp.	seed		5	0.00
Black walnut	*Juglans nigra*	nutshell	fall	18	0.09
Cane	*Arundinaria* sp.	cane		6	0.01
Chenopod	*Chenopodium berlandieri*	seed	late summer/fall	7	0.00
Chenopod cf.	*Chenopodium berlandieri*	seed	late summer/fall	12	0.00
Corn cupule	*Zea mays*	cupule	late summer/fall	2	0.01
Corn cupule cf.	*Zea mays*	cupule	late summer/fall	3	0.00
Corn glume	*Zea mays*	glume	late summer/fall	1	0.00
Grape	*Vitis* sp.	seed	summer	3	0.00
Grape cf.	*Vitis* sp.	seed	summer	2	0.00
Hickory	*Carya* sp.	nutshell	fall	446	1.02
Hickory cf.	*Carya* sp. cf.	nutshell	fall	1	0.00
Maygrass	*Phalaris caroliniana*	seed	spring/early summer	8	0.00
Maygrass cf.	*Phalaris caroliniana* cf.	seed	spring/early summer	1	0.00
Monocot stem	*Poaceae*	non-woody stem		1	0.00
Persimmon cf.	*Diospyros virginiana* cf.	seed	fall	2	0.00
Pine cone	*Pinus* sp.	other fruit		3	0.00
Pitch		amorphous plant tissue		147	0.18
Sunflower cf. wild	*Helianthus* sp.		summer	1	0.00
Spore clump				1	0.00
Unidentifiable	Unidentifiable	amorphous plant tissue		98	0.05
Unidentifiable seed	Unidentifiable	seed		16	0.00
Walnut family	*Juglandaceae*	nutshell	fall	42	0.04

VITA

Daniel H. Webb Jr. was born in Durham, North Carolina on January 5th, 1988. He attended received his B.A. in Anthropology from the University of Tennessee at Chattanooga in 2011. Daniel enrolled in graduate program at the University of Tennessee, Knoxville in 2016 where he received his M.A. in Anthropology in the fall of 2018.