12-2012

Contextualizing the Tipton-Haynes State Historic Site (40WG59): Understanding Landscape Change at an Upland South Farmstead.

Daniel Whitaker Howard Brock
dbrock4@utk.edu

To the Graduate Council:

I am submitting herewith a thesis written by Daniel Whitaker Howard Brock entitled "Contextualizing the Tipton-Haynes State Historic Site (40WG59): Understanding Landscape Change at an Upland South Farmstead.." 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.

Barbara J. Heath, Major Professor

We have read this thesis and recommend its acceptance:

Henri D. Grissino-Mayer, Elizabeth Kellar-DeCorse, Gerald F. Schroedl

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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

Contextualizing the Tipton-Haynes State Historic Site (40WG59): Understanding Landscape Change at an Upland South Farmstead.

A Thesis Presented for the
Master of Arts Degree

University of Tennessee, Knoxville

Daniel Whitaker Howard Brock
December 2012

ACKNOWLEDGEMENTS

The author wishes to acknowledge the following organizations and persons who made this project possible.

<u>Tipton-Haynes State Historic Site</u>
Penny McLaughlin

<u>State of Tennessee</u>

<u>Tennessee Historical Commission</u>

<u>Tennessee Division of Archaeology</u>

<u>Tennessee Council for Professional Archaeology</u>

<u>Alexandria Conservation Services, Ltd.</u>
Lisa Young

<u>University of Tennessee, Knoxville</u>
Department of Anthropology
Charles H. Faulkner Archaeology Laboratory
Archaeological Research Laboratory
Laboratory of Tree-Ring Science
Dr. Charles Faulkner

<u>Committee Members</u>
Dr. Barbara Heath
Dr. Gerald Schroedl
Dr. Elizabeth Kellar-DeCorse
Dr. Henri Grissino-Mayer

<u>Volunteers and Field Crew</u>
Dustin Lawson, Archaeological Field Assistant
Stephen Yerka, Geophysical Consultant
Robbie Jones, Architectural Consultant
Jessie Duncan, Field Tech
Angela Milhorn, Field Tech
Crystal Akers, Amy Yerka, Rebecca Marston, Zac Cavitt, Ruby Munoz, Kevin Patrick Russell, Josh Brown, Alexander Pooler, Lisa LaForest, Monica Rother, Matthew Kookogee, Nancy Li, Grant Harley, and the Tipton-Haynes Junior Board

ABSTRACT

This thesis focuses on a contextual archaeological approach to investigate the historic landscape of the Tipton-Haynes State Historic Site. Tipton-Haynes is a late eighteenth- through twentieth-century upland south farmstead located in Johnson City, TN. Home to two prominent Tennessee families and occupied until acquired by the state in the 1960s, the site has experienced many alterations to the landscape over time. The analysis presented views the landscape as material culture investigated through a multidisciplinary approach including historic research, architectural survey, geophysical survey, dendrochronology, and archaeology. To make sense of the complex nature of the Tipton-Haynes site, multiple methods were used in order to achieve context of the historic landscape. Context is then used to provide knowledge of the past by historically situating the landscape. Landscape change was found to be influenced by household dynamics, production, employment, as well as consumer access, attitudes towards construction, and progressive farming.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

This thesis presents research that has been completed at the Tipton-Haynes State Historic Site in Johnson City, Tennessee as part of the Tipton-Haynes Landscape Archaeological Project (THLAP) funded by the Tennessee Historical Commission and a grant from the Tennessee Council for Professional Archaeology. The Tipton-Haynes Landscape Archaeological Project was undertaken to analyze and interpret one of Tennessee's valuable cultural resources through the lens of historical archaeology using multiple methods of investigation. The purpose of the project was to discover and explain transformations at the Tipton-Haynes site and obtain an understanding as to why these changes took place on the landscape through a contextual analysis. A contextual analysis involves interweaving data from multiple sources in meaningful ways that allow for a more complete interpretation of a complex past. Context provides a means for interpretation, or best explanation, of the past providing multiple ways of knowing. The Tipton-Haynes site has the potential to inform on a variety of research questions associated with change on historic farmsteads and therefore necessitates a thorough contextual background in order to achieve a solid foundation for interpretation and future research. The data obtained from this multidisciplinary investigation allow for the interpretation of the historic farmstead landscape and farm life in the Upland South from the frontier to modern era including cultural, social, economic, and ideological influences.

A contextual historical archaeological approach to interpreting the upland south farmstead at Tipton-Haynes is employed in order to recover meaning through examination of the landscape. Landscape here is viewed as material culture contextually situated to recover these

meanings. The residents of the site created, maintained, and changed the landscape within the context of their social, economic, and political realities. We can study the landscape to understand the impacts of these processes at Tipton-Haynes. The constructed material landscape can be explained by providing spatial, temporal, and cultural context through the use of many different disciplines. Multiple methods were employed during the investigation including historical research, architectural survey, dendrochronology, geophysical survey, and archaeology to contextualize the Tipton-Haynes landscape and supply rigorous data for investigation. The complex history of the site and its transformation through time necessitate this approach and its focus on context to explain the processes that created the past landscape at Tipton-Haynes.

The Tipton-Haynes site (40WG59) is located south of Johnson City in Washington County, Tennessee and is named for the Tipton and Haynes families who historically occupied the site (Figures 1 and 2). It is currently managed by the Tipton-Haynes Historical Association under the auspices of the State of Tennessee as a state historic site and is recorded on the National Register of Historic Places (NHRP Building #70000620). The site serves as a historic house museum which, together with its grounds, is intended to help preserve and interpret Tennessee's history.

The grounds are comprised of a core 17 acres situated around the Catbird Branch of Sinking Creek at the base of the Buffalo Mountain (Figure 2). The site contains the farmhouse, outbuildings, a spring and springhouse, a pond, a cave, a section of the old Buffalo Trace as well as the managerial offices and museum (Figure 3). The adjacent Tipton and Simerly family cemetery is also managed as part of the site and contains the burials of Colonel John Tipton and family as well as members of the Simerly family, later residents of the site. Other parcels have

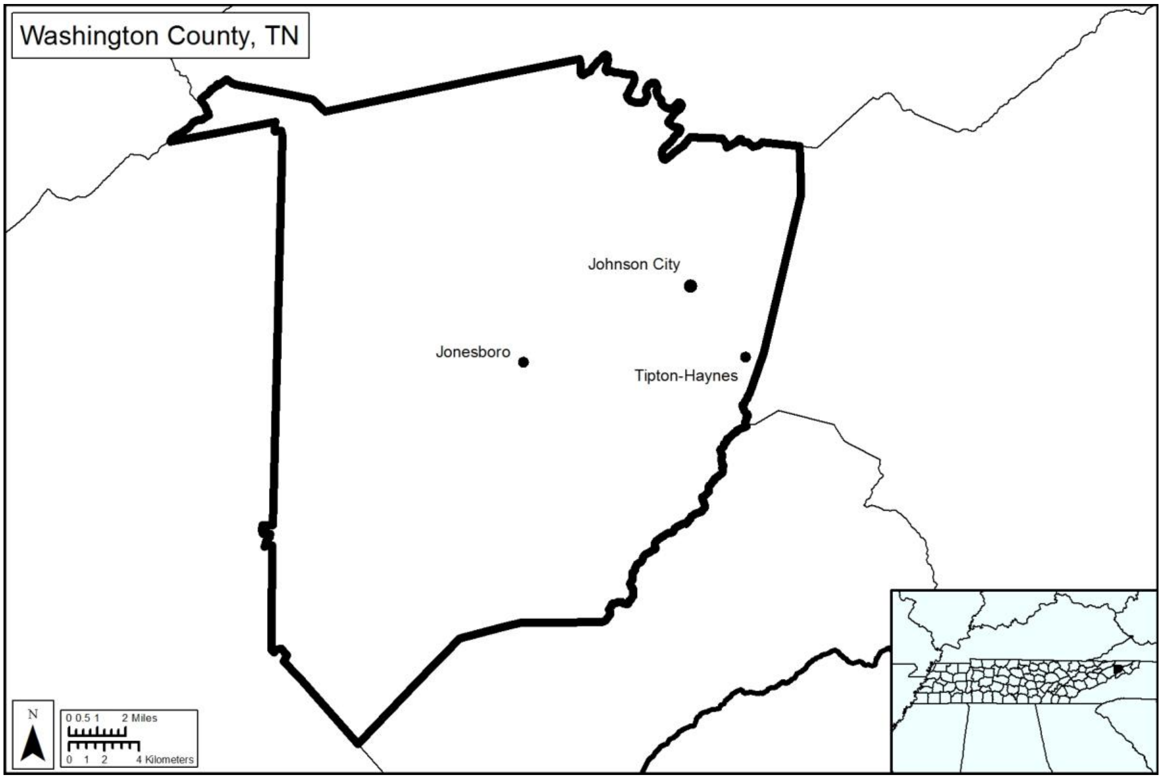

Figure 1. Washington County, Tennessee.

recently been acquired to the south of the core site to include a total of 47.23 acres for the entire property.

Tipton-Haynes has been described as "the most historic site in Tennessee" (Bailey 1991:vii). The site's significance comes from its association with two prominent historic families who resided there from the late eighteenth through mid-nineteenth centuries including Colonel John Tipton, his son John Tipton, Junior, and later Landon Carter Haynes. The incident known as the "Battle of the Lost State of Franklin" in 1788 was also a significant event that has lent to this title. Aside from the big men and events of history, the later Simerly family, relatives of the Haynes family, also lived in the house during the later part of the nineteenth century until the state acquired the property in 1962. Other family members and enslaved peoples owned by the Tipton and Haynes families have also lived there as well as earlier groups of Native

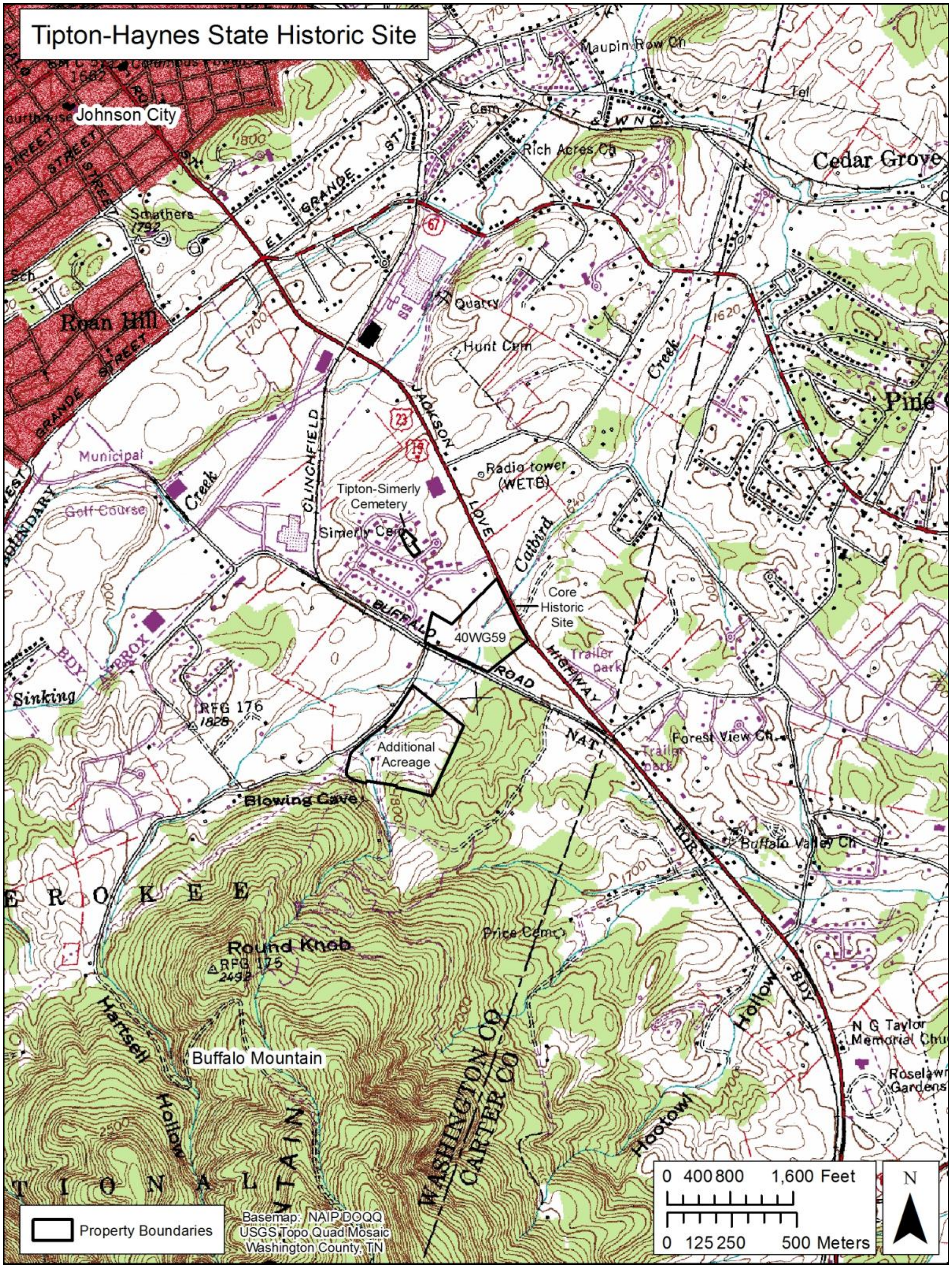

Figure 2. Tipton-Haynes State Historic Site.

Figure 3. Tipton-Haynes site features.

Americans. The property's long history allows for an avenue of understanding and interpreting lifeways of all peoples from the prehistoric past into the modern era. However, for the purposes of this thesis, a historical archaeological perspective is used to look at the site's use from the late eighteenth through twentieth centuries.

The Tipton-Haynes site is situated in the Southern Appalachian region of the Upland South. The Upland South is geographically made up of the Southern Appalachians, the interior low plateaus, and the Ozarks and the Ouachitas. This is in contrast to the Lowland or Deep South. The Upland South is of generally higher elevation, where agriculture is relatively less productive as compared to the Deep South, a flatter lowland, which is identified with slavery and large-scale agriculture (Hudson 2003:101). The division of the South into upland and lowland also parallels to some extent cultural differences within the American population, which has played a role in regional political economy, between the up-country yeomanry and the lowland planter class (Hudson 2003:101). Of the three divisions of the Upland South, the Southern Appalachians best typify the region as a whole (Hudson 2003:101).

The Upland South was first defined by geographer Fredrick Jackson Turner (Faulkner 1998:138; Turner 1920:164). Turner in his "frontier thesis" defined the Upland South as an area that was "an extension from the middle region chiefly from Pennsylvania, with a mixture of nationalities and religions" (Turner 1920:164). It was moreover a rural section characterized by the small farmer, living in a log cabin, raising a small crop and a few animals for family use (Turner 1920:165). Turner proposed that the adaptive experience of the early upland south farmer gave rise to the ideals of an individualistic democratic American society (Turner 1920:165, 302).

The region was further refined by Henry Glassie who defined what he called the Southern Appalachian culture which was a mixture of Pennsylvanian German and Scots-Irish cultures (Faulkner 1998:138; Glassie 1968:78-79). This was especially evident in the construction of houses and outbuildings which was typified by log cabin construction (Faulkner 1998:138; Glassie 1968:78-79). The Southern Appalachian region is distinctive culturally because of migration flows in the late eighteenth and early nineteenth centuries that followed the mountains south from Pennsylvania (Hudson 2002:101). Scots-Irish, English, and German settlers who moved south from Pennsylvania evolved a folk-cultural system that came to represent the Upland South as a unique region (Hudson 2002:103).

The Upland South is defined as a distinct region based on its geography and cultural characteristics, including its economy and politics, which differ from the traditional American South (Jordon-Bychkov 2003). The area is politically conservative with a market economy primarily based on house-hold level agricultural production and family farms (Groover 2003:75). In the past, upland south culture also included “a reliance on diversified farming, the importance of the cooperative family unit, an oligarchic political system centered on the county court, and a stratified social system with slaves as the lowest class” (Faulkner 1998:138). People in the area were primarily small- to medium-scale farmers who kept few slaves and practiced a diversified agriculture based on livestock and small grains (Hudson 2002:103). An understanding of these contexts helps to situate the Tipton-Haynes site as a rural upland south farmstead. Tipton-Haynes was a small-scale farm focused on grain and livestock production placing this site within the realm of farmstead studies.

A farmstead is simply a tract of land cultivated for the purposes of agricultural production including its land and buildings. Farmsteads differ from plantations in scale and means of

production. Plantations can be defined as large-scale agricultural enterprises "in which a number of workers of a subordinate class (i.e. slaves) work together to produce a crop for someone else to be sold in a market" (Heath 1999:54; Singleton 1985:1). Farmsteads are small in scale where typically "the family acts as the primary labor force on the farm, and goods are produced for internal consumption" (Heath 1999:54; Singleton 1986:2; Thompson 1975:18-19). This defines a site-type, which within archaeology also includes people and the historical contexts of the lives that created and shaped this unit of analysis. Farmsteads form a fairly new area of archaeological research though they are the most ubiquitous type of historic site in the United States (Groover 2008; Sayers 2003; Wilson 1990). The importance of understanding this type of site has grown in recent years; enough to warrant a comprehensive contextualization of the field (Adams 1990; Baugher and Klein 2002; Groover 2003, 2008; Heath 1999; Orser 1990; Sayers 2003). Farmstead sites are important for understanding a wealth of information about the agrarian South including landscape change from the frontier to the modern era. Farming was a common family enterprise in the past when compared to today in which monocrops and industrial-scale farms now dominant production. Since most families practiced farming in the past, farm sites are important for understanding how a majority of the population lived.

The Tipton-Haynes Landscape Archaeological Project started with several goals in mind. It was principally created to allow for an examination of the historic use of the landscape at the site using multiple methods of investigation. On a smaller scale, it was also created as an educational opportunity for the general public through witnessing site excavation and the creation of a museum display incorporating archaeology. The primary goal, however, was to obtain data pertinent to Tennessee's history, people, and culture by providing a highly contextual model to understand the Tipton-Haynes site. The conclusions reached in this study in turn will

help the state better manage this cultural resource and supply a strong foundation for interpretation of the site.

The Tipton-Haynes Landscape Archaeological Project is a multidisciplinary intrasite investigation of the historic farmstead landscape. While historical documentation allows an investigation into the larger landscape associated with the property, the main scope of the project, based on physical evidence, is on the core 17-acre historic site as it survives today. The focus of data collection is primarily centered on continuity and change within the built environment of the Tipton-Haynes site including the architecture of buildings and groups of buildings through time. The integration of historic research, architectural survey, dendrochronology, geophysical survey, and archaeology yields a holistic understanding of the site and its changing landscape that could not be achieved by the application of any single approach.

By focusing on the way people have modified and shaped their past surroundings, this thesis proposes to explore the diachronic organization of space at the Tipton-Haynes site. Research questions include: What changes took place on the landscape at Tipton-Haynes? When did these changes take place? Why did these changes take place? Other broader questions that developed as part of this research center on the farmstead and the effect of local and regional development on goods and services available at the site as well as the presence of slavery on an upland south farmstead. By using different methodologies, the changes that took place and their provenience in time and space will be revealed. Questions relating to why landscape change at Tipton-Haynes occurred and to broader questions surrounding upland south farmsteads will be recovered through the use of a contextual historical archaeological approach.

Historical archaeology can broadly be defined as the study of the material remains of past societies that also left behind documentary evidence. However, a more widely accepted view of historical archaeology in North America narrows its scope to the study of the modern world and the historical and cultural conditions that have shaped it since the beginning of European exploration in the fifteenth-century (Deetz 1977:5; Hall and Silliman 2006; Orser 1996; 2002:xvi). Drawing on evidence of people's actions and their consequences, historical archaeologists seek to understand the effects of European expansion worldwide, including interactions among and displacement of people, and of cultural continuity, contest, and change (Deagan 1988:8; De Cunzo 1996:10; Deetz 1977:5). The study of the recent past looks at the interaction of diverse cultures due to Western expansion across the globe and how cultures were transformed by economic, ideological, and technological changes that culminated in today's world. The modern era encompasses all of Tennessee's documented history since the sixteenth century and has been a useful tool in our understanding of the past, allowing us to learn about people and places through the examination of documents, archaeological deposits, and material culture. Historical archaeology has the ability to provide insight into the development of modern-day Tennessee by examining the Tipton-Haynes farmstead and related changes seen in the landscape from the frontier to the twentieth century.

Dialogue within historical archaeology in the past few decades has focused on its place within the sciences or the humanities, sources of data, and theoretical approaches to analysis (De Cunzo 1996:3). The divide between humanistic and scientific archaeology came with processual school and its drive for positivistic empiricism. Processual archaeology turned its back on the humanities, rejected much of social science, and emulated the natural sciences (Beaudry 1996:476). Processual archaeology was a positivist endeavor focusing on cultural materialism

and using hypothesis testing for pattern recognition in the search for universal laws of behavior (Beaudry 1996:474). It minimized context and privileged patterns in material culture over the particularity of historical documents (De Cunzo 1996:7)

Historical archaeologists have linked the issue of sources of evidence with the question of disciplinary association limiting interdisciplinary dialogue (De Cunzo 1996:4). “Archaeologists study material culture; historians study documents” (De Cunzo 1996:4). Dissatisfaction arose with being relegated to simply verifiers or debunkers of historical documents. Document testing was viewed in opposition to science; and was descriptive rather than explanatory (Beaudry 1996:481). This opposition to historical evidence, however, devalued the historical record and its necessity in historical archaeology (Beaudry 1996:482). The “written word’s role in historical archaeology remains central to the field” (De Cunzo 1996:5).

Reaction to the positivistic approach was taken up by differing theoretical schools including structural, cognitive, and symbolic “mentalists,” Marxists and critical theorists, and feminists (De Cunzo 1996:5). Historical archeologists influenced by these different approaches have been rethinking and reinventing their field rejecting the notion that historical archaeology falls within the natural sciences and is incapable of providing meaning (Beaudry 1996:473). The solution to the debate is an interpretive contextual approach to historical archaeology (Beaudry et al. 1991, 1996; De Cunzo 1996; Hodder 1988). Historical archaeology should be situated “directly over the fault on the academic landscape that separates the social sciences from the humanities” (De Cunzo 1996:9; Glassie 1977:24). Historical archaeologists can then attend to “the humanist’s concern for meaning, intention, and being, and to the scientist’s concern for form, behavior, and conditions, and avoid the blindness of any single approach” (De Cunzo 1996:9; Fitting 1977:67). “The interpenetration of anthropology, history, literary theory, cultural

geography, material culture studies, and other fields, combined with the influences of radical theoretical perspectives provide impetus for a reinvention of historical archaeology as a creative discipline whose aim is the holistic study and interpretation of cultures with archival and oral histories" (Beaudry 1996:476). This moves us past the rhetorical discussion creating an interdisciplinary approach to a positivistic humanistic historical archaeology focused on context.

At the core of historical archaeology is the interpretation of past peoples, cultures, and contexts (De Cunzo 1996:13). A contextual archaeology addresses such concerns. Context is everything in archaeology. Context is where meaning is located and constituted and provides the key to interpretation (Beaudry et al. 1991:160). In its basic sense, context can be defined as a material culture's physical provenience in time and space. Another definition involves "the connecting or interweaving of things in a particular situation or group of situations" including cultural, symbolic, and ideological situatedness in the past (Herman 1996:19; Hodder 1986:120). Context can then be understood as, "defining and defined by the situations and settings in which they historically operated" (Herman 1996:30). This allows us "to understand people in their cultural context and culture in its human context" (De Cunzo 1996:15).

Context is multilayered and complex (Herman 1996:19). People, culture, and the archaeological record are all complex and therefore call for a contextual approach. Only by integrating all of the available evidence and acknowledging multiple meanings we can come closer to regaining the past from its many perspectives (Beaudry 1996:497; De Cunzo 1996:14). Contextual archaeology "aspires to hear a multiplicity of voices, to know many pasts, and to privilege no single perspective" (De Cunzo 1996:11). It therefore requires an interdisciplinary approach.

Historical archaeologists study people and culture, in particular, material culture. Culture can be viewed as "the shared meanings, practices, and symbols that constitute the human world" (Beaudry 1996:480-481). It is a system of meaning in which material culture serves expression, medium, sign, or symbol (Beaudry 1996:480). Borrowing from social anthropology, archaeologists have taken an ethnographic approach to material culture, seeking to address cultural questions in conjunction with historical ones (Beaudry 1996:482). This approach consists of setting people's beliefs back into the social context of their lives, by careful, intensive field research comprised of extracting ethnographic-style data from different sources (Beaudry 1996:478). Ethnographic-style research is used as a metaphor to elicit cultural questions and re-center focus on people as well as validation of each dataset by examining them similar to a historic document for the purpose of leveling the theoretical playing field and not allowing for one approach or one piece of evidence to be placed above another.

The search for context through the exploration of material culture stands at the very core of historical archaeology (Herman 1996:19). Material culture here is defined broadly "to include everything people have made, every material consequence of people's actions, and every way people have altered their physical world and their bodies" (De Cunzo 1996:13-14). This approach includes looking at landscape, historical documents, architecture, artifacts, and features as material culture. Material culture analysis gives us insight into peoples' attitudes toward the world around them which is an integral component of recovering meaning as well as of explanation of the archaeological record (Beaudry et al. 1991:160). "The underlying premise of material culture is that objects made or modified by man reflect the beliefs of the individuals who made, commissioned, purchased, or used them and, by extension, the beliefs of the larger society to which they belonged" (Beaudry et al. 1991:150; Prown 1988: 19). Material culture is

therefore a tangible incarnation of social relationships embodying the attitudes and behaviors of the past whereby objects are a medium of communication through symbolism (Beaudry et al. 1991:150; Herman 1996:29). This type of communication is recoverable if encoded cultural values are historically and circumstantially contextualized (Herman 1996:29). The analysis of material culture is what makes this examination of the landscape historical archaeology.

Landscape archaeology can be defined as the study of how people shaped and were shaped by the land in dynamic cultural and natural contexts (Zierden and Stine 1997:xi). "Landscape archaeology thus encompasses the study of human use, misuse, or neglect of the landscape and the study of the built environment, as well as the examination and interpretation of intentional formalized landscapes efforts" (Beaudry 1996:491). Landscape archaeology is one of the most common types of research to be undertaken at farmstead sites (Groover 2008:15-17). The Tipton-Haynes Landscape Archaeolgical Project follows this paradigm by trying to understand diachronic change at Tipton-Haynes by examining the landscape of the site including land use, boundary maintenance, farm layout, and household dynamics, as well as building construction and placement by utilizing multiple methods of analysis. The constructed "landscape history" in turn provides context and meaning (Adams 1990).

Landscapes are complex, layered with multiple meanings and amenable to the same actions or discourses as are artifacts and documents (Beaudry 1996:492). For the purposes of this thesis, the landscape is considered a cultural landscape created or modified physically according to a set of cultural plans (Deetz 1990:2). It embodies an understanding of the "worldview that underlies the organization of the physical past and the way ideology shaped people's lives" (De Cunzo and Ernstein 2006:256; Deetz 1977:23).

Landscape analysis is used here as an analytical tool to contextualize relationships of the built environment at the Tipton-Haynes site as they reflect changing cultural plans of the Tiptons, the Haynes, the Simerlys and others who occupied the site. The main focus of this analysis is to investigate how and why the changing landscape was created and maintained by the household at the level of the farmstead. This includes using a contextual perspective to provide meaning to the changing landscape from vernacular to Federal to Greek-Revival then postbellum farmhouse over its 237-year history.

Examination of the Tipton-Haynes site is structured around the theme of a contextual landscape analysis using the different methodologies as an organizational framework. First the historical reasearch is presented as a base for analysis in Chapter II. The architectural survey is discussed in Chapter III in order to put in perspective the standing structures on the property. The use of dendrochronology on original historic standing structures is examined in Chapter IV, followed by a chapter devoted to the geophysical survey (Chapter V). The archaeological survey is then presented in Chapter VI including previous excavation and results. The final chapter is devoted to a discussion of the principal conclusions reached from each methodology, the changing landscape over time, and the reasons why landscape change occurred at Tipton-Haynes.

CHAPTER II

HISTORICAL RESEARCH

This chapter covers the history of the Tipton-Haynes site within the context of Tennessee history, drawing upon previous research as well as original documentation. Primary sources of information were obtained locally at the Tipton-Haynes State Historic Site Archives, the Archives of Appalachia, and the Washington County Archives, as well as the Tennessee State Library and Archives, The Tennessee Historical Commission, and the Tennessee Division of Archaeology in Nashville. Within this chapter four main periods of occupation at the site by three different families are discussed, as well as its acquisition by the state. The periods of occupation include the tenancies of Colonel John Tipton, his son John Tipton, Jr., Landon Carter Haynes, the Simerly family, and the State of Tennessee. The research compiled here serves as a foundation for understanding the documented landscape history of the site.

Though this thesis rests within the confines of historical archaeology, it is necessary to mention those without written record in the area. The first people to use the Tipton-Haynes site were Native Americans, in particular during the Archaic and Woodland periods as discovered from previous archaeological excavation (Boyd 1989; Boyd and Riggs 1986, 1990). Archaeological testing near Catbird Creek revealed a basin-shaped pit feature as well as the recovery of a Kirk Corner Notched projectile point, Pigeon Check Stamped ceramics, and Limestone-Tempered Plain ceramics. The site also later fell within Cherokee territory, although no evidence yet exists that suggests it was used for anything other than hunting grounds. These were the people that were encountered when European settlement began in the region.

Although hunters or traders probably entered the East Tennessee area regularly following the early Spanish entradas, the first thoroughly documented account of sustained European encroachment began with the arrival of James Needam and Gabriel Arthur from the east. Setting out from Virginia on a business venture sponsored by Abraham Wood, Needam and Arthur arrived at a Cherokee town across the Allegheny Mountains in July, 1673 (Bergeron et al. 1999:8). Needam then returned to their point of departure at Fort Henry near present-day Petersburg, later being killed on his return journey, while Arthur was left behind in the Cherokee towns to establish trade relations. On their way over the mountain, their route took them through the gap of the Allegheny Mountains between Zionville, North Carolina and Trade, Tennessee by the great buffalo trail up Buffalo Creek and around Buffalo Mountain passing by the bold spring on the Tipton-Haynes tract (Williams 1928:27, 1940:9). Their route then went down the stream called Cherokee Creek to the Nolichucky River thence on to the Overhill Towns (Williams 1940:9).

Other traders and long hunters entered the area following the same buffalo trail including the famous folk hero Daniel Boone who is believed to have set up a base camp at the same "bold" spring as testified by the Taylor Family (Fields 1998:981; Williams 1940:9). The waterfall where Boone is believed to have hidden himself from pursuing Native Americans is located not far from the site. The "Boone" tree stated to have been carved by Boone himself, and reading, "D Boon Cilled a Bar on the tree in the year 1760" was also located a few miles from the site until felled during a storm (Fink 2002:62; Williams 1940:9). Although their stay was brief, these early adventurers foreshadowed the encroachment of more Europeans into the backcountry to exploit its resources.

The first permanent settlement recorded was that of William Bean and a group of relatives and friends from Pittsylvania County, Virginia who settled along the Watauga River at the mouth of Boone's Creek in 1768 (Corlew 1981:43; Williams 1940:9). Bean's son, Russell, is the first recorded Englishman to be born in what would later become Tennessee. Increasing settlement by Euro-Americans continued for the next few years due to a disregard or misinterpretation of the boundaries of North Carolina and Virginia and the Treaty of Lochaber in 1770 which defined boarders between British and the Cherokee lands.

These early settlements were labeled by their tributaries and founders and included the Watauga, Carter's Valley, Nolichucky (Brown's Purchase), and North Holston Settlements (Figure 4). The call for a survey to determine the boundaries of these early settlements in 1771 found all but the North Holston Settlement to be outside of the bounds of North Carolina and

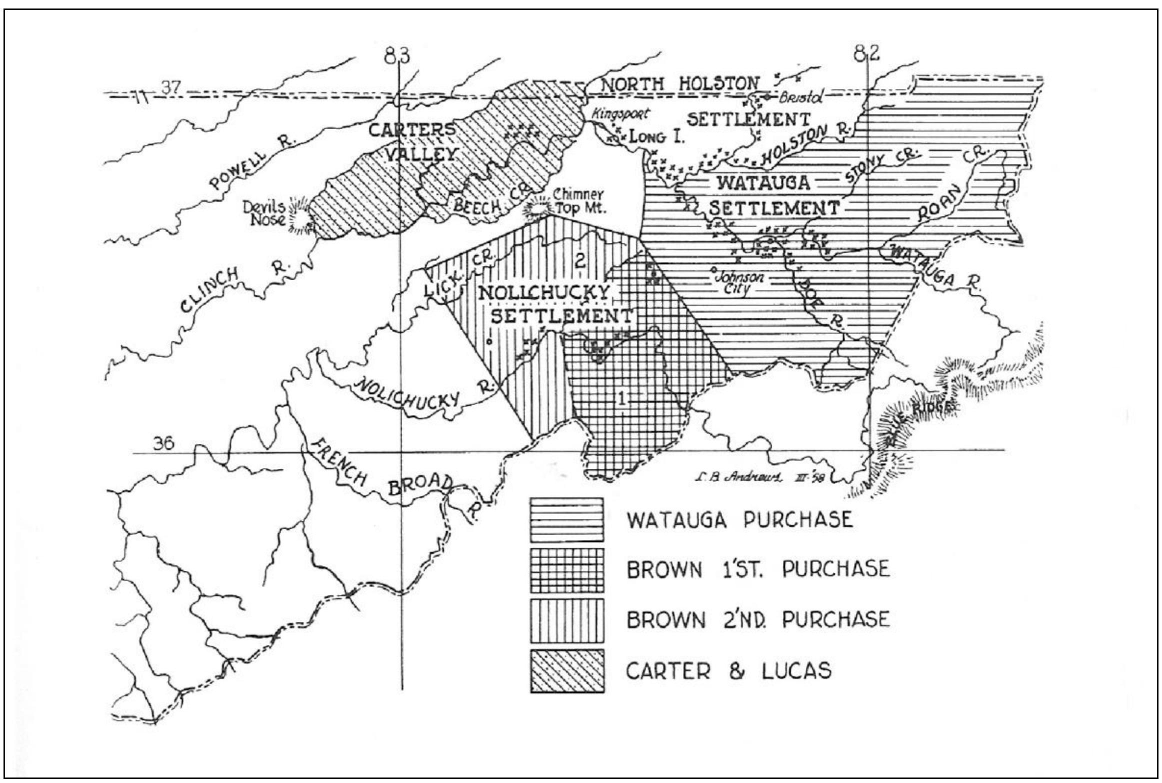

Figure 4. Early Tennessee settlements (Alderman 1986:55).

Virginia and in violation of the treaty (Bergeron et al. 1999:23). These settlements were then forced to fend for themselves on the frontier and soon banded together to form a governing body known as the Watauga Association in 1772. At Sycamore Shoals near present-day Elizabethton, a representative body signed the papers which chartered a vernacular government based on the laws of Virginia. This was the first attempt at free government by Europeans in North America independent of any other state or colony (Alderman 1986:22).

The Wataugans along with private entrepreneurs and land companies continued to treat with the Cherokee and purchase their lands in defiance of the Proclamation of 1763. These purchases were made in the space of a few days at Sycamore Shoals and include the Treaty of Sycamore Shoals, the Watauga Purchase, and Brown’s Purchase. The first indentures to the area where made as part of the Watauga Purchase and include the first documented claim to the Tipton-Haynes property. Jonathan Tipton of Virginia purchased 524 acres of land along Sinking Creek and crossing Little Sinking Creek (a.k.a. Catbird Creek) in 1775 (Keesee 1997:43; Williams 1940:11). His brother Joseph Tipton also purchased land adjacent to the current site as part of this sale (Keesee 1997:63; Williams 1940:11, 13). Though a land title was claimed, no known improvements were made to the property at this time. Between the period of 1775-1776, other deeds to land on Brush and Sinking Creeks were sold to Robert Young, James Denton, Christopher Cummingham, and Charles Roberston (Williams 1940:11).

At this same time, the Watauga Association joined the cause of liberty and sided with their brothers in arms to the east against the British. This action brought retaliation from the Cherokee and created the need for new defenses. Once joining the Revolution, the Wataugans prepared a committee of safety and were organized under the title of Washington District, the first place to be named after General George Washington (Corlew 1981:61). The newly labeled

Washington District then petitioned the independent state of North Carolina for annexation. North Carolina granted the terms of the petition, and elected representatives from the Washington District were allowed to help draft the state's constitution in 1776. The following year the North Carolina legislature officially annexed the Washington District, changing the name to Washington County, and extended its boundaries to include most of present-day Tennessee (Finchum 1959:6). Later this action was severely reduced to present-day upper-east Tennessee with the creation of Sullivan (1779) and Greene (1783) counties.

With the formation of Washington County, a site needed to be selected as the county seat. In 1779, the divide of the Watauga and Nolichucky Rivers was chosen and called Jonesborough, the first town in Tennessee. This planned city brought infrastructure to the area including a courthouse, stores with the finest wares from Philadelphia, taverns, inns, and some of the first churches in Tennessee. Other improvements were also made such as the building of roads and the first charter for a state college. The northern portion of the Buffalo Trail which runs through Tipton-Haynes was chartered as a road at this time running between Robert Young's home on Sinking Creek towards Jonesborough being one of the first roads established by the county and known as the Jonesborough East-West Road (Williams 1940:13). The road was also extended towards Burke County, North Carolina as one of the first interstate roads and was labeled the Morganton Stage Road (Stahl 1986:14; Williams 1940:13).

With the acceptance of Washington County into the state of North Carolina, land purchases made under the auspices of the Watauga Association were nullified. If, however, a homestead had been established, the squatters were able to purchase a total of 640 acres surrounding the site (Bailey 1991:4; Stahl 1986:18, figure 3). Jonathan Tipton's claim to the property was voided. This action indicates that he had not constructed a dwelling on the site.

His land was reclaimed by North Carolina. A total of 778 acres lying between Sinking and Buffalo Creeks was eventually sold to Samuel Henry, a cousin of Patrick Henry, in 1782 (Washington County Deed Book [WCDB] 1:100, 110 [book:page]). Henry then promptly sold 100 acres of his property to Colonel John Tipton, brother of Jonathan and Joseph, in 1784. It is this Tipton who is believed to have constructed a log cabin for his home at the site shortly after the purchase (WCDB 1:301, 3:261).

Colonel John Tipton

Colonel John Tipton (1730-1813) is considered a founding father of the United States and the states of Virginia, North Carolina, and Tennessee. Tipton was a politician, soldier, and farmer who amassed a long list of accomplishments during his life (Table 1). Born in Baltimore County, Maryland in 1730 Tipton moved with his family to what was Fredrick County, Virginia in 1747 where he began his own family and career as a soldier and politician (Lawson 1970:107; Parrish 2008:1). In 1751, shortly after moving to the area, he married Mary Butler and is also known to have purchased 181 acres on the North River of the Shenandoah known as the Seven Bends from Samuel Denton (Massengill 1942:21). The farm was located near the Valley Pike, also known as the Great Wagon Road or East-West Road. While living on the farmstead, Tipton raised a large family. With Mary he had a total of nine children, all males, including: Samuel, Benjamin, Abraham, William, Isaac, Jacob, John, Jr., Thomas, and Jonathan. Each of his sons obtained their own reputations and prominence for military and political service.

During Tipton's years in Virginia, he served many political and military appointments including service as a member of House of Burgesses, a member in the Virginia House of Delegates from 1776 to 1781, and as a delegate from to the Virginia Constitutional Convention

Table 1. Timeline of Col. John Tipton's life including military and political appointments (Taken from Hall and Merritt 1913; Lawson 1970; Massengill 1942; Parrish 2008, 2009; West 1998).

Year	Event
1730	Born Aug 15, 1730 in Baltimore County, Maryland.
1747	Moved with family to the Shenandoah Valley.
1751	Married Mary Butler. Owned 181 acres on the Seven Bends of the Shenandoah.
1772	Served as a Justice of the Peace for Dunmore County.
	Served in due service as a Vestryman of the Anglican Church of Beckford Parish.
	Dunmore County from Fredrick with Woodstock as county seat.
1774	Took first military command as a Captain in Lord Dunmore's War leading his men at the Battle of Point Pleasant.
	Served on a Committee of Safety and Correspondence for Dunmore County which wrote the Woodstock Resolutions.
	Served as a Member of the House of Burgesses.
1775	Organized Militia by Dunmore Committee of Safety and Correspondence. (First Independent Company of Dunmore.)
1776	Wife Mary died in childbirth with son Johnathan.
	Delegate from Dunmore County to the Virginia Constitutional Convention.
	Elected to the Virginia House of Delegates (1776-1781).
1777	Married Martha Denton Moore.
	Served as Justice of the Peace for Shenandoah County.
	Justice of the Courts of the County (1777-1781).
	Dunmore renamed Shenandoah County.
1778	Lieutenant-Colonel of Militia and Sheriff of Shenandoah County.
1779	Commissioners of Shenandoah County.
	Appointed Recruiting Officer for the Virginia Continental Line.
1780	Commissioner of the Provision of Law.
1782	High Sheriff of Shenandoah County (1781-1783).
1783	Moved to Washington County, North Carolina.
1784	Purchased Tipton-Haynes Property.
	Served in the Franklin Conventions of 1784 and 1785.
1785	Served in the Second Franklin Convention.
1786	Elected to the North Carolina State Senate to represent Washington County (1786-1790).
1787	Colonel of Washington County Militia.
	Served as County Court Clerk and Secretary.
1788	Represented Washington County in Constitutional Convention held in Hillsboro, North Carolina.
	Served as Washington County Justice of the Courts and Court Clerk.
	Defeated Sevier at the Battle of the Lost State of Franklin.
1790	Territory South of the Ohio (SW Territory) created.
	Served in House of the Southwest Territory.
1793	Tipton was elected to first Territorial Assembly in 1793 and served through 1794 and 1795.
1794	Wife Martha Died.
1795	One of the Incorporators of Washington College.
1796	Delegate to First Constitutional Convention in Knoxville.
	Elected Senator to 1st and 2nd assemblies (1796-1799).
1799	Retired.
1813	Died.

of 1776 (Hale and Merritt 1913:2599; Lawson 1970:107; Massengill 1942:20; West 1998:980-981). He also served as a Justice of the Courts between 1777 and 1781 for Shenandoah County and was appointed High Sheriff between 1781 and 1783 (Lawson 1970:107; Massengill 1942:20). Tipton also helped draft the Woodstock Resolutions declaring the liberties of Englishmen (*Virginia Gazette* 1774:1-2).

Tipton took his first military command as a Captain in Lord Dunmore's War leading his men at the Battle of Point Pleasant in 1774 (Massengill 1942:20). Tipton was a patriot for the cause of liberty during the Revolution. In 1778, Tipton served as Lieutenant-Colonel of the militia thus acquiring his title as Colonel (Hale and Merritt 1913:2599; Massengill 1942:19). The following year, he was appointed Continental Army Recruiting Officer for the Virginia Continental Line (Parrish 2008:3; West 1998:980).

On the home front, five of Tipton's sons served in the Revolution (Hale and Merritt 1913:2596, 2603; Parrish 2000:8-9). Tipton also suffered tragedy at this time with the death of his wife Mary during childbirth with his ninth son, Jonathan in 1776. The following year he was remarried to Martha Denton Moore who bore him his tenth and final son named Abraham in honor of his fallen brother, killed during an Indian attack near the Falls of the Ohio in 1782 (Hale and Merritt 1913:2606). There is also mention of a daughter believed to have been named Minerva, although no source could determine the statement's authenticity (Hale and Merritt 1913:2602; Massengill 1942:19).

With the ending of the Revolutionary War and the expiration of his office as High Sheriff, Col. Tipton decided to take his family and move to what was at that time Washington County, North Carolina. The last documented account of John Tipton in Virginia consists of

three land transactions in August of 1783, the last of which records the sale of his 181 acres on the North River of the Shenandoah (Massengill 1942:21).

Late in 1783, John Tipton came to the Watauga region with Martha, and a few of his children including John, Jr., Thomas, Jonathan, and Abraham. Tipton followed the Great East-West Road located near his home and traveled by many other settlers to the region. These included German, Scot-Irish, and English immigrants. In fact, all of the residents at the Tipton-Haynes site, including spouses, traced their origins from the Shenandoah Valley prior to moving to the Watauga area.

Tipton, an Englishmen, also followed his brothers to Washington County. Like many others who followed family members when they migrated to the frontier, he probably learned about the land which had previously been theirs during the Watauga years. Aside from his brothers, Tipton's father is also thought to have been brought here by Jonathan (Parrish 2000:4). John Tipton's sons Isaac and Samuel had also come prior to his arrival, with all of his sons eventually migrating to the area (Parrish 2008:8-9). Tipton's in-laws had also moved to the area including the Denton family, who owned property adjacent to Tipton-Haynes (Stahl 1986:18, figure 3). The men that would settle Johnson City were from Shenandoah County, Virginia, such as the Denton's, the Tipton's, the Jobes, and others. There was a decided tendency for relatives and friends to settle near one another (Williams 1940:11).

In 1784, John Tipton purchased a 100 acre tract of land lying between the waters of Buffalo Creek and Sinking Creek in Washington County, North Carolina (WCDB 1:301, 3:261). Other land was also purchased by Col. Tipton at that time near Sycamore Shoals and given to his son Samuel as a wedding gift (Rae 1991:78). After Tipton's purchase along Sinking Creek, he is believed to have constructed a story-and-a-half log cabin for his home at the site. This is thought

to survive as the core of the farmhouse that still stands on the site today. He also is believed to have eventually constructed a springhouse, stillhouse, barn, and stables within the first few years of his occupation at the site. A kitchen, which also could have served as a slave dwelling, is believed to have been constructed in the cabin cellar. Once settled into his new home, Tipton quickly became active in political life and resumed his role as a leader in the community.

At the same time Tipton arrived in Washington County, the area was gearing up for a movement of self-governance independent from North Carolina due to the relinquishment of her western lands. It came to be known as the "Lost State of Franklin" due to its later demise and its lack of surviving original documentation (Figure 5). The statehood movement culminated in a unique event in American history known as the "Battle of the Lost State of Franklin" in 1788 for which Col. Tipton and the Tipton-Haynes site are best known (Draper 1944-1949; Haywood

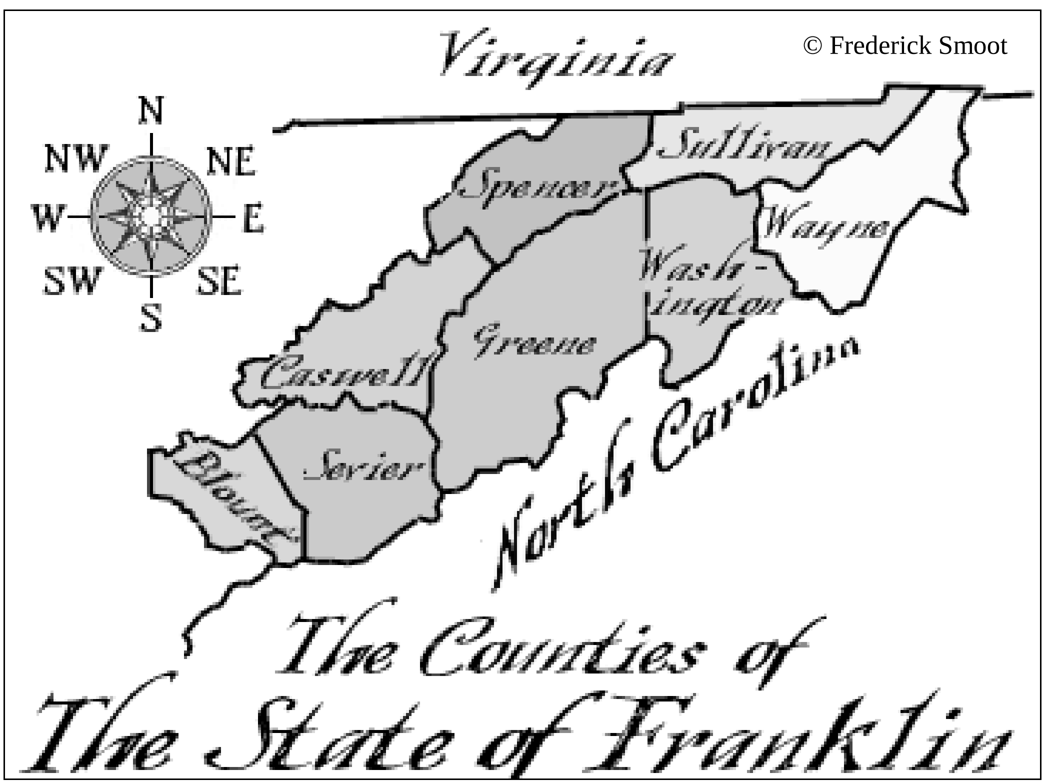

Figure 5. Boundaries of the State of Franklin (TNGenWeb Project 2007).

1823; Williams 1933).

Due to pressure from Congress and the western counties, North Carolina ceded the western territory to the federal government. The Cession Act introduced by William Blount was passed by the North Carolina General Assembly on April 19, 1784 setting its eastern boundary on the Washington County line. The newly formed territory was then able to organize itself independently and proceed to statehood on its own recourse. At this time, John Tipton essentially purchased private property from Samuel Henry in an ungoverned territory although the cession did validate any land claims.

The North Carolina legislature then proceeded to reform the area into the Washington District, creating additional counties and courts (Toomey 1998:338). A confusing situation was created in the west essentially making the new independence movement an act of rebellion in the eyes of North Carolina unbeknownst to the western counties. Unaware of the repeal, the Franklin statehood movement went ahead as planned.

Tipton was initially involved in the Franklin movement attending the First Franklin Constitutional Convention, where he voted against independent statehood (Williams 1933:41). The next month a letter from Governor Martin of North Carolina alerted the Franklinites of the repeal of the Cession Act though they continued on with their cause (Williams 1933:43). He also appealed to John Tipton's loyalty to which Tipton responded, "…both from the zeal I bear to the old State and towards your Excellency … I shall continue to discountenance the lawless proceedings of my neighbors" (Williams 1933:72).

Tipton was again elected as a delegate to representing Washington County at the Second Franklin Convention. Tipton's attendance at this meeting indicates that he was in favor of statehood when North Carolina favored it and legal action permitted it. Constitutional division

created a schism which led to divided factions eventually being led by Tipton and Franklin's governor, John Sevier. This opposition to Franklin and its failure to adopt a more conservative constitution caused a divide that eventually turned into political and personal rivalry between the Franklinites and Tiptonites; especially its leaders John Sevier and John Tipton.

Colonel Tipton kept his allegiance with North Carolina and openly refused obedience to the Franklin government (Haywood 1823:173). He was elected to serve in the North Carolina senate and was also appointed Washington County Court Clerk, but resigned later that August to serve as Secretary of the court (McCown 1964:8-9). Tipton also served as Colonel of the Washington County militia for North Carolina early that same year reaffirming his title as Colonel (Goodspeed 1887:895; Hall and Merritt 1913:2601; Lawson 1970:108; Massengill 1942:19, 24).

In 1788, Tipton returned home to resume his role as Colonel of the county militia and clerk of the court after being deprived of his senate seat. Disorder and anarchy prevailed. Hostilities finally came to a head when Sheriff Pugh was given a writ of execution, or *fieri facia,* against the estate of Governor Sevier for taxes due to North Carolina (Haywood 1823:190; Ramsey 1853:406). The sheriff then seized a number of slaves and livestock from Sevier's home at Mount Pleasant on the Nolichucky River to satisfy the debt (West 1998:981). The slaves, including one named Tobe, as well as Sevier's livestock were then taken to Tipton's home for "safe-keeping" (Haywood 1823:190; Williams 1933:202).

The situation had disintegrated into open hostility with both parties trying to exert their authority over the other. These aggressive measures culminated into the Battle of the Lost State of Franklin at the Tipton's home. This event helped to seal the fate of the failing state and

allowed North Carolina to regain control of her western territory. It is also the reason the Tipton-Haynes site is well known in the region.

On the afternoon of February 27, 1788, Sevier and a force of about 150 men carrying a light artillery piece arrived at Tipton's home along Sinking Creek "with a drum beating, Colours flying, in Military Parade, and in a Hostile Manner" (Fink 1957:210; Haywood 1823:190; Lawson 1970:109; Williams 1933:199). There he set up camp "some 300 or 400 yards from Tipton's house, in a sunken or hollow place, which protected them from annoyance from Tipton's" (Figure 6) (Draper 1944-1949:54; Haywood 1823:190-191).

Tipton had with him a force of 15 men upon Sevier's arrival including his sons Jacob, John, and perhaps Isaac Tipton as well as Robert Love and some men from Greasy Cove (Draper 1944-1949:54; Haywood 1823:191). Others involved would have clearly included Tipton's wife Martha and his younger children Thomas, Jonathan, and Abraham. Tipton's slaves and those taken from Sevier would also have been at the home. It is also possible that other family members of the men held up there were present.

Sevier posted his men and the small piece of ordinance in front of the home and demanded Tipton and his party surrender and submit to the laws of Franklin (Haywood 1823:191). Tipton is said to have given the reply of "fire and be damned" and if "Sevier would surrender himself and his leaders they should all have the benefit of North Carolina's law" (Haywood 1823:191; Williams 1933:200). Upon Tipton's refusal to cooperate, Sevier returned to camp and sent Colonel Conway with a detachment of men to occupy "an eminence near to the spring and stillhouse" east of the house to guard the Old Jonesborough East-West Road (Fink 1957:210). At this time Captain Peter Parkinson, responding to Tipton's call, arrived from the east. The Parkinson party was fired upon, driving them off, killing three horses, and capturing

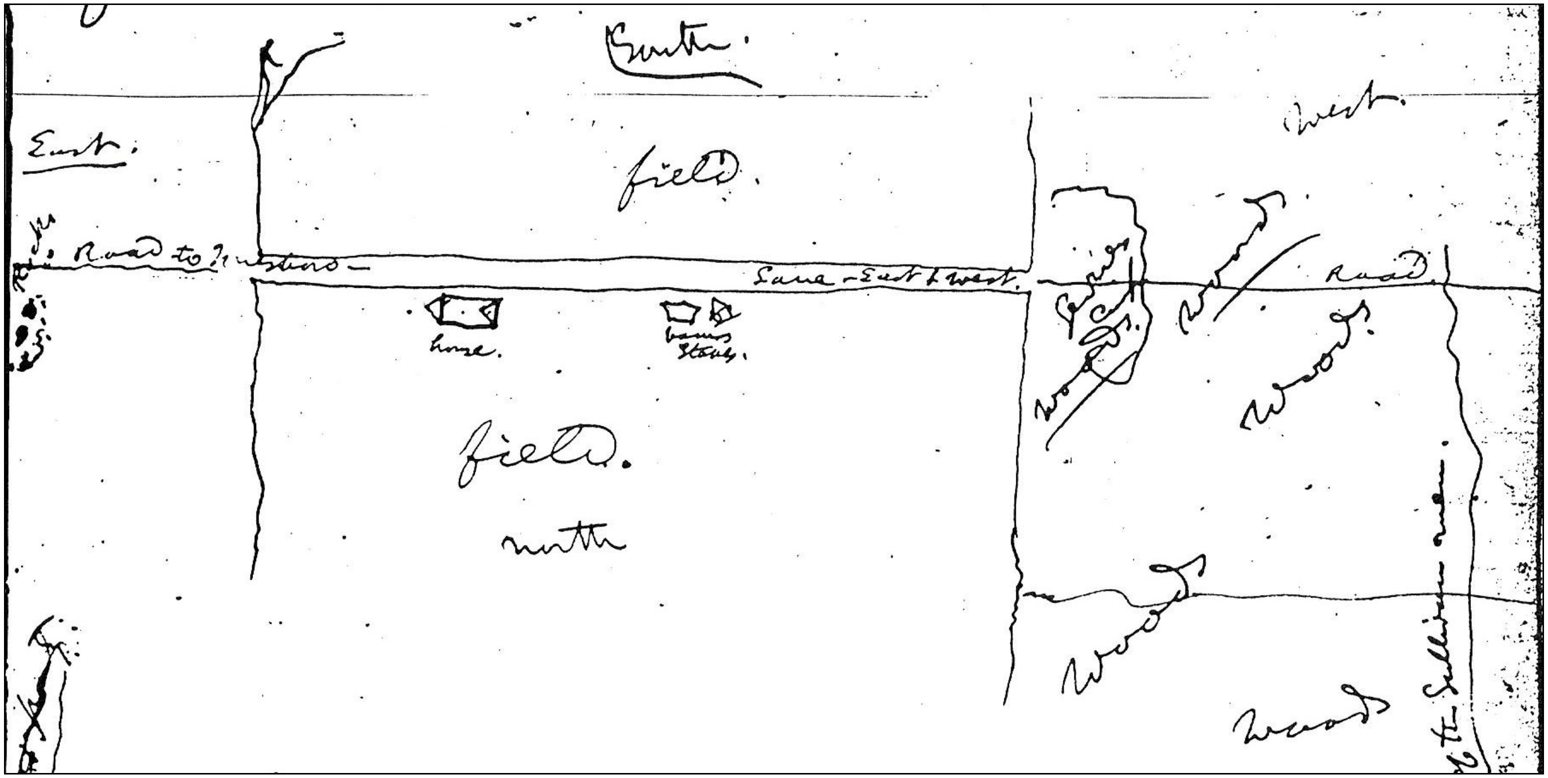

Figure 6. Memory map of Tipton-Sevier Battle (Draper Manuscripts 1944-1949:56).

five (Fink 1989:40; Williams 1933:200). In the ensuing chaos, two young women passing by the stillhouse during the daytime, “probably to see some of their friends,” were also later accidentally fired upon by Conway’s detachment at the limestone rocks, one being wounded in the shoulder (Draper 1944-1949:56; Fink 1957:211; Williams 1933:200). Both parties achieved a standoff and a siege of the home then ensued.

On February 29, 1788, during a blinding snowstorm, Colonels Maxwell and Pemberton arrived with reinforcements from Sullivan County. The Franklin militia was routed and the men made a hasty retreat leaving their artillery piece and other camp equipment behind. Tipton and Maxwell followed in pursuit for about 200 yards “to an eminence not far from their camp which being gained a number of shots were returned on the attacking force” (Williams 1933:202). Tipton halted the advance to regroup allowing the Franklinites to flee towards Jonesborough in the blinding snow (Haywood 1823:193). Shortly thereafter, Robert Young, Jr. returned with a verbal message from Sevier for time to consider terms. Tipton and Maxwell gave Sevier until the 11th of March to submit to the laws of North Carolina (Williams 1933:204). The Franklinite’s siege was raised, allowing Tipton to claim victory. It is known as the only battle John Sevier ever lost (Bailey 1991:6). During the battle, which would more accurately be described as a skirmish, only a few men lost their lives or were wounded.

Some of the most relevant information for the Tipton-Haynes site during John Tipton’s residency was preserved as a result of the battle’s occurrence there giving a wealth of information about the people and the past landscape. Two of the most telling accounts come from Colonel Tipton himself and Colonel Thomas Love who came to aid Tipton during the siege (Draper 1944-1949; Fink 1957:210-211; Lawson 1970:109-110; Appendix I). Tipton, and other men present during the conflict, described the situation that occurred at the home late in

February, 1788 under sworn deposition. Colonel Thomas Love, however, later recounted the story which was documented by Lyman Copeland Draper. His description also contains one of the only surviving historic maps of the property. The memory map created by Draper shows the layout of the property including structures and features associated with the description of the siege and subsequent battle.

Combining this information with data collected from other sources some inferences can be made. As for the people present during the siege, we know Tipton's sons including Jacob, John, and perhaps Isaac Tipton were there with their father (Draper 1944-1949:54; Haywood 1823:191). Others not mentioned in the records would have included Tipton's additional family members including his wife Martha as well as the younger children Thomas, Jonathan, and Abraham. The identity of the women who were shot at while passing by the stillhouse is uncertain but it was noted they were probably friends of the besieged.

Tipton's slaves were present during the siege as well as those taken from Sevier "for safe-keeping." It is also possible that Tipton's slaves at some point watched over Sevier's captured slaves (Bailey 1991:6). It was common to keep prisoners in private homes if no other means were available (Finchum 1959:103). The only mention of Tipton's slaves came after the battle when he gave a negro slave to the needy widow of one of the men killed (Hall and Merritt 1913:2601; Massengill 1942:25). One of Sevier's slaves named Tobe was also mention as having escaped after the siege.

The landscape during this time is also documented including the mention of structures and other cultural and natural features. The best description of Colonel Tipton's home comes from Colonel Thomas Love's account to Draper: "Col. Tipton's house was a large size house, some 25 by 30 feet, hewn logs a story and a half – no windows below – two or three window

holes, round, in each gable and above – a door in front" (Figure 7) (Draper 1944-1949:55). Musket balls are also believed to be imbedded in the logs as a result of the siege (Massengill 1942:28; Williams 1933:20).

Other outbuildings mentioned include a stable and barn located, roughly 150-200 yards by Love's estimate, to the west of the house along the Old Jonesborough East-West Road. Unfortunately, everything to the west of Tipton's cabin is now underneath an adjacent subdivision. A stillhouse is also mention in the east field being the location that the women were shot at from the eminence of rocks.

Other cultural features mentioned included a fence fronting the lane of Tipton's home as well as the altered landscape of cleared fields for agriculture. The position and use of the Old Jonesborough East-West Road is also mentioned. Other natural features included the limestone

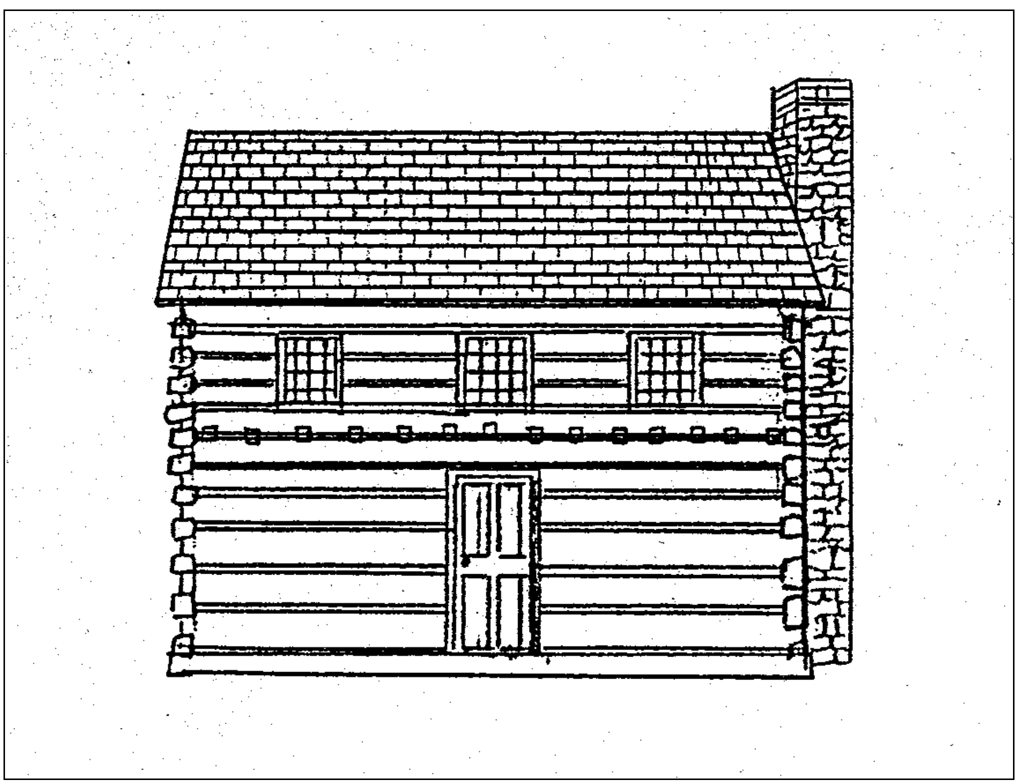

Figure 7. Col. Tipton's Cabin circa 1784 (Bailey 1991).

eminence of rocks as well as the location of the spring believed to be illegible in the memory map (Figure 6).

Tipton, though hampered by his bold actions and personal animosity against Sevier and the State of Franklin, continued his career as a politician. He continued to serve as a clerk of the Washington County Court (Massengill 1942:25). He also served as a delegate to the North Carolina Constitutional Convention held at Hillsboro to ratify the Federal Constitution in 1788. Serving in a Second Convention in November of 1789, Tipton again voted against adoption, but the Constitution was adopted and ratified by North Carolina (Ramsey 1853:431; Williams 1933:245).

After ratification of the Constitution, North Carolina ceded the region west of the Allegany's to the federal government to become part of the Territory South of the River Ohio commonly referred to as the Southwest Territory. Tipton was elected to the unicameral legislature of the Southwest Territory (Lawson 1970:115; West 1998:981). Tipton also served as one of the founding Trustees of the Washington College, formerly Martin Academy, and today known as Washington College Academy (Goodspeed 1972:893; Hall and Merritt 1913:2601; Parrish 2008:7).

In 1794, Tipton suffered hardship again with the passing of his second wife who is buried at the family cemetery. His son Captain Jacob Tipton also fell at St. Clair's Defeat as part of the Northwest Indian War on November 4, 1791 at the age of 26. Tipton County, Tennessee was named in his honor in 1821.

During the Southwest Territory years, Tipton was visited by the renowned botanist Andre Michaux while recording the local flora. His journal shows his particular interest in the rhododendron and azalea of the region (Williams 1940:18). Twice Michaux visited Tipton,

whom he considered a friend. Once on the 14th of May in 1795, “Slept at the House of Colonel Tipton, 20 Miles from Miller’s” (Williams 1928:332). Again on the 20th of March in 1796, “Slept at Colonel Tipton’s 10 miles from Johnsborough” (Williams 1928:342).

Carter County was created from Washington County in March, 1796. Descriptions provided by the survey place the line,

> “…thence the nearest direction to the top of the Buffaloe Mountain, thence along the heights of the said mountain, to the high knob on the fence, near the north end thereof, thence a direct line to the house where Jonathan Tipton, junior, now lives, leaving said house in Washington County, thence a direct line to the south bank of Watauga River, at Jeremiah Dungan’s Ford…” (Tennessee State Library and Archives [TSLA] 2009; Williams 1940:17).

The current boundaries of the county closely follow the same survey provided in the original formation act and thus provides a description of the property boundaries at the time. The property was split into both counties though the home remained in Washington County (TSLA 2009; WCDB 22:177; Williams 1940:17). It is believed that Jonathan Tipton, also known as a junior, resided at the home of his father during Col. Tipton’s years as a state representative.

On June 1st, 1796, Tennessee was admitted as the 16th state into the union. Col. John Tipton was appointed the first Justice of the Peace for Washington County under the State of Tennessee (Williams 1940:16). He also was again was elected to represent Washington County as a state senator. Tipton was elected to the first and second General Assemblies of the State Senate serving between 1796 and 1799 (Lawson 1970:115; Massengill 1942:27; West

1998:981). In the second General Assembly, he served as chair of the Senate Committee on Propositions and Grievances (Speers 2000:23). He then retired after an illustrious career in 1799 to his home below Buffalo Mountain (Hall and Merritt 1913:2602; Lawson 1970:116; Massengill 1942:19; Parrish 2008:7). He there lived the remainder of his life dying on October 8, 1813 and was buried alongside Martha in the family cemetery adjacent to his home. Upon Col. Tipton's death, he willed the estate to his son Abraham Tipton and it eventually passed to John Tipton, Jr. after his death.

Historical Documentation

During his years in Tennessee, Tipton's activities at home are recorded in various documents. Among those include grant and deed records, tax records, and estate sales. A brief overview of his purchases, payments, and land dealings is discussed. This data is then used to conclude with a summary of the household, the enslaved household, and agriculture during the Col. John Tipton years.

Grant and Deed Records

Aside from his original purchase in 1784 along Sinking Creek, Tipton increased his land holdings over the years. Tipton also purchased property near Sycamore Shoals and gave it as a wedding gift to his son, Samuel and his wife Susannah Reneau (Rae 1991:78). Other property was also bought in Greene County (Griffey 2000:304). His other son, John Tipton, Jr., was also deeded 524 acres along the south side of the Watauga River and 640 acres in Carter County in 1806 (Tomlinson 2008; WCDB 8:250). At the Tipton-Haynes site, Col. Tipton is believed to have purchased another 2,350 acres between the period of his arrival in 1784 and 1794 as

evidenced by available deed records (Table 2) (Burgner 1981:21, 30; Byron and Sistler 1998:406-407; Griffey 2000:304; Rae 1991:56; Works Progress Administration [WPA] 1940:358). These purchases are adjacent to other land owners: Casaday [Cassidy], Huds [Hudson], Joseph Denton, and Baptest [Baptist] McNabb. McNabb was an original neighbor of Tipton's listed as adjacent to the original deeded acreage in 1784 (WCDB 1:301, 3:261). Specifically in the year 1787, revision of North Carolina land laws gave him title to 600 acres surrounding his home (Rae 1991:56). Other land sales are also documented (Table 3) (Rae 1991:78; WPA 1940:39, 77, 91, 115).

Tax Records

Tax records during Tipton's life at Tipton-Haynes indicates how many acres he owned, how many individuals were taxable at the home including his slave holdings, and an indication of his livestock holdings (Table 4). By 1787, Tipton had acquired over 2, 000 taxable acres of land, his largest holding (Creekmore 1980:206). By the mid-1790s, Tipton had reduced his holdings to around 1000 acres (McCown et al. 1964:73, 90, 107, 131,148, 167, 183). After retirement, Tipton had severely reduced his land holdings to only about 332 acres which surrounded his home (McCown et al. 1964:244).

People at the residence are recorded as two taxable white polls in 1790, which represents Col. Tipton and possibly his son Jonathan or Abraham (McCown et al. 1964:73). All other white polls are believed to represent Col. Tipton as the single taxable white poll after 1790. Black polls are recorded as fluctuating between one and five individuals between the years 1787-1801 with Tipton's maximum holdings recorded in the years 1796 and 1797 (Table 4).

Tipton was also documented as the owner of one to two studs between the years of 1796

Table 2. Col. John Tipton's land purchases.

Grantee	Grantor	District	County	Acres	Kind Ins	Grant Number	Grant Date	Deed Book	Location	Adjacent Landowners	Source
John Tipton	-	NC District	Green	1000	Grant	18	-	-	Being the E Fork &c	-	Griffey 2000:304
John Tipton	-	NC District	Washington	150	Grant	540	1784	4:348; 5:348; 6:144; 69:118	Beg at a chestnut, Joining Casady and Huds lines.	Casaday, Huds.	Burgner 1981:21; Byron and Sistler 1998:406; Griffey 2000:304
John Tiptain	North Carolina	NC District	Washington	600	Grant	780	1787	1:329-331; 4:403; 64:146	Beg at 3 white oak saplins &c, Joining Joseph Dentons lines.	Joseph Denton, Baptest McNabb	Burgner 1981:30; Byron and Sistler 1998:407; Rae 1991:56; Griffey 2000:304; WPA 1940:358
John Tipton	-	NC District	Washington	600	Grant	760	1787	6:212	-	-	Byron and Sistler 1998:406
John Tipton	-	Eastern District	Eastern District	1000	Grant	202	1794	81:625	On E Fork of Emerys River	-	Griffey 2000:304

Table 3. Col. John Tipton's land sales.

Grantee	Grantor	District	County	Kind Ins	Grant Date	Deed Book	Source
Samuel Tipton	John Tipton	NC District	Washington	Deed	1784	-	Rae 1991: 78
Abraham Cox	John Tipton	SW Territory	Washington	Deed	Feb. 14, 1791	4:151	WPA 1940:77
William Davis	John Tipton	SW Territory	Washington	Deed	May 5, 1793	2:295	WPA 1940:91
John Burras	John Tipton	Tennessee	Washington	Deed	Feb. 26, 1801	1:351	WPA 1940:39
John Tipton, Jr.	John Tipton	Tennessee	Washington	Deed	Feb. 11, 1806	8:250	Tomlinson 2008
John Tipton, Jr.	John Tipton	Tennessee	Carter	Deed	Feb. 11, 1806	8:250	Tomlinson 2008
John Elliot	John Tipton	Tennessee	Washington	Deed	April 9, 1811	12:310	WPA 1940:115

Table 4. Col. John Tipton's list of taxables.

Year	Head of Household	Land	White Polls	Black Polls	Stud	Source
1787	John Tipton	2,015 Acres	-	1	-	Creekmore 1980:206
1790	Colo John Tipton	2013 Acres	2	-	-	McCown et al. 1964:73
1792	Col. John Tipton	1865 Land	0	2	-	McCown et al. 1964:90
1793	Colo John Tipton	999 Land	-	2	-	McCown et al. 1964:107
1794	John Tipton	-	1	-	-	McCown et al. 1964:131
1794	Col. John Tipton	1130 Land	-	3	-	McCown et al. 1964:131
1795	John Tipton	-	1	-	-	McCown et al. 1964:148
1796	Col. John Tipton	947 Land	-	5	1	McCown et al. 1964:167
1797	Col. John Tipton	947 Land	-	5	2	McCown et al. 1964:183
1801	John Tipton Sr.	1 Town Lot	-	-	-	McCown et al. 1964:228
1801	John Tipton	332 Land, $2.00	-	3	1	McCown et al. 1964:244

and 1801 indicating the rearing of horses at his farm (McCown et al. 1964:167, 183, 244).

Estate Sales

Purchase records from estate sales as well as Tipton's settlement of estates document some of the activities that occurred at the Tipton farm as well as some of his slave and livestock holdings. Records indicate that Tipton purchased a number of items from estate sales during the 1790s, which included agricultural goods, livestock, tools, furniture, liquor, and a French Wagon (Table 5) (WPA 1939a). He also purchased enslaved people (WPA 1939a). Estate settlements also document that Col. Tipton settled Jacob Tipton's debt to Peter Parkinson in 1790 just prior to his death (Table 6) (WPA 1939a:1). Tipton also settled debt at this time with payments made to him for "season of two mares", whiskey, and corn giving an indication of his other farming activities (WPA 1939a:2).

Table 5. Col. John Tipton's estate purchase records.

Estate	Date	Item	D C F (Dollars-Cents-Fraction of Cents)	Source
Jacob Tipton's Estate	None Recorded	to Spools	- 3 -	WPA 1938:66
George Little's Estate	Dec 16, 1793	one plow	1 14 6	WPA 1938:356
George Little's Estate	Dec 16, 1793	One mans saddle	4 13 -	WPA 1938:356
George Little's Estate	Dec 16, 1793	One bag flax seed	- 7 -	WPA 1938:356
Samuel Fain's Estate	April 2, 1794	one arm chair	- 9 -	WPA 1938:80
Samuel Fain's Estate	April 2, 1794	Shoemaker Tools	- 8 1	WPA 1938:81
Samuel Fain's Estate	April 2, 1794	One Pitch Fork	- 5 1	WPA 1938:81
Samuel Fain's Estate	April 2, 1794	One Horse	5 - -	WPA 1938:81
Samuel Fain's Estate	April 2, 1794	One French Wagon	- 5 -	WPA 1938:81
Samuel Fain's Estate	April 2, 1794	One cow and calf and heifer	4 3 6	WPA 1938:81
Samuel Fain's Estate	April 2, 1794	One cow creature	1 13 6	WPA 1938:82
Samuel Fain's Estate	April 2, 1794	4 head of cattle	5 8 1	WPA 1938:82
Samuel Fain's Estate	April 2, 1794	Fat Tub	- 12 1	WPA 1938:84
Samuel Fain's Estate	April 2, 1794	One Hogshead	- 3 1	WPA 1938:84
Charles Young's Estate	Nov 1, 1796	to negro man	320 - -	WPA 1938:109
Thomas Young's Estate	1796	to two grindstones	- 12 -	WPA 1938:111
Thomas Young's Estate	1796	to a horse	70 - -	WPA 1938:111
Thomas Young's Estate	1796	to cow and calf	11 - -	WPA 1938:112
Modecai Price's Estate	1796	to Sow and 4 pigs	2 30 -	WPA 1938:130
Modecai Price's Estate	1796	to pig in the pen	2 66 -	WPA 1938:130
Modecai Price's Estate	1796	to one steer	5 26 -	WPA 1938:131
John Little's Estate	Nov 20, 1812	one negroeman Ben	530 - -	WPA 1938:273

Table 6. Col. John Tipton's settlements of estates (Settled May 18, 1796).

Estate	Date	Settlement	L S D (Pounds-Shillings-Pence)	Source
Peter Parkison Estate	Sept. 12, 1790	To cash of Col Tipton on Jacobs acct.	9 10 3	WPA 1939a:1
Peter Parkison Estate	Sept. 12, 1792	By cash balance of Tipton proven acct	3 4 6	WPA 1939a:2
Peter Parkison Estate	Sept. 12, 1792	By cash to Tipton season of 2 mares	2 8 -	WPA 1939a:2
Peter Parkison Estate	Sept. 12, 1792	By cash to Tipton for whiskey 22	- 15 -	WPA 1939a:2
Peter Parkison Estate	Sept. 12, 1792	By cash to Tipton for corn	- 8 -	WPA 1939a:2

Household

The Tipton household was variable and fluctuated due to his political and military appointments, deaths, and age of his sons (Table 7). At his home, Tipton lived with his wife and sons until they were of age to move out on their own. Tipton's wife then died in 1794. It is believed that the latest resident was possibly Jonathan who was listed at the house in 1796 (TSLA 2009). By the time Tipton retired, however, all of his sons were living on their own reducing the household to Col. Tipton and his slaves.

Table 7. Col. John Tipton's household (Taken from Hall and Merritt 1913; Parrish 2008, 2009; and Speer 2000).

Head	Gender	Relation	Date of Birth	Date of Death	At Tipton-Haynes
John Tipton (Colonel)	M	Husband and Father	1730	1813	1784-1813
1st Wife (1751-1776)					
Mary Butler	F	Wife and Mother	1732	1776	Died previous
Children					
Samuel Tipton (State Representative)	M	Son	1752	1833	In Watauga
Benjamin Tipton (Lieutenant)	M	Son	1755	1807	In Watauga
Abraham Tipton (Captain)	M	Son	1758	1781	Died previous
William Tipton (Colonel) "Fighting Billy"	M	Son	1761	1849	Yes, at Battle
Isaac Tipton	M	Son	1763	1827	In Watauga
Jacob Tipton (Captain)	M	Son	1765	1791	In Watauga
John Tipton, Jr. (State Representative)	M	Son	1769	1831	Yes, at Battle
Thomas Tipton	M	Son	1771	1845	Yes, at Battle
Jonathan Tipton (Colonel/Senator)	M	Son	1776	1858	Yes, at Battle
2nd Wife (1777-1794)					
Martha Denton Moore	F	Wife and Mother	About 1740	1794	Yes, at Battle
Children					
Abraham Tipton	M	Son	1781	1820	Yes, at Battle

Enslaved Household

There is little information about the enslaved household at the Tipton farm as recorded in the documentation. The enslaved household at the Tipton farm fluctuated between one and five individuals mainly indicated by tax records (Table 4) (McCown et al. 1964). Tipton probably owned more slaves than those listed in the tax records, for only those slaves who were in a specific age group, usually around 10-50 years, were taxable property (Speer 2000:39).

Prior to Col. Tipton's arrival he is documented as owning four slaves which are thought to have been brought with him to the Watauga country (Wayland 1927:217). The tax list for 1787, however, shows only one individual as belonging to Col. Tipton (Creekmore 1980:206). After the battle at his home, Tipton was attributed with giving a needy widow one of his slaves due to the misfortune he had caused her (Hall and Merritt 1913:2601; Massengill 1942:25). The Tipton slave household then increased to a maximum of five individuals in the late 1790s (McCown et al. 1964:167, 183).

Tipton is also recorded as purchasing two slaves, one "negro man" in 1796, increasing the slave household to its maximum five, and another "negroman Ben" in his late retirement years (Table 8) (WPA 1938:109, 273). This is the only enslaved individual whose name is

Table 8. Col. Tipton's enslaved household.

Year	Number of Slaves	Documentation	Notes	Source
1783	4	Shenandoah County Census	-	Wayland 1927:217
1787	1	Washington County Tax List	-	Creekmore 1980:206
1792	2	Washington County Tax List	-	McCown et al. 1964:90
1793	2	Washington County Tax List	-	McCown et al. 1964:107
1794	3	Washington County Tax List	-	McCown et al. 1964:131
1796	1	Charles Young's Estate sale	John Tipton Senr Dr to negro man $320	WPA 1938:109
1796	5	Washington County Tax List	-	McCown et al. 1964:167
1797	5	Washington County Tax List	-	McCown et al. 1964:183
1801	3	Washington County Tax List	-	McCown et al. 1964:244
1812	1	John Little's Estate sale	John Tipton one negroman Ben $530	WPA 1938:273

known. The slave household, though probably not all related, did share the same conditions and living quarters which are believed to be in the kitchen cellar. One other bit if information claims that Col. Tipton had his favorite female slave buried to his left in the family cemetery (Bailey 1991:8). No other information, however, confirms the existence of slave burials at the family cemetery.

Agriculture

Agricultural production at the Tipton farm is primarily deciphered through estate purchases and settlements (Tables 5 and 6). Production at the farm consisted of spinning and weaving and shoemaking, and fat processing (WPA 1938:66, 81, 84). Records also indicate that livestock and grains were raised on the farm, in addition to flax (WPA 1938:356, 1939a:2). Also related to that endeavor was Tipton's purchase of a plow and pitch fork (WPA 1938:81, 356). Records also show that Tipton was producing whiskey for sale (WPA 1939a:2). The purchase of grindstones and the mentioning of a stillhouse located on his property also alludes to this fact (Draper 1944-1949:56; Fink 1957:211; Williams 1933:200; WPA 1938:111).

Livestock is also recorded with the purchase of a man's saddle, horses, mares, cows, cattle, sows, pigs, and steer (WPA 1938:81, 82, 111, 112, 130, 131, 356). Col. Tipton avidly raised horses. He bred, raised, and raced horses (Lawson 1970:116). "Tipton appreciated fine horses and owned several thoroughbreds, including Diomede which was of the celebrated Diomede imported to Virginia from England" (Lawson 1970:116). Other thoroughbreds he owned included Irish Gray, Paunch, and Don Quixote (Lawson 1970:116). Don Quixote was advertized at stud in the *Knoxville Gazette* February 24, 1808 (Parrish 2008:9). Tipton raced at a

course owned by Henry Massengall during the 1790s even settling a dispute based on the winner of the race (Massengill 1942:21).

After the passing of Col. John Tipton in 1813, it is believed the home and farm, amounting to some 300 acres, was inherited by his youngest son Abraham Tipton (McCown et al. 1964:244; Speers 2000:24). He shortly thereafter obtained a marriage license with Mary "Polly" Boren in February, 1814 (Burgner 1985:10; Speer 2000:24-25; Washington County Court Minutes [WCCM] 1814). A few days later Abraham also asked the court to change the names of his five illegitimate children to Tipton (Speer 2000:25; WCCM 1814). Abraham died early in 1820, leaving 300 acres of land to be divided by his wife and six children (Speer 2000:25; WCCM 1820; WCDB 20:138-140). It is not known whether or not Abraham lived at the residence during those years. Records do not indicate that the property was inhabited until Tipton, Jr's arrival.

Abraham Tipton was in debt at the time of his death and on August 9, 1823 his property was sold to Chana Boren, relation to Abraham's wife, at a sheriff's sale (Speers 2000:25; WCDB 21:242-243). On May 28, 1824, Abraham's older brother, John Tipton, Jr., paid Boren for "demands on the lands of the Heirs of Abram [Abraham] Tipton" (Speer 2000:25; WCDB 21:242-243). John Tipton, Jr. then purchased the "dower right" of Abraham's widow and the land of some of his nephews amounting to 200 acres (Burgner 1987:10-11, 29; Speer 2000:25). Some of the property was then, however, sold to others outside of the family (Speer 2000:25-26; WCDB 20:128).

John Tipton, Junior

John Tipton, Junior (1767-1831) is also a well known Tennessean statesmen serving as a state legislator in the Tennessee General Assembly and in the military like his father. Tipton, Jr. even attained the rank of Colonel like his father during his service in the state militia. He served seven terms in the Tennessee House of Representatives as well as one term in the State Senate between the years 1803-1831 representing six counties in Tennessee (McBride 1975:727).

John, Jr. was born in Frederick County, today Shenandoah County, Virginia in 1767 and lived there with his father until the age of 16 when they relocated to Washington County. After their arrival, Tipton, Jr. is listed on the Washington County voter's list in August, 1786 (Thompson 1993:1424; Tomlinson 2008). During the Franklin years, John Tipton, Jr. is known to have supported his father in the argument against Franklin even getting into a fist fight with John Sevier, Jr. during one of the courts held at William Davis' house (Draper 1944-1949:54). He was also documented as being at the cabin with his father during the Battle of the Lost State of Franklin (Draper 1944-1949:54).

During the years of the Southwest Territory, Tipton, Jr. served as a private in the Washington Militia of the United States between 1791 and 1794 (Clark 2003:109-110; Tomlinson 2008; White 1987). While in service, he also fought with his older brother Jacob, who was killed, at St. Clair's Defeat in 1791 (Parrish 2008:9; Tomlinson 2008).

After serving in the militia, John Tipton, Jr. then returned to Shenandoah County, Virginia where he married his wife, Elizabeth Snapp, on October 28, 1791 (Speer 2000:26; Tomlinson 2008). Elizabeth was born to Lawrence and Margaret Snapp of Shenandoah County and close friends of Col. Tipton, Senior (Parrish 2008:9; Speer 2000:26). Tipton lived in Shenandoah County until September 12, 1797 when he then sold 317 acres to the Warner family

and moved back to the recently formed state of Tennessee (Shenandoah County Deed Book L:433; Tomlinson 2008).

John Tipton, Jr. returned to Tennessee in 1797 moving to Blountville in Sullivan County where he became a wealthy owner of land and slaves (Hall and Merritt 1913:2605; McBride 1975:727; Moore 1947:31; Speer 2000:26; Thompson 1998). Upon returning to Tennessee, Tipton, Jr. once again served in the state militia before beginning his career as a politician. In 1801, after the resignation of John Scott, John Tipton, Jr. achieved the rank of Lieutenant Colonel Commandant of the Sullivan County Militia (Moore 1947:31; Tennessee Civil and Military Commission Book 1:1:175 [volume:book:page]; Tomlinson 2008). During the War of 1812, Tipton, Jr. was also appointed to the Committee of Military Affairs by Governor Willie Blount (Tomlinson 2008).

John Tipton, Jr. then began a lifelong career as a legislator elected to represent Sullivan County in the Tennessee House of Representatives in 1803. He continued to serve in the Tennessee House of Representatives six terms between 1803 and 1815 during the 5th through the 10th General Assemblies representing Sullivan County (Bailey 1991:15; Fields 1998:981; McBride 1975:727; Speer 2000:26). During the 7th General Assembly between 1807 and 1809, he was elected Speaker of the House of Representatives for the State of Tennessee (Hall and Merritt 1913:2605; McBride 1975:727; Speer 2000:26). John Tipton, Jr. also later served one term in the Tennessee State Senate between 1817 and 1819 representing Sullivan and Hawkins Counties during the 12th General Assembly (Fields 1998:981; Lawson 1970:116; McBride 1975:727; Speer 2000:26). During this same session, Tipton, Jr. was elected Lieutenant Governor of the State of Tennessee and served as President of the Senate (Bailey 1991:15).

The Tipton farm was inherited by John's half-brother Abraham at the time of his father's death in 1813 (Speers 2000:24). In 1824, four years after his brother's death, John Tipton, Jr. purchased the "dower right" of Abraham's widow, Mary, and the land of some of his nephew's amounting to 200 acres (Burgner 1987:10-11, 29; Speer 2000:25). Chana Boren, however, retained legal title with John Tipton, Jr. retaining the right of redemption (WCDB 21:242-243, 22:177-178).

After his term in the state senate, Tipton is believed to have moved into the home sometime between 1821 and 1825, possibly even as early as 1819 (Bailey 1991:16; Hall and Merritt 1913:2605; Massengill 1942:22). In 1821, Tipton, Jr. deeded his son-in-law James H. Barnett a lot in Blountsville possibly foreshadowing his departure from Sullivan County (Tomlinson 2008). He was most definitely in residence by 1825 due to his listing as John Tipton of Washington County when deeding 2.5 acres to another son-in-law, Lawrence Snapp of Sullivan County on the 17th of March, 1825 (Tomlinson 2008).

Until John Tipton, Jr.'s arrival on the property very little is known to have changed. He, however, renovated the cabin tearing down the west wall and constructing a new addition. He then finished the second story and placed clapboard siding on the exterior to create a Federal-style home (Figure 8). A front and rear porch was also constructed which ran the length of the house as well as a second-story porch in the rear (Baily1991:21).

John Tipton, Jr. lived there with his family and worked the 300-acre farm with five enslaved laborers, producing a variety of goods and altering the landscape to fit his family's needs. He also continued following his political aspirations running unsuccessfully for election to the United States House of Representatives for Tennessee's 1st District, losing to John Rhea in 1821, and John Blair in 1823, 1825, and 1827 (Speer 2000:26). Never making it to the U.S.

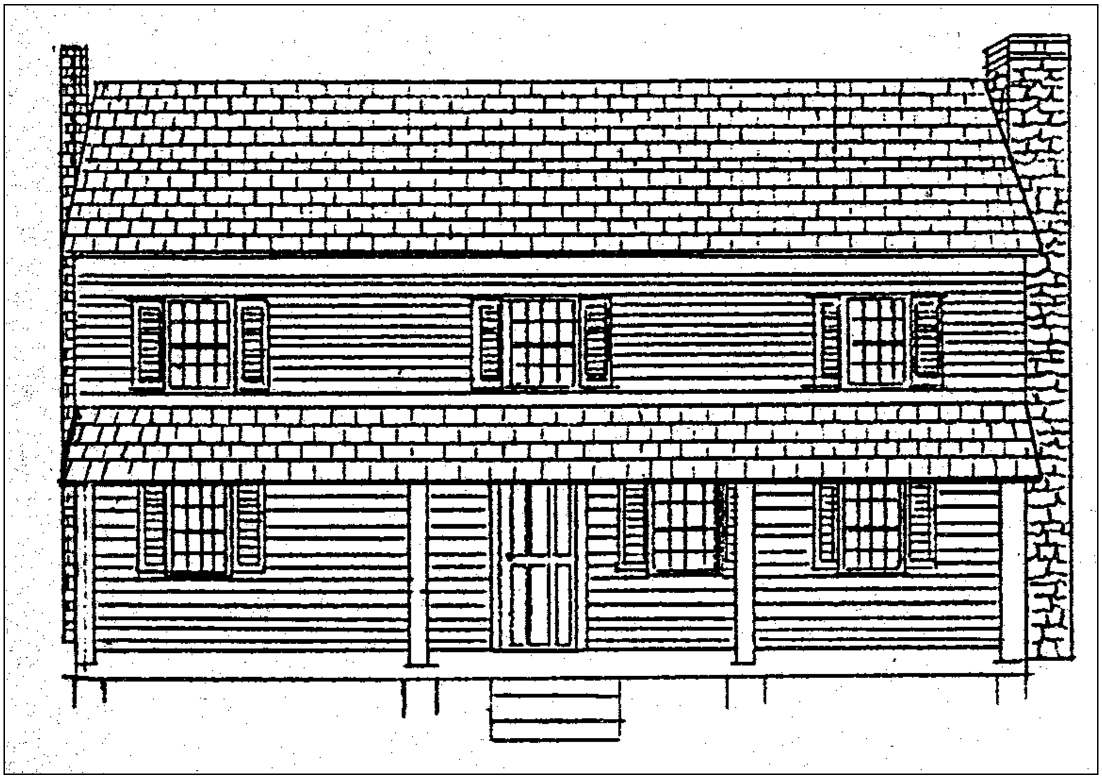

Figure 8. John Tipton, Jr.'s Farmhouse (Bailey 1991).

House, Tipton, Jr. decided to turn again to state politics. Tipton, Jr. was reelected to the Tennessee House of Representatives to represent Washington, Greene, Cocke, and Sevier counties during the 19th General Assembly (1831-1833) (Bailey 1991:15; Hall and Merritt 1913:2605; Lawson 1970:116; Massengill 1942:22; McBride 1975:727; Speer 2000:26). During the first session of the assembly in Nashville, John Tipton, Jr. died on October 8, 1831 and was buried in a state funeral at the Nashville City Cemetery (Bailey 1991:15; Lawson 1970:116; Massengill 1942:22; Speer 2000:26). A monument was also erected by the state legislature at his gravesite in the Nashville City Cemetery (Bailey 1991:15; Parrish 2008:9). In 1895, the 49th Tennessee General Assembly replaced John's original monument with a new larger one that describes a life of service and a man "bold in conception and fearless in execution" (Parrish 2008:9; Tomlinson 2008).

Previous to Tipton, Jr.'s death, his wife, Elizabeth, unfortunately passed before him on July 6, 1829 in Washington County (Speer 2000:27; Thompson 1998:128-129). Elizabeth Tipton's remains are believed to lie in an unmarked grave at the Tipton-Simerly Cemetery (Bailey 1991:19; Speer 2000:27). Also just prior to Tipton, Jr.'s death, he recorded a will on October 3, 1831 leaving the estate to three of his children: Samuel, Elizabeth, and Edna. Specifically, the will states:

> "[I] bequeath my land and premises where I now reside to my three children Samuel P. Tipton, Elizabeth S. Tipton and Edna M. Tipton to be equally divided according to quality and quantity but reserving to Samuel P. the patch where Includes the house and equal privileges as to the water with all. I will that my personal estate be disposed of to the satisfaction of my debts and if anything left then I wish it equally divided among all my children having heretofore given to Abram B. Tipton Margaret V Emelia Manerva P. and Lucinda M all the part of my estate that allotted for them" (Washington County Will Book [WCWB] 1:244).

The will lists several of his children (Samuel P., Elizabeth S., and Edna M. Tipton as well as Abram Butler, Margaret V., Emelia [Emilia], Manerva [Minerva] P., and Lucinda M. Tipton). The will gives the 200 acre estate to his three children Samuel, Elizabeth, and Edna while the others received their portions totaling approximately 100 acres prior to his death (Bailey 1991:18, 31; WCWB 1:244). Tipton, Jr. was practicing rural parsimony, a common trait among upland south farmers, by giving his son Samuel the house lot and dividing the farm into smaller lots among his other children.

Historical Documentation

During his years in Tennessee, John Tipton, Jr.'s actions at home are recorded in various documents. Among these are census records, deed records, tax records, estate sales, and estate settlements. An overview of his purchases, payments, and land dealings is discussed and then used to conclude with a summary of the household, the enslaved household, and agriculture during John Tipton, Jr.'s years at Tipton-Haynes.

Census Records

John Tipton, Jr. is listed in the 1830 census as a white male between the ages of 60 and 70 with four other family members (Table 9). Previous census records for Washington County are unavailable. The census does not list Elizabeth since it was recorded after her passing. The four other family members listed are probably two of his children and two of his grandchildren or another white male is married to one of the females thus making it two children and one grandchild. Tipton, Jr.'s slaves are listed as well showing a possible family unit with two adults, a son, and two daughters under the age of ten.

Table 9. 1830 Federal Census (United States Bureau of the Census [USBC] 1830).

Name	Count	Description
Col. John Tipton (Jr.)	1	White Male 15 to 20
	1	White Male 60 to 70
	1	White Female 10 to 15
	1	White Female 20 to 30
	1	White Female 30 to 40
Slaves	1	Black Male Under 10
	1	Black Male 24 to 36
	2	Black Female Under 10
	1	Black Female 10 to 24

Deed Records

Upon returning to Tennessee, John Tipton, Jr. was deeded 600 acres by his father-in-law Lawrence Snapp in the heart of Blountville (Table 10) (Sullivan County Deed Book [SCDB] 3:402-403; Thompson 1993:1424; Tomlinson 2008). Other deed records indicate that he purchased another 410 acres in Sullivan County increasing his land holdings there to about 1000 acres (Table 11) (Tomlinson 2008). He kept portions of the Sullivan estate well into the final years of his life, selling off portions of the town lot to family members (SCDB 10:473; Tomlinson 2008). Aside from indirectly inheriting the Tipton farm from his father, deed records indicate that John Tipton, Jr. also received 524 acres along the south side of the Watauga River and 640 acres in Carter County in 1806 from his father (Tomlinson 2008; WCDB 8:250).

Tax Records

Tax records prior to John Tipton, Jr.'s tenancy at Tipton-Haynes indicate that he owned about 1,050 acres of land and was the owner of four slaves and one stud (Table 12) (Speer 2000:39; Tomlinson 2008).

Estate Sales

Purchase records and estate settlement records document some of the personal belongings, livestock holdings, farm activities, as well as work performed for Tipton, Jr. Purchases made at Daniel Bayle's estate sale in 1827 document Tipton, Jr. as buying numerous items for home and the farm (Table 13). In particular, fire dogs, a fire shovel, a pitcher, as well as a bed and furniture were purchased for the home. Farm items bought included 17 sheep, horse riding gear, 7 meal bags, and a cockle sieve for milling wheat.

Table 10. John Tipton, Jr.'s land purchases.

Grantee	Grantor	District	County	Acres	Kind Ins	Grant Date	Deed	Location	Price	Source
John Tipton, Jr.	Lawrence Snapp	Tennessee	Sullivan	600	Deed	Sept. 13, 1798	SCDB 3:402-403	Blountville	$4000	Thompson 1993:1424; Tomlinson 2008
John Tipton, Jr.	John Tipton, Sr.	Tennessee	Washington	524	Deed	Feb. 11, 1806	WCDB 8:250	South side of Watauga	$50	Tomlinson 2008
John Tipton, Jr.	John Tipton, Sr.	Tennessee	Carter	640	Deed	Feb. 11, 1806	WCDB 8:250	-	$51	Tomlinson 2008
John Tipton, Jr.	William Armstrong	Tennessee	Sullivan	200	Deed	Oct. 9, 1811	-	-	-	Tomlinson 2008
John Tipton, Jr.	Thomas Goddard	Tennessee	Sullivan	210	Deed	Sept. 2, 1816	-	-	-	Tomlinson 2008

Table 11. John Tipton, Jr.'s land sales.

Grantee	Grantor	District	County	Acres	Kind Ins	Grant Date	Deed	Price	Location	Source
Lawrence Snapp	John Tipton, Jr.	Tennessee	Sullivan	2.5	Deed	March 17, 1825	-	-	-	Tomlinson 2008
Jacob Snapp and John Shave	John Tipton, Jr.	Tennessee	Sullivan	½ Acre	Deed	March 25, 1829	-	$150	-	Tomlinson 2008
Magdaline Snapp	John Tipton, Jr.	Tennessee	Sullivan	½ Acre	Deed	May 20, 1829	SCDB 10:473	$50	Blountville	Tomlinson 2008

Table 12. John Tipton, Jr.'s list of taxables for 1811-1812.

Year	Head of Household	Land	White Polls	Black Polls	Stud	Source
1811- 1812	John Tipton (Jr.)	1,046 Acres	-	4	1	Speer 2000:39; Tomlinson 2008

Table 13. John Tipton, Jr.'s estate purchase records.

Estate	Date	Item	D C (Dollars-Cents)	Source
Daniel Bayle's Estate	Jan. 1827	4 Sheep First Choice	6 –	WPA 1939b:26
Daniel Bayle's Estate	Jan. 1827	4 2nd Choice Sheep	6 01	WPA 1939b:26
Daniel Bayle's Estate	Jan. 1827	4 3rd Choice Sheep	5 61	WPA 1939b:26
Daniel Bayle's Estate	Jan. 1827	5 Last Choice Sheep	6 36	WPA 1939b:26
Daniel Bayle's Estate	Jan. 1827	Gears Pr.	5 10	WPA 1939b:26
Daniel Bayle's Estate	Jan. 1827	3 Meal Bags	– 81	WPA 1939b:28
Daniel Bayle's Estate	Jan. 1827	Fire Shovel	1 –	WPA 1939b:28
Daniel Bayle's Estate	Jan. 1827	Fire Dogs	2 13	WPA 1939b:29
Daniel Bayle's Estate	Jan. 1827	Pitcher	– 10	WPA 1939b:29
Daniel Bayle's Estate	Jan. 1827	Cockle Sieve	1 50	WPA 1939b:29
Daniel Bayle's Estate	Jan. 1827	4 Bags	– 51	WPA 1939b:29
Daniel Bayle's Estate	Jan. 1827	Bed and Furniture	22 –	WPA 1939b:29

After John Tipton, Jr.'s death in 1831, his personal property was sold at an estate sale held August 18, 1832 (Table 14) (Washington County Inventory Book [WCIB] 1:143-146; WPA 1939b:89-91). Numerous household and agricultural items were sold with purchasers including mainly family members and friends. Household items included personal objects, kitchen-related, furniture, fireplace-related, and sundry articles (Table 15). Nine delft plates are also recorded but are thought to actually be referring to common refined earthenwares of the time.

Table 14. John Tipton, Jr.'s settlement of estate (Settled August 18, 1832) (WCIB 1:143-146; WPA 1939b:89-91).

Purchaser	Item	D C (Dollars-Cents)
Samuel Tipton	1 Corner Cupboard	500
Samuel Tipton	9 Delf Plate	37 ½
Enda Tipton	2 Dishes and Four Cups and Saucers	12 ½
Elizabeth Tipton	Sundry Articles	12 ½
Elizabeth Tipton	Sundry Articles	6 ¼
Elizabeth Tipton	Sundry Articles	6 ¼
James P. Taylor	Sundry Articles	25
Edna Tipton	1 Table	50
Elizabeth Tipton	1 Table	12 ½
Samuel Tipton	1 Large Table	50
Edna Tipton	1 Desk	25
Samuel Tipton	1 Looking Glass	12 ½

Table 14. John Tipton, Jr.'s settlement of estate (Settled August 18, 1832) (WCIB 1:143-146; WPA 1939b:89-91) (Continued).

Purchaser	Item	D C (Dollars-Cents)
Samuel Tipton	1 Book Case and Books	6 ¼
Emeline Young	1 Pair Fire Dogs	6 ¼
Jonathan Pugh	2 Books	200
William Young	1 Pair of Steelyards	62 ½
Jonathan Kelly	1 Heckle	142
William Young	1 Reel	6 ¼
Elizabeth Tipton	1 Water Bucket	25
Samuel Tipton	1 Wheat Sieve	26
James Roberson	1 Hand Saw	75
Edna Tipton	1 Bible	6 ½
Samuel Tipton	1 Table	50
Samuel Tipton	2 Tables	00 ¼
William Young	1 Pair of Fire Dogs	72 ½
Elizabeth Tipton	1 Oven and Kettle	75
Samuel Tipton	1 Churn	3
William Young	1 Pot and Skillet	6 ¼
Elizabeth Tipton	1 Pot and 1 Skillet	6 ¼
Jonathan Pugh	Sundry Articles	25
Samuel Tipton	2 Hoes and 1 Shovel	6/14
James Barnes	1 Half Bushel and Other Things	66
Samuel Tipton	1 Oven and 1 Pot	3
James Barnes	1 Pair of Hames and Chains Collar	175
Edna Tipton	1 Bed, Bedstead and Furniture	50
Samuel Tipton	1 Bed, Bedstead and Furniture	50
William Young	1 Bed, Bedstead and Furniture	100
Elizabeth Tipton	1 Bed, Bedstead and Furniture	100
James P. Taylor	1 Pair of Fire Dogs	500
William Young	1 Large Kettle	50
James Robinson	1 Large Kettle	100
James Hughes	1 Grind Stone	450
Joshua Swanger	1 Log Chain	225
John Ryland	1 Small Chain	37 ½
Samuel Tipton	1 Pair of Horse Gears	6 ½
James Casasda	1 Pair of Horse Gears	2 6 ½
James P. Taylor	2 Breech Bands	275
Samuel Hunt	1 Set of Harrow Teeth	200
John Stephens	1 Plough	395
John Ryland	1 Plough	116
James P. Taylor	1 Axe	6 ¼
Samuel Tipton	1 Barrel	6 ¼
Robert Casada, Jr.	1 Windmill	8 12 ½
Jonathan Kelly	1 Dung Fork	58
Samuel Tipton	1 Large Trough	25
James Robinson	3 Hogsheads	35

Table 14. John Tipton, Jr.'s settlement of estate (Settled August 18, 1832) (WCIB 1:143-146; WPA 1939b:89-91) (Continued).

Purchaser	Item	D C (Dollars-Cents)
Samuel Tipton	1 Sow and Pigs	100
John Stevens	5 Heads of Hogs 1st Choice	551
Elizabeth Tipton	2 Heads of Hogs 2nd Choice	100
John Stevens	6 Heads of Hogs 3rd Choice	550
William Young	1 Loom and Tackling	38
Elizabeth Tipton	1 Wool Wheel	12 ½
Elizabeth Tipton	1 Sow and Pigs	100
James Barnes	1 Shovel Mole and Skillet	01
James Harvey	5 Heads of Sheep 1st Choice	3 6 ¼
James Harvey	5 Heads of Sheep 2nd Choice	300
James Harvey	5 Heads of Sheep 3rd Choice	231 ¼
James Harvey	5 Heads of Sheep 4th Choice	190 ½
Elizabeth Tipton	3 Heads of Geese	3
James Barnes	1 Pair of Stretchers and Shovel	36
James P. Taylor	1 Clock and Case	1325
James W. Young	1 Side Board	2600
Samuel Hunt	1 Set of Silver Spoons	1800
James P. Taylor	1 Pair of Scales and Weights	50
Jonathan Right	1 Set of Windsor Chairs	50
Samuel Tipton	1 Set of Split Bottom Chairs	6 ¼
James Barnes	1 Man's Saddle	3 18 ¾
Samuel Tipton	1 Felling Axe	26
Elizabeth Tipton	The Whole Rent Grain of Wheat and Oats	50
Samuel Tipton	1 Pair of Stretchers	26
Samuel Tipton	1 Bottle	25

Table 15. Household items sold at John Tipton, Jr.'s estate sale.

Personal	Kitchen	Furniture	Other
1 Looking Glass	9 Delft Plates	1 Corner Cupboard	3 Pairs of Fire Dogs
2 Books	2 Dishes and Four Cups and Saucers	1 Side Board	Sundry Articles
1 Bible	2 Ovens	5 Tables	
1 Clock and Case	2 Pots	1 Large Table	
Books	3 Skillets	1 Desk	
	2 Large Kettles	1 Book Case and Books	
	1 Kettle	4 Bed, Bedstead and Furniture	
	1 Set of Silver Spoons	1 Set of Windsor Chairs	
	1 Bottle	1 Set of Split Bottom Chairs	

Agricultural and related production items included livestock, grain, tools, equine hardware, spinning and weaving hardware, production hardware, and various other farm items including liquor (Table 16).

Other types of inventory can be seen attached to the estate sale with debts owed to John Tipton, Jr. for shoe and boot making as well as house joiners and cabinet maker's tools acquired from Joseph Wyatt (Table 17).

David Sellers served as an administrator of John Tipton, Jr.'s estate after his death. On January 16, 1836, debts owed to Tipton, Jr. and monies made during the estate sale were paid to Samuel amounting to $91.98 plus an additional $51.90 owed to the estate with David receiving $25 of it for his trouble (Tables 18 and 19) (WPA 1939a:179-180). Of particular interest were payments made for "the hire of Bob a Slave" by Larry Snapp, and the debt owed to Emmerson "for printing" (WPA 1939a:179-180).

Table 16. Agricultural and production items sold at John Tipton, Jr.'s estate sale.

Livestock	Grain	Tools	Equine Hardware	Spinning and Weaving Hardware	Production	Other
2 Sow and Pigs	1 Half Bushel and Other Things	1 Axe	2 Pairs of Horse Gears	1 Loom and Tackling	1 Pair of Scales and Weights	1 Water Bucket
13 Heads of Hogs	The Whole Rent Grain of Wheat and Oats	1 Felling Axe	1 Man's Saddle	1 Wool Wheel	1 Pair of Steelyards (Balance Weight)	1 Large Trough
20 Heads of Sheep		1 Hand Saw	1 Pair of Hames, Collar, and Chains	1 Hackle Comb	1 Churn	1 Barrel
3 Heads of Geese		2 Hoes	2 Breech Bands	1 Spinning Reel	1 Wheat Sieve	3 Hogsheads
		2 Shovels		2 Pairs of Loom Stretchers	1 Windmill	
		1 Shovel Mole			1 Grind Stone	
		1 Dung Fork				
		1 Log Chain				
		2 Ploughs				
		1 Set of Harrow Teeth				

Table 17. John Tipton, Jr.'s settlement of estate (August 18, 1832) (WCIB 1:143-146; WPA 1939b:89-91).

Debtor	Item or Service	Amount Due	Date Due
B. Grady	Shoe and Boot Making	$80.00	Sept. 28, 1817
James Landon	-	$7.50	Jan. 11, 1814
James Landon	Discharged in Work at Cash Price	$70.00	Dec. 21, 1813
James Landon	-	$25.00	Nov. 30, 1810
Henry Newton	-	$177.92	Feb. 23, 1822
Joseph Wyatt	Discharged in House Joiner Work on Tipton's Farm	$42.12	May 1, 1829
Joseph Wyatt	Bill of Sale for One Lot of House Joiners and Cabinet Maker Tools all his Household and Kitchen Furniture to have and to hold until the above note is satisfied.	Owed to Tipton, Jr.	-

Table 18. John Tipton, Jr.'s settlement of estate with David Sellers serving as administrator (Money owed to estate) (Settled January 16, 1836) (WPA 1939a:179).

Money Paid by	Settlement	D C F (Dollars-Cents-Fraction of Cents)
-	Sale as Returned in Inventory.	$142.36 ¾
Saml Hunt	Redemption Money.	$54.52
Larry Snapp	For the hire of Bob a Slave.	$40.00
James H. Jones	For a Camp.	$7.00
Darling Jones	-	$0.75
Moor Land	-	$0.25
Thomas King	Receipt.	$29.25

Table 19. John Tipton, Jr.'s settlement of estate with David Sellers serving as administrator (Money paid by estate) (Settled January 16, 1836) (WPA 1939a:179).

Money Owed (Credited) to	Settlement	D C F (Dollars-Cents-Fraction of Cents)
Samuel Tipton	Credit.	$91.98
-	Costs paid at Sundry Times.	$17.25
James Sevier	Receipt.	$12.00
W. R. Dunlany	2 Receipts.	$7.00
John Ryland	Receipt.	$5.00
James V. Anderson	Receipt.	$5.00
Saml Greer	Receipt.	$0.87 1/2
James Melvin	Receipt.	$1.25
Emmerson	For Printing.	$1.50
John Parker	Receipt.	$2.00
Abraham Sellers	Receipt.	$2.00
Saml Hunt	Receipt.	$27.88

Household

John Tipton, Jr.'s household was made up of Tipton, his wife Elizabeth, and their children (Table 20). The names are listed in his will, estate sales, and various other sources and included two sons and nine daughters of unknown age except Abram born in 1794. Census records for 1830 show four individuals at the home besides Tipton, Jr. (Table 9). These included a white male 15 to 20, a white female 10 to 15, a white female 20 to 30, and a white female 20 to 30. The four other family members listed are probably two of his children and two of his grandchildren or another white male is married to one of the females thus making it two children and one grandchild.

Table 20. John Tipton, Jr.'s household (Taken from Tomlinson 2008; WCIB 1:143-146; WPA 1939b:89-91).

Head	Gender	Relation	Date of Birth	Date of Death
John Tipton, Junior (Colonel)	M	Husband and Father	1767	1831
Wife (1791-1829)				
Elizabeth Snapp Tipton	F	Wife and Mother	1771	1829
Children				
Abram Butler Tipton	M	Son	1794	1865
Samuel P. Tipton	M	Son		
Elizabeth S. (Betsy) Tipton	F	Daughter		
Edna M. Tipton	F	Daughter		
Margaret V. Tipton	F	Daughter		
Emelia (Emilia) Tipton	F	Daughter		
Manerva (Minerva) Tipton	F	Daughter		
Lucinda M. Tipton	F	Daughter		
Louisa R. Tipton	F	Daughter		
Eula Tipton	F	Daughter		
Emily Tipton	F	Daughter		

Enslaved Household

The enslaved household at Tipton, Jr.'s farm is documented in census, deed, and estate settlement records (Table 21). Prior to moving into his father's home, Tipton, Jr. is documented

Table 21. Documents relating to John Tipton, Jr.'s enslaved household.

Year	Number of Slaves	Source	Notes	Source
1811-1812	4	Sullivan County Tax Lists	-	Speer 2000:39; Tomlinson 2008
-	1	Washington County Settlement of Estates	Larry Snapp paid $40.00 for the hire of Bob a Slave.	WPA 1939a:179
1828	1	Washington County Deed Book	Sold Meriah, a slave girl about seven years old to David Pugh for $175.	Speer 2000:39-40; Tomlinson 2008; WCDB 18:358-359
1829	1	Washington County Deed Book	Gave Female Slave Child (about three months old) to his daughter Elizabeth Tipton.	Speer 2000:40; WCDB 19:268-269
1830	5	1830 Federal Census	One black male under 10, one black male 24 to 36, two black females under 10, and one black female 10 to 24.	USBC 1830
1831	4	Washington County Deed Book	Gave family to Greenway and Jones merchants including James, about 41, his wife Polley, about 30, and their two children Lewis and Martha.	Speer 2000:40; WCDB 19:219-220

as owning four slaves in the Sullivan County tax lists for 1811-1812 (Speer 2000:39; Tomlinson 2008). After moving to Washington County, Tipton's slaves are not mentioned until near his death when he began selling some of his slaves. In 1828, Tipton, Jr. sold Meriah, a slave girl about seven years old, for $175 to David Pugh (Speer 2000: 39-40; WCDB 18:358-359). Again the next year he gave a newborn female slave child (about three months old) to his daughter Elizabeth (Speer 2000:40; WCDB 19:268-269).

The 1830 Census lists John Tipton, Jr. as owning five slaves (Table 9) (USBC 1830). These include one black male under 10, one black male 24 to 36, two black females under 10, and one black female 10 to 24. This is a possible family unit with two adults, a son, and two daughters under the age of 10. In 1831, Tipton, Jr. conveyed a slave family to Greenway and Jones, Jonesborough merchants which Tipton was indebted (Speer 2000:40; WCDB 19:219-220). Those listed in the transfer included James, about 41, his wife Polley, about 30, described as "slaves for life," and their two children Lewis and Martha (Speer 2000:40; WCDB 19:219-220). These are believed to be the slaves listed in the 1830 census. Ages for the enslaved are thought to be estimated accounting for the slight discrepancy. The only other documented

account relating to Tipton, Jr.'s slaves comes from the settlement of his estate in 1836 (Table 18). Larry Snapp is recorded as hiring Bob, a slave, for $40 (WPA 1939a:179).

Agriculture

Agricultural production on Tipton, Jr.'s farm was recorded in estate settlements and purchase records (Tables 13 and 14). Livestock on the farm at the time of his death included 20 sheep, 13 hogs, two sow and pigs, and three heads of geese (WCIB 1:143-146; WPA 1939b:89-91). Seventeen sheep had been purchased in 1827 (WPA 1939b:26). Other livestock would have included horses. Tipton, Jr., like his father, loved race horses (Parrish 2008:9). Some of Tipton's possessions included equine hardware in the form of two pairs of horse riding or work gear, a saddle, breech bands, as well as a pair of hames, collar, and chains for work horses (WCIB 1:143-146; WPA 1939b:89-91). Tipton, Jr., also purchased a pair of horse gears in 1827 (WPA 1939b:26). Other items related to livestock included a dung fork, a large trough and water bucket, as well as the purchase of seven meal bags (WCIB 1:143-146; WPA 1939b:26, 89-91).

Grain production on the farm continued into Tipton, Jr.'s tenancy. Types of grains consisted of wheat and oats which were given to Elizabeth Tipton (WCIB 1: 145; WPA 1939b:90). Other evidence points towards Tipton also continuing to produce whiskey thereby indicating the possible production of corn and/or barley. A half bushel of grain was also sold to James Barnes (WCIB 1:144; WPA 1939b:90). The presence of three hogsheads and hoes could also possibly indicate that tobacco was cultivated at the farm. However, hogsheads could be referring to barrels of liquor.

Evidence of wheat cultivation is also apparent through his purchase of a cockle sieve or wheat sieve, as later described at his estate sale. Used for the milling of flour or grist, the sieve

also was accompanied by the sale of a grindstone and windmill. These items point towards the production of flour for food or grist for whiskey. It is probably that Tipton, Jr. continued to utilize the stillhouse built by his father as evidenced by the sale of three hogsheads and one barrel when settling his estate. It is also possible that a cistern was present on site and the windmill was used for pumping water as opposed to turning the grindstone (Bailey 1991:72).

Tools related to farming sold at Tipton, Jr.'s estate sale including clearing, planting, and measuring tools. Clearing tools mentioned include axes, a hand saw, and a log chain. Planting tools include hoes, shovels, two ploughs, and a set of harrow teeth. Measuring tools included a pair of scales and weights and a pair of steelyards, a type of balance weight.

Production on the farm diversified and expanded during Tipton, Jr.'s tenancy. Flour or grist production, liquor production, spinning and weaving, as well as joiner and cabinet making were some of the activities taking place at the farm. Shoes and boots are also listed as being produced by Tipton, Jr. prior to his move to Washington County (WCIB 1:146; WPA 1939b:91).

Spinning and weaving were also taking place at Tipton, Jr.'s farm. Numerous items including a loom and tackling, two pairs of loom stretchers, a wool wheel, a hackle comb, and a spinning reel were sold to settle the estate. The presence of sheep also points to the use of their wool for sewing.

Other types of production interpreted from the documentary record include butter-making and woodworking. Butter manufacturing is known to have taken place due to the sale of a butter churn also indicating that Tipton probably had dairy cows. Woodworking in the form of joiner work and cabinet making are also believed to have been a type of production seen at the farm. Listed at his estate sale are house joiner and cabinet maker tools acquired from Joseph Wyatt.

On February 28, 1837, Tipton, Jr.'s heirs sold their portion of the estate, about 200 acres, situated in Washington and Carter Counties for $1050 to David Heines [Haines], a wealthy farmer and land owner (Bailey 1991:31; Speer 2000:27; WCDB 22:177-178). With these funds, the Tipton's redeemed not only their portion of the estate from Chana Boren but acted as Heines agents for the purchase of additional tracts amounting to 100 acres (Bailey 1991:31). Two years later in 1839, David Heines [Haines] conveyed the property, between 233 and 257 ½ acres, including the dwelling house and other outbuildings to his son Landon Carter Heines (later changed to Haynes in the 1840s) as a wedding gift (Bailey 1991:31; Bellamy 1952:5; Speer 2000:27; Tomlinson 2008).

Landon Carter Haynes

Landon Carter Haynes (1816-1875) is well known as a Tennessee Senator and later Confederate Senator for the State of Tennessee. He was also a farmer, minister, a lawyer, and newspaper editor who is remembered for his feud with William Brownlow (Fields1998:981; Lawson 1970:118-119; Stahl 1986:43). During his political career, he was known for his speaking skills and described as the "Silver-Tongued Orator of the South" and the "Cicero of America" (Bellamy 1952:76-78; Toncray 1987:67). He also promoted the growth of rail lines and was influential enough to actually bring the line through Johnson's Depot, later Johnson City. During the time of the Civil War, the area was also named Haynesville in his honor.

Landon Carter Haynes was born in Elizabethton, Tennessee on December 2, 1816. He was named after Landon Carter, the namesake of Carter County (Speer 2000:27; Toncray 1987:66). He was the first born of 12 children to David and Rhoda Taylor Haynes of Carter County (Bellamy 1952:5; Toncray 1987:66). David Haynes, also known as "King David", was

one of the largest farmers, slaveowners, and landowners in Carter and Washington Counties (Cooper et al. 1993:8; Toncray 1987:66). David's father was George Heines, of German descent, who in the 1750s moved to Winchester, Virginia near the Tipton's and later to Buffalo Creek during the Southwest Territory years (Cooper et al. 1993:8; Lawson 1970:117). In 1843, the spelling of the family name was changed from Heines to Haynes (Bailey 1991:320).

Before moving to the Tipton-Haynes site, Landon attended Washington College (Bellamy 1952:9; Lawson 1970:117; Speer 2000:28; Toncray 1987:66). He graduated in 1838 and the next year began studying law under Thomas Amis Rogers Nelson in Elizabeth who was serving as state's attorney for the First Congressional District (Bailey 1991:31; Bellamy 1952:10; Stahl 1986:43; Toncray 1987:66). In 1840, Nelson moved his office to Jonesborough were Haynes continued to study law and was admitted to the bar that same year (Bellamy 1952:10-11; Speer 2000:28; Stahl 1986:43; Toncray1987:66). Growing up Landon was said to give orations to those on his father's farm (Toncray 1987:66).

Following his father's purchase of Tipton's land in 1837, Landon Carter Haynes married Eleanor Margaretta Powell, daughter of a prosperous Shenandoah Valley family who moved to Elizabethton, on March 26, 1839 (Bailey 1991:31; Speer 2000:28). A majority of the Tipton farm amounting to around 250 acres including the Federal-style dwelling house and other outbuildings was then given to Landon as a wedding gift from his father (Bailey 1991:31; Bellamy 1952:5; Speer 2000:27; Tomlinson 2008). The farm at that time contained outbuildings and established gardens, grain fields, and pastures (Cooper et al. 1993:16). No record of the conveyance has been found to date (Bailey 1991:32; Speer 2000:27).

At his new home, Landon raised a family with Eleanor having a total of six children. He is also known to have renovated the house at some point later in his residence. The site

Figure 9. Landon C. Haynes' Greek-Revival Farmhouse.

underwent dramatic change again shifting with the changing styles of architecture. This time Haynes created a Greek-Revival house adding a portico and ell as well as constructing a law office adjacent to the house in the same style (Figures 9 and 10). Although it continued to serve as a political domicile, it was changed from a farmhouse to the country home of a prominent couple (Bailey 1991:43). The interior of the house also resembled the elegance of the exterior and was furnished in the Victorian Louis XVI Revival, Hepplewhite, and Sheraton styles (Bailey 1991:48).

Other improvements were made including the construction of more outbuildings. Production on the farm, focused primarily on livestock and grain, continued with the help of a total of three enslaved workers. After moving into his new home, Haynes continued to study law with Thomas A. R. Nelson in his new office at Jonesborough and was admitted to the bar in 1840

Figure 10. Landon C. Haynes' Law Office.

(Bellamy 1952:10-11; Speer 2000:28; Stahl 1986:43; Toncray 1987:66). Haynes also served as a minister for a short time. In 1842, Haynes converted to Methodism at a camp meeting in Jonesborough (Speer 2000:30). Shortly thereafter, Haynes' oratorical powers were put to use when he became a licensed minister at a quarterly conference of the Jonesborough circuit (Speer 2000:30). Haynes was later removed from the ministry for slander and falsehood, but remained a member of the Methodist church (Bellamy 1952:22-23; Speer 2000:31).

Haynes first employment was as an editor and journalist (Lawson 1970:118; Toncray 1987:66). In 1840, Haynes became the editor of the strongly Democratic *Tennessee Sentinel* at Jonesborough (Speer 2000:31; Toncray 1987:66-67). Haynes edited the paper until it was sold by Gifford in 1846 (Speer 2000:31; Toncray 1987:67).

During his years as editor, Landon C. Haynes was well known for his feud with William Gannaway Brownlow which was reminiscent of the Tipton-Sevier dispute. William Brownlow was editor of another paper, the [*Jonesborough*] *Whig*, also known as Brownlow's Whig, which began in Elizabethton in 1838 as the *Tennessee Whig* and moved to Jonesborough in 1839 (Conklin 1998:98). The two newspapers waged bitter political and personal warfare with both parties viciously attacking the other and culminating in an altercation between Haynes and Brownlow in which the latter was shot (Goodspeed 1887:899). Brownlow would eventually move his newspaper to Knoxville after the political campaign of 1849 (Conklin 1998:98; Goodspeed 1887:899). Brownlow and Haynes would remain powerful political figures and continue to dislike each other throughout the remainder of their lives.

In 1844, Haynes decided to enter the politic arena as a Democratic candidate for presidential elector in the first congressional district (Toncray 1987:67). Following the political leanings of the *Tennessee Sentinel* newspaper, Haynes served as an elector for James K. Polk (Toncray 1987:67). This was the period before direct election of presidents, when the process was to vote for members of the Electoral College (Cooper et al. 1993:18). The following year Haynes considered opposing the incumbent, Andrew Johnson, for election to the United States House of Representatives; but instead, he decided to run for a seat in the state legislature (Bellamy 1952:33-34). Landon was then elected to the Tennessee General Assembly serving three terms between 1845 and 1851 (Fields 1998:981; Toncray 1987:66). During those years Haynes was elected to the Tennessee House of Representatives, then to the Tennessee Senate, and then again to the House, serving in this last session as speaker (Cooper et al. 1993:18).

Between 1845 and 1847 Haynes represented the counties of Washington, Greene, and Hawkins in the lower house of the 26th General Assembly (Bailey 1991:32; Speer 2000:32;

Toncray 1987:67). Haynes again decided to oppose Johnson in 1847 for a seat in the United States House, but late in the campaign he withdrew to seek election in the upper house of the legislature (Bellamy 1952:38). In 1847, Haynes was elected to state legislature to represent Johnson, Carter, Sullivan, and Washington in the Senate of the 27th General Assembly serving until 1849 (Bailey 1991:32; Toncray 1987:67). Haynes also campaigned for election as a Democratic presidential elector in 1848 for Lewis Cass (Speer 2000:36; Toncray 1987:67). In 1849, state Democrats considered him a gubernatorial candidate; however, William Trousdale was nominated (Bellamy 1952:43-44; Speer 2000:36; Stow 2004:3). That year Haynes was again elected to the Tennessee House of Representatives during the 28th General Assembly representing Washington, Greene, and Hawkins until 1851 (Bailey 1991:33; Speer 2000:36; Toncray 1987:67). During this session on October 1, 1849, Haynes was elected Speaker of the House (Toncray 1987:67). This marked the pinnacle of Landon Carter Haynes' career as a state legislator.

During his time as a state legislator, Haynes is probably best known as a promoter of railroads. The establishment of adequate railroad transportation was one of his aims both politically and as a private citizen (Toncray 1987:66). Haynes fought for state aid and promoted railroads in order to increase economic development in the region. At an internal improvements meeting, Haynes supported a bill calling for the construction of a railroad between the Holston and Nolichucky Rivers (Speer 2000:34). In probably his most notable action involving railroads, Haynes sponsored a bill during the 26th General Assembly (1845-1847) to incorporate the East Tennessee and Virginia Railroad Company (then East Tennessee, Virginia, and Georgia, then Southern, and today Norfolk Southern Railway) (Speer 2000:34). The company was chartered to construct a railroad from Knoxville to Bristol connecting it with Lynchburg, Virginia. Then next

session, while Haynes was serving as Senator, the charter was approved with the line being completed in 1858 (Bailey 1991:32; Stahl 1986:147).

After serving in the state legislature, Haynes continued his support for railroads. Upon his arrival home he served on a committee which convinced the people of Washington County to buy bonds for the East Tennessee and Virginia Railroad (Bailey 1991:33). Haynes also fought in subsequent years for state subsidies and loans to supplement the private investment that was funding the project (Cooper et al. 1993:20). He also continued his political career by serving on a national committee assigned to select the route that would connect the Atlantic and Pacific Oceans by rail (Bailey 1991:33).

With his service in the state house soon to end, Haynes again ran for a seat in the United States House against his rival Andrew Johnson in 1850 (Bellamy 1952:49; Toncray 1987:67). Johnson had represented the 1st congressional district since 1843 (Speer 2000:37). The campaign was described as "intensely bitter and personal, the rival candidates accusing each other of every dishonorable act they had ever committed, or had been charged with committing" (Speer 2000:37; Temple 1912:378). In the toughest campaign of his political career, Johnson defeated Haynes by 1,653 votes (Bellamy 1952:51; Speer 2000:37).

In 1851, after losing the election and his term expired, Haynes retired from politics for the next eight years (Lawson 1970:118; Toncray 1987:67). While at home, Haynes devoted his time to his law practice (Lawson 1970:118). Haynes' license to practice law in Washington County was certified December 1, 1851 (Speer 2000:37; WCCM 1851). Haynes is reputed to be the first lawyer of present-day Johnson City and the first to have constructed a free-standing law office which he built by his home (Lawson 1970:118; Williams 1940:20). Haynes also practiced law from Elizabethton to Knoxville (Toncray 1987:67).

In 1859, Landon Haynes left political retirement with aspirations on Washington, D.C. (Lawson 1970:119). This time he ran for a seat in the United States Congress against his old law instructor Thomas A. R. Nelson, a pro-Unionist Whig candidate (Bellamy 1952:51; Speer 2000:37; Toncray 1987:67). Haynes was nominated on the 20th of April at a Democratic convention in Greeneville (Bellamy 1952:52; Speer 2000:37). A major debate during the campaign was the issue of state's rights. However, as opposed to his previous campaign for a federal position, the political debate this time was polite and courteous. In a close race, Haynes ended up losing the race by only 90 votes (Bellamy 1952:53-57; Speer 2000:37; Toncray 1987:67).

The area surrounding the Haynes home was known as the Brush Creek District from around 1830 until about 1850, named after the creek that runs through what is now downtown Johnson City (Williams 1940:20-21). The community was later also known as Green Meadows, then Blue Plum in 1849, named after the homes of former Post Masters (Johnson City Planning Department 2004:9; Williams 1940:20-21).

Improvements to the community included the construction of the East Tennessee and Virginia Railroad which Haynes had a hand in developing. Chartered in 1849, the East Tennessee and Virginia Railroad Company opened subscription books in 1850 and began construction of the line in 1855 (Williams 1940:21). Construction of the railroad was done in two sections with one phase of the construction beginning at Bristol and the other at Knoxville. The line between Bristol and Johnson City was completed in 1857 with the line between Knoxville and Johnson City being completed the following year (Fink 1989:63; Stahl 1986:33). With the coming of the railroad, the area surrounding Haynes' home began to flourish.

In 1854, Henry Johnson, namesake of Johnson City, purchased from Abraham Jobe a half-acre of land along the stage road where the railroad was to be constructed (Williams 1940:20). In 1856, Landon Carter Haynes helped to finance a store at the intersection of the stage roads for Henry Johnson (Bailey 1991:33; Johnson City Planning Department 2004:9). At the site of his store, Henry Johnson also built a tank, depot, post office, and residence (Stahl 1986:33). Several others stores and residences were built prior to the Civil War (Stahl 1986:33).

In the beginning, the village came to be known as Johnson's Tank because trains stopped to take on water for the steam engines; later it became known as Johnson's Depot because trains stopped to load and unload passengers and freight (Stahl 1986:33). The railroad purchased the store from Johnson for the right-of-way and by late 1857 a settlement had begun to thrive around the railroad (Johnson City Planning Department 2004:9). In 1858, with the railroad between Knoxville and the Bristol completed, the volume of farm products exported from the region, and goods imported, grew markedly with its connection to the Shenandoah Valley (Cooper et al. 1993:20; Stahl 1986:147). Later in 1859, the area was known as Haynesville in honor of Landon C. Haynes for his promotion of, and investment in, the railroad (Stahl 1986:33-34; Johnson City Planning Department 2004:9; Williams 1940:23). After the war, the village again became Johnson's Depot, named for Henry Johnson (Stahl 1986:34). The city later received its first charter from the State of Tennessee on December 1, 1869 as Johnson City (Williams 1940:24).

In 1860, Haynes continued his political career campaigning again as a Democratic presidential elector for John C. Breckinridge (Toncray 1987:67). However, the result was the election of Abraham Lincoln for president which spurred on the American Civil War. The bombing of Fort Sumter occurred on April 12, 1861 (Speer 2000:37). On June 8, voters declared

independence, and Tennessee formally joined the Confederacy on July 22, 1861 (Speer 2000:37).

Although his party and his state were for the Confederacy, a majority of East Tennessee supported the union (Stahl 1986:43). The planters of Middle and West Tennessee were hardily in favor of supporting the cause of the Confederacy due to their dependency on the system of slavery. In 1850, eight percent of the population in East Tennessee was comprised of slaves as opposed to 40 percent of the population in West Tennessee (Cooper et al. 1993:19; Dykeman 1975:80). This difference in economy and politics led more than 30,000 men of the 45,000 eligible for military service in East Tennessee to volunteer for the Union army (Stahl 1986:33).

Haynes remained a staunch pro-southern Democrat who believed that Tennessee should cooperate with the South even if war was inevitable (Toncray 1987:66). His state's rights position and the broad base support of which he gained campaigning propelled him into the Senate of the Confederate States of America (Bailey 1991:34). On October 24, 1861, the state legislature elected Landon C. Haynes and Gustavus A. Henry to represent Tennessee in the Confederate Senate (Bellamy 1952:64; Speer 2000:37; Toncray 1987:67).

Haynes took his seat as Senator in the 1st Congress of the Confederate States of America in 1862. He was appointed to Confederate Congressional committees for the Judiciary, Patents, Post Offices and Post Roads, Printing, Enrollment and Engrossment, and in the second Congress Commerce (Bailey 1991:34; Toncray 1987:67). As part of his duties as Congressman, Haynes toured battlefields in Tennessee and reported on them to President Davis sending recommendations for improving conditions (Toncray 1987:67).

During the war, Haynes continued to hold his position as senator and remained in Richmond (Stahl 1986:43; Toncray 1987:67). Haynes' family relocated during this time due to

safety concerns. Between 1860 and the end of the war, the Haynes family alternated their residency between Haynesville, Knoxville, and Cornot, a villiage outside Wytheville, Virginia (Bailey 1991:35). After federal authorities took control of the area, the Haynes farm was seized and remained in federal control until the end of the war (Bailey 1991:35).

After the war, Senator Haynes was arrested for treason at his home in Statesville, North Carolina and was held there by federal authorities (Bailey 1991:35). While in prison, his sister, Emmaline Taylor, went to President Andrew Johnson to appeal for his release (Cooper et al. 1993:19; Stahl 1986:43). Haynes was freed from arrest and pardoned by 1867.

Haynes also received his property back upon being released from prison (Bailey 1991:54). It was not until after his release that he became aware the Chancery Court at Jonesboro had auctioned his estate on May 12, 1865 to John R. Branner, President of the East Tennessee and Virginia Railroad (Bailey 1991:35; WCDB 40:498-499). He was conveyed 250 acres lying near the dividing line of Washington and Carter Counties for $400, paid on July 1, 1865 (WCDB 40:498-499). On November 27, 1867, Robert W. Haynes of Shelby County repurchased the estate on behalf of his father amounting to 250 acres for $489 (Bailey 1991:35; WCDB 40:499). Landon Haynes, however, never went back to live at the site (Lawson 1970:120).

The state of the home at this time is mentioned in the Minute Books of the Chancery Court of Jonesborough on November 24, 1869 in a suit against Landon C. Haynes stating,

> "and it appearing to the Chancellor from the report of the C&M that the roof of the dwelling house upon the tract of land attached in these causes, requires to be repaired or received for the protection of the said house from injury and decay" (Bailey 1991:54-55).

Haynes had abandoned the estate and the courts again auctioned the property upon the request of Haynes' creditors (Bailey 1991:54). After the Civil War, poor whites frequently moved into the homes of former aristocracy (Bailey 1991:54). On February 25, 1871, the Tennessee Chancery courts auctioned the property to John White of Washington County (WCDB 48:531-532). The next year, Haynes' niece, Sarah L. Simerly, acquired the estate from John White (WCDB 48:533-534).

After the war, anti-confederate sentiment persuaded the Haynes family to relocate to Memphis. Here Confederate sympathy was strong and Haynes continued to practice law (Speer 2000:37; Toncray 1987:67). Again in 1872, Haynes campaigned for Congress only to be defeated (Stow 2004:3; Toncray 1987:67). He still, however, listed his old home in Johnson City as his legal residence (Bailey 1991:54).

Historical Documentation

Some of the best historical data come from the period of Haynes' occupation of the farm. During his family's time at the site, activities are recorded in various documents including census records, deed records, tax records, and historic images. A discussion of the historic records including the historic imagery, tax lists, deeds, and census data are used to conclude with a summary of the household, the enslaved household, and agriculture during Landon C. Haynes' occupation of the site.

Woodcut

One of the most telling pieces of information comes in the form of a woodcut published in a Harper's New Monthly Magazine article entitled "A Winter in the South" (Figure 11)

(*a*) Federal farmhouse, (*b*) possible kitchen addition, (*c*) smokehouse, (*d*) slave quarter, (*e*) barn, (*f*) corn crib, (*g*) pig sty.

Figure 11. "Tipton's House" circa 1856 with labeled structures (Adapted from Strother 1857:723).

(Strother 1857:721-740). This was the third paper in a series of papers published on the stories of a set of travelers exploring the South. Carved in 1856 and published in 1857 by David Hunter Strother, the image shows the house and grounds as renovated by John Tipton, Jr. and Landon C. Haynes (Baratte 1970:126; Strother 1857:723). The house is shown as renovated to the Federal style by Tipton, Jr. with porches running the length of the front and back prior to Haynes' Greek-Revival alterations. Other outbuildings are shown including what has been interpreted as a possible kitchen behind the house, the smokehouse, a slave quarter, the barn, pig sty, and corn crib. The image also shows a split-rail fence running the length of the Buffalo Trace and sheep in the foreground.

Portraits

At about the same time the woodcut was published, the affluent David Haynes commissioned portrait painter Samuel M. Shaver to paint his family. Samuel M. Shaver was a renowned portrait artist gaining the title of, "East Tennessee's standard portraitist" (Stow 2004:2). Shaver was from Sullivan County and began painting in the 1830s in Washington and Carter Counties (Price 1952:950; Stow 2004:2). After the death of his wife in 1856, he lived in Rogersville, eventually moving to Knoxville around 1860, where he opened a studio and became a member of the East Tennessee Art Association (Stow 2004:2).

Shaver painted the portraits of David, Rhoda Taylor, Landon Carter, and Eleanor Powell Haynes. The portraits of Landon and his wife Eleanor were drawn at the Tipton-Haynes home in either 1857 or 1858 (Figures 12 and 13) (Price 1952:95; Smithsonian Institution Research Information System [SIRIS] 2009a, 2009b). Haynes is shown standing in his law office while Elizabeth is shown sitting in front of the portico at their home.

Figure 12. Portrait of Landon C. Haynes painted by Samuel M. Shaver circa 1857-1858.

Figure 13. Portrait of Eleanor Powell Haynes painted by Samuel M. Shaver circa 1857-1858.

At the same time, Shaver painted the portraits of his father David and mother Rhoda Haynes circa 1857 (Price 1952:101). The Taylors, Eleanor's family, in Carter County were also painted by Shaver in the late 1850s (Stow 2004:2). Eleanor's portrait has been previously dated to 1862. This date is erroneous since all other portraits were completed at the same time, the Haynes home is clearly visible in the portrait, and the Haynes family was not present at the house during the Civil War (Price 1952:101; SIRIS 2009b). Other portraits completed by Shaver include those of Andrew Johnson and John Branner. Another portrait was also done of Landon's sister Margaret "Peggy" Haynes (Price 1952:101).

The four Haynes portraits hung in the home of Landon Carter and Eleanor Powell Haynes in Washington County (Stow 2004:1). Well after the Civil War, Roberta Haynes, step daughter of Margaret "Peggy" Haynes and granddaughter of David and Rhoda Haynes, acquired the portraits (Price 1952:95). She donated the portraits to Rocky Mount in 1962 (Stow 2004:1). In 2003, the portraits were given to the Tipton-Haynes Historical Association (Stow 2004:1).

The dates of the woodcut published by Strother (1857) and the portraits drawn by Shaver places the renovation of the Haynes home at 1857 to 1858 (SIRIS 2009a, 2009b). The house is shown in a Federal style in the woodcut, created between 1856 and 1857, and the portraits were completed sometime between 1857 and 1858 thereby definitely placing the construction of the Greek-Revival home and law office to that time frame.

Census Records

Census records are available throughout the Haynes family's occupation of the site. In 1840, Landon, his wife, and three other people are shown to be living at his home (Table 22) (USBC 1840). These are probably family members, including a possible married couple and an

Table 22. 1840 Federal Census (USBC 1840).

Name	Count	Description
Landon Haynes	2	White Male 20 to 30
	2	White Female 15 to 20
	1	White Female 50 to 60
Slaves	1	Black Male Under 10
	1	Black Male 10 to 24
Other	2	Employed in Agriculture
	1	Employed in Manufacturing and Trade

older female 50 to 60 years of age. Landon is also listed as being employed in manufacturing and trade. Two other family members are employed in agriculture. Two male slaves were also recorded.

By the 1850s, the Haynes household grew to include his sons Robert W., Joseph E., and Landon C. Haynes, Jr., and his two daughters Ann H. and Mary A. Haynes (Table 23) (USBC 1850a). Landon is listed as a farmer by trade. His two oldest sons Robert and Joseph are listed as having attended school within the year.

In 1860, the Haynes family once again grew with the addition of Landon's last son David H. Haynes (Table 24). Haynes' occupation is listed as a lawyer with a valued real estate of $9,600 and a valued personal estate of $1,545 (USBC 1860a). Three of his oldest children also had attended school within a year including Ann Helen Haynes. Joseph, however, is listed as a

Table 23. 1850 Federal Census (USBC 1850a).

Name	Occupation	Age	Sex	Place of Birth	Attended School within Year
Landon C. Haynes	Farmer	33	Male	Tennessee	-
Eleanor M. Haynes	-	29	Female	Tennessee	-
Robb Haynes	-	9	Male	Tennessee	Yes
Joe Haynes	-	7	Male	Tennessee	Yes
Ann H. Haynes	-	6	Female	Tennessee	-
Mary A. Haynes	-	3	Female	Tennessee	-
Landon Haynes	-	8/12	Male	Tennessee	-

Table 24. 1860 Federal Census (USBC 1860a).

Name	Age	Sex	Color	Occupation	Value of Real Estate	Value of Personal Estate	Place of Birth	Attended School within Year
Landon C. Haynes	44	Male	White	Lawyer	9600	1545	Tenn	-
Ellenor M. Haynes	40	Female	White	Domestic	-	-	Tenn	-
Robert W. Haynes	19	Male	White	Student	-	-	Tenn	Yes
Joseph E. Haynes	17	Male	White	Farmer	-	-	Tenn	Yes
Ann Helen Haynes	15	Female	White	Student	-	-	Tenn	Yes
Mary A. Haynes	12	Female	White	-	-	-	Tenn	-
Landon C. Haynes	11	Male	White	-	-	-	Tenn	-
David H. Haynes	9	Male	White	-	-	-	Tenn	-
Charlotte Haynes	60	Female	Black	-	-	-	Tenn	-
George Haynes	35	Male	Mulatto	-	-	-	Tenn	-
Cornelia Haynes	9	Female	Mulatto	-	-	-	Tenn	-

farmer and probably helped to work his father's farm. Haynes' slaves are also documented in the census which lists a family unit comprised of Charlotte, George, and Cornelia Haynes.

Deed and Tax Records

On February 28, 1837, Tipton, Jr.'s heirs conveyed their interest in the 200-acre Tipton farm to David Haynes for $1050 (Bailey 1991:31; Speer 2000:27; WCDB 22:177-178). Landon Haynes is then believed to have acquired the property from his father as a wedding gift in 1838, although no record of the conveyance has been found (Bailey 1991:31-32; Bellamy 1952:5; Speer 2000:27). David Haynes is still shown as legal owner and is recorded as paying taxes on 233 acres of land in Washington County in 1840 (Table 25) (Speer 200:27; Watauga Association of Genealogists 1975a:17). When the additional 33 acres was purchased is not known (Speer 2000:27). It is also apparent that Landon Haynes was legal owner of the estate by 1842, when he sold some of his property to Lawson Gifford, his current business partner, future neighbor, and brother-in-law (Table 26) (WPA 1940:137). It is also possible that the land was given to him, rather than sold, as part of a wedding gift since Lawson married his sister Mary Taylor Haynes

Table 25. Landon C. Haynes' tax records (Speer 200:27; Watauga Association of Genealogists 1975a:17).

Year	Head of Household	Land	White Polls	Black Polls	Stud
1840	David Haynes	233 Acres	-	-	-
1850	Landon Haynes	233 Acres	-	1	-

Table 26. Landon C. Haynes' deed record (WPA 1940:137).

Grantee	Grantor	County	Kind Ins	Grant Date	Deed
LawsonGifford	T.R. Kennedy and L. C. Haynes	Washington	Deed	Filed April 16, 1842	WCDB 24:98

that same year (Speer 2000:31). Landon Haynes is also later recorded in Washington County as paying taxes on 233 acres of land and one slave over the age of 10 in 1850 (Speer 2000:27; Watauga Association of Genealogists 1975b:12). That same year Haynes is also documented as amassing a total 450 acres of land as recorded in the agricultural census (USBC 1850b).

Household

When Landon first acquired the property he was listed along with his wife and three other family members (Table 22) (USBC 1840). These family members probably vacated the residence once Haynes began raising a family of his own in the 1840s. Between 1840 and 1852, Haynes fathered six children including four sons and two daughters (Table 27). Also during this time, the family name was changed from Heines, its original German spelling, to Haynes in 1843 (Bailey 1991:32; Cooper et al. 1993:8).

Table 27. Landon C. Haynes' household (Taken from Speer 2000; Stow 2004:4; and USBC 1840).

Head	Gender	Relation	Date of Birth	Date of Death
Landon Carter Haynes	M	Husband and Father	1816	1875
Wife (1839-1875)				
Eleanor M. (Powell) Haynes	F	Wife and Mother	1822	-
Children				
Robert W. Haynes	M	Son	1840	1905
Joseph E. Haynes	M	Son	1842	1926
Ann Helen Haynes	F	Daughter	1844	1900
Mary Alice Haynes	F	Daughter	1848	1878
Landon Carter Haynes, Jr.	M	Son	1849	1878
David Henry Haynes	M	Son	1852	1904

Enslaved Household

Information about the enslaved household during Haynes residence at the estate can be pieced together from available census data including population and slave schedules. In 1840, Haynes owned two male slaves, one under 10 and one between the ages of 10 to 24 (Table 28) (USBC 1840).

The 1850 Census included for the first time a slave schedule and Haynes is recorded as again owning two slaves, one black female age 53 and one 21 year old mulatto male (Table 29) (USBC 1850c). Tax records also indicate one slave of working age at the Haynes household in 1850 (Speer 2000:27; Watauga Association of Genealogists 1975b:12). This slave is thought to be referring to George Haynes. In 1852, Haynes is recorded as trying to sell, "George a mulatto about 22 years of age" to his brother-in-law Lawson Gifford for one dollar in order to settle his debts with David H. Haynes, Matt L. Haynes, and William R. Dulaney (WCDB 33:104-105). The agreement must not have been honored because George is again listed in the 1860 Census (Table 30) (USBC 1860a).

Table 28. Slaves recorded in 1840 Federal Census (USBC 1840).

Name	Count	Description
Slaves	1	Black Male Under 10
	1	Black Male 10 to 24

Table 29. 1850 Slave Schedule (USBC 1850c).

Slave Owner	Count	Age	Sex	Color
Landon C. Haynes	1	53	Female	Black
	1	21	Male	Mulatto

In 1860, Haynes is documented as owning three slaves that represent a family unit (Tables 30 and 31) (USBC 1860a, 1860c). This includes Charlotte, George, and Cornelia Haynes. Charlotte, a black female, is also listed in the 1850 Census and is believed to be George's mother. George, a mulatto, is believed to be the father of Cornelia Haynes and is listed in the 1840, 1850, and 1860 censes. The family is believed to have resided in the slave quarter listed in the census and seen in the 1857 woodcut (Strother 1857:723; USBC 1860c). Prior to this date, they are assumed to have lived in Structure 1. It is not known what happened to the enslaved people at Haynes' farm during or after the Civil War.

Table 30. Slaves recorded in 1860 Federal Census (USBC 1860a).

Name	Age	Sex	Color	Place of Birth
Charlotte Haynes	60	Female	Black	Tenn
George Haynes	35	Male	Mulatto	Tenn
Cornelia Haynes	9	Female	Mulatto	Tenn

Table 31. 1860 Slave Schedule (USBC 1860c).

Slave Owner	Count	Age	Sex	Color	No. of Slave Houses
Landon C. Haynes	1	60	Female	Black	1
	1	38	Male	Mulatto	
	1	9	Female	Black	

Agriculture

Agricultural production on Haynes' farm is primarily deciphered through the 1850 agricultural census (Tables 32-34) (USBC 1850b). During his tenure, Haynes amassed a large farm totaling 450 acres and amounting to almost $5,000 (Table 33). Livestock on the farm totaled $560 and included horses, cows, sheep, swine, and other cattle. Vegetable and grains were also grown on Haynes farm including wheat, oats, hay, Indian corn, and potatoes.

Other types of production on the farm are also recorded including making butter, molasses, as well as beeswax and honey. With his large sheep herd, seen in Strother's (1857) woodcut, wool was produced on the farm. Haynes is also recorded trading textiles and linens at an unidentified store in Carter County (MacRae 2001:52). The agricultural census also records the value of his home-made manufactures at $35. It is also noted that unlike his contemporaries, Haynes was not recorded as producing cotton, whiskey, or tobacco in the agricultural census.

Landon Carter Haynes died on February 17, 1875 in Memphis and was buried at the Elmwood Cemetery (Lawson 1970:120; Stahl 1986:43; Toncray 1987:67). In 1903, his remains were reinterred in Riverside Cemetery in Jackson County, Tennessee (Stow 2004:3). Eleanor Haynes continued to live in Memphis until 1878 then she moved to Jackson, Tennessee (Stow 2004:4). It is not known when she died (Stow 2004:4).

Table 32. 1850 Agricultural Census (USBC 1850b).

Item	Amount
Improved Acres of Land	300
Unimproved Acres of Land	150
Cash Value of Farm	4000
Value of Farming Implements and Machinery	200
Horses	7
Mileh Cows	7
Other Cattle	6

Table 32. 1850 Agricultural Census (USBC 1850b) (Continued).

Item	Amount
Sheep	20
Swine	40
Value of Live Stock	560
Wheat, bushels of	150
Indian Corn, bushels of	1200
Oats, bushels of	200
Wool, lbs of	60
Irish Potatoes, bushels of	6
Sweet Potatoes, bushels of	20
Butter, lbs of	300
Hay, tons of	12
Molasses, gallons of	10
Beeswax and Honey, lbs of	100
Value of Home-made Manufactures	35
Value of Animals Slaughtered	120

Table 33. Acreage and value of estate recorded in the 1850 Agricultural Census (USBC 1850b).

Description	Total
Improved Acres of Land	300
Unimproved Acres of Land	150
Total Acreage	450 Acres
Cash Value of Farm	$4,000
Value of Farming Implements and Machinery	$200
Value of Live Stock	$560
Value of Home-made Manufactures	$35
Value of Animals Slaughtered	$120
Total Value of Estate	$4,915

Table 34. Agricultural and production items recorded in the 1850 Agricultural Census (USBC 1850b).

Livestock	Vegetable and Grain	Production
7 Horses	150 Bushels of Wheat	60 Pounds of Wool
7 Mileh Cows	1,200 Bushels of Indian Corn	300 Pounds of Butter
6 Other Cattle	200 Bushels of Oats	10 Gallons of Molasses
20 Sheep	6 Bushels of Irish Potatoes	100 Pounds of Beeswax and Honey
40 Swine	20 Bushels of Sweet Potatoes	
	12 Tons of Hay	

Simerly Family

The Simerly family was the next group of long-term residents that lived and worked at the farm. The family was comprised of Samuel W. Simerly of Carter County, his wife Sarah Lavinia Simerly, and their sons Samuel W., Jr. and Lawson G. Simerly. The Simerly's were the first non-politically oriented owners of the site using it strictly as a small-scale farming operation (Bailey 1991:62).

After Haynes debts were settled in court, the property containing 251 acres was sold to John White at auction for $4625 on February 25, 1871 (WCDB 48:531-532). John White then agreed to transfer the property to Sarah L. Simerly on August 1, 1872 (WCDB 48:533-534). The house and 251 acres were sold for $4200 with a portion of the payment being received. The total amount of purchase was paid in full with interest on May 1, 1882 giving Sarah L. Simerly legal title. Others have claimed that this was a rental agreement (Cooper et al. 1993: 21; Lawson 1970:121).

Sarah Lavinia Simerly was the niece of Landon Carter Haynes. Sarah was the daughter of Lawson Gifford, Haynes neighbor and brother-in-law, and Mary Taylor Gifford, Haynes sister. This is possibly the reason that the property was put into Sarah's name rather than her husband's. It is also possibly the reason that Haynes listed this as his residence in 1872 when he ran for Congress since his family was in possession of the property.

Sarah married Samuel W. Simerly in Washington County in 1871 (Speer 2000:41). Samuel was from Carter County and was the son of Elijah Simerly, President of the East Tennessee and Western North Carolina Railroad between 1867 and 1871 (Bailey 1991:55). Elijah, who was partially paid by the railroad in stock, passed the shares to his son upon his death (Bailey 1991:55).

After purchasing the property, Sarah also received the Haynes' family furniture that had been removed for safe keeping during the war (Bailey 1991:48). The furnishings consisted of Victorian Louis XVI Revival, Hepplewhite, and Sheraton styles (Bailey 1991:48). This was part of her dowry given to her by her mother, Mary Taylor Gifford, who lived across the Buffalo Road (Bailey 1991:49).

Samuel and Sarah began raising a family shortly after their marriage. Their first son, Samuel, was born in 1871 in North Carolina just prior to their arrival at the farm. After the family moved to the property in 1872, a second son, Lawson, was born the following year.

During their tenure, the site once again saw some changes with the advent of the modern era. These included construction of more outbuildings, minor renovations to the house including enclosing the back porch, and the addition of modern improvements such as stoves and electricity (Bailey 1991:54-62). A standing-seam tin roof was also placed on all buildings on the estate at this time (Bailey 1991:62).

Life continued on the farm. Large scale production however ceased. Intensive farming was scaled back to small-scale subsistence and small-profit farming. Samuel Simerly was listed as an unemployed disabled farmer in the 1880 census, although he still was paid in railroad stock (USBC 1880). He died in 1888 leaving his personal estate to his wife (Lawson 1970:121). Sarah and her sons continued farming the estate after his death as listed in the 1900 census (USBC 1900).

Samuel Jr. continued his trade as a farmer, but also served in the military during World War I losing a leg to a bullet and gangrene (Bailey 1991:57). However, he is listed as a non-veteran in the 1930 census (USBC 1930). Lawson worked as a hardware salesperson and later

for the railroad as a laborer and foreman. Production on the farm was at such a small scale that no agricultural census data are available for the Simerly family during their ownership.

Historical Documentation

Census Records

Census data are available throughout the Simerly's occupation of the site excluding the 1890 census which is not on record due to fire. Pertinent information relating to the family includes their occupation, places of birth, and education summarized in Tables 35-39. One small piece of information provided in the 1930 census states they did not own a radio set, a common item in most homes at the time, possibly an indication of their low economic standing (USBC 1930).

Table 35. 1880 Federal Census (USBC 1880).

Recorded Attributes	S. W. Simerly	S. L.	Sam	Lawson
Color	W	W	W	W
Sex	M	F	M	M
Age	30	32	8	7
Relationship	-	Wife	Son	Son
Single	-	-	1	1
Married	1	1	-	-
Occupation	Farmer	Keeping House	-	-
Unemployed	Y	-	-	-
Disabled	Y	-	-	-
Place of Birth	Tenn	Tenn	NC	Tenn
Father's Place of Birth	Tenn	Tenn	Tenn	Tenn
Mother's Place of Birth	Tenn	Tenn	Tenn	Tenn

Table 36. 1900 Federal Census (USBC 1900).

Recorded Attributes	Louisa Simerly	Samuel W.	Lawson G.
Relation	Head	Son	Son
Color	W	W	W

Table 36. 1900 Federal Census (USBC 1900) (Continued).

Recorded Attributes	Louisa Simerly	Samuel W.	Lawson G.
Sex	F	M	M
Date of Birth	March 1846	Dec 1872	May 1874
Age	54	27	26
Marital Status	Widowed	Single	Single
Mother of how many Children	2	-	-
Number of Children Living	2	-	-
Place of Birth	Tenn	NC	Tenn
Father's Place of Birth	Tenn	Tenn	Tenn
Mother's Place of Birth	Tenn	Tenn	Tenn
Occupation	Farmer	Farm Laborer	Salesman-Hardware
Months not Employed	0	0	0
Can Read	Yes	Yes	Yes
Can Write	Yes	Yes	Yes
Can Speak English	Yes	Yes	Yes
Own or Rent Home	Own	-	-
Owned Free or Mortgaged	Free	-	-
Farm or House	Farm	-	-

Table 37. 1910 Federal Census (USBC 1910).

Recorded Attributes	Sarah L. Simerly	Samuel	Lawson
Relation	Head	Son	Son
Sex	F	M	M
Color	W	W	W
Age	63	37	34
Marital Status	Widowed	Single	Single
Mother of how many Children	2	-	-
Number of Children Living	2	-	-
Place of Birth	Tenn	Tenn	Tenn
Father's Place of Birth	Tenn	Tenn	Tenn
Mother's Place of Birth	Tenn	Tenn	Tenn
Language	English	English	English
Occupation	None	Farmer	Laborer
Nature of Industry	-	General Farm	Railroad
Working Status	Own Account	Working	Working
Unemployed	-	No	No
Weeks not Employed	-	0	0
Able to Read	Yes	Yes	Yes
Able to Write	Yes	Yes	Yes
Own or Rent Home	Own	-	-
Owned Free or Mortgaged	Free	-	-
Farm or House	Farm	-	-

Table 38. 1920 Federal Census (USBC 1920).

Recorded Attributes	Samuel W. Simerly	Lawson G.	Sarah L.
House Number or Farm	Farm	-	-
Relation	Head	Brother	Mother
Home Owned or Rented	Owned	-	-
Owned Free or Mortgaged	Free	-	-
Sex	M	M	F
Color	W	W	W
Age	48	47	73
Marital Status	Single	Single	Widowed
Able to Read	Yes	Yes	Yes
Able to Write	Yes	Yes	Yes
Place of Birth	NC	Tenn	Tenn
Father's Place of Birth	Tenn	Tenn	Tenn
Mother's Place of Birth	Tenn	Tenn	Tenn
Able to Speak English	Yes	Yes	Yes
Occupation	Farmer	Foreman	None
Nature of Industry	General Farm	Railroad Warehouse	-
Working Status	Own Account	Working	-

Table 39. 1930 Federal Census (USBC 1930).

Recorded Attributes	Samuel W. Simerly	Lavinia S.	Lawson G.
Relation	Head	Mother	Brother
Home Owned or Rented	Owned	-	-
Radio Set	None	-	-
Farm	Yes	--	-
Sex	M	F	M
Color	W	W	W
Age	55	83	53
Marital Status	Single	Widowed	Single
Attended School Within Year	No	No	No
Able to Read and Write	Yes	Yes	Yes
Place of Birth	Tenn	Tenn	Tenn
Father's Place of Birth	Tenn	Tenn	Tenn
Mother's Place of Birth	Tenn	Tenn	Tenn
Able to Speak English	Yes	Yes	Yes
Occupation	Farmer	None	Foreman
Industry	General Farm	-	Steam Railroad
Class of Worker	Own Account	-	Working
Employment	Yes	-	Yes
Veteran	No	-	No

Household

The Simerly household was comprised of what today we consider a modern family unit including a father, a mother, and two children (Table 40). Samuel Simerly, his wife, Sarah, and their sons Samuel Jr. and Lawson lived on the estate and worked the farm until their deaths.

Table 40. Simerly household (Taken from Lawson 1970; Speer 2000; USBC 1880, 1900, 1910, 1920, 1930).

Head	Gender	Relation	Date of Birth	Date of Death
Samuel Simerly	M	Husband and Father	1849	1888
Wife (1871-1888)				
Sarah Lavinia Simerly	F	Wife and Mother	1847	1935
Children				
Samuel W. Simerly Jr.	M	Son	1871	1962
Lawson G. Simerly	M	Son	1873	1962

Historic Photographs

Several photographs documenting the property after the turn of the century exist. The earliest photograph available of the house comes from an unknown newspaper article published in 1928 (Figure 14). This photograph shows the house, law office, and a possible storage shed addition constructed by the Simerly family to the rear of the law office. The joinery/loomery and the smokehouse can also be seen in the distance as well as a barbed wire fence running along the Buffalo Road, which would have been available after 1886 (Miller et al. 2000:15). Another set of photographs were recovered that were believed to be taken at the same time, however, the old Haynes fence is in the front yard (Figures 15 and 16).

The next photograph is believed to have been taken sometime during the 1930s to 1940s (Figure 17). This image shows the farmhouse and numerous outbuildings. The cantilevered barn and corn crib are shown on the right with the farmhouse and law office towards the left. In

Figure 14. Tipton-Haynes site in 1928 newspaper article
(On file Tipton-Haynes Historic Site).

Figure 15. Farmhouse circa 1928 facing west
(On file Tipton-Haynes Historic Site).

Figure 16. Farmhouse circa 1928 facing south (On file Tipton-Haynes Historic Site).

Figure 17. Tipton-Haynes site circa 1930s-1940s (On file Tennessee Historical Commission).

the center is located the smokehouse and two other unknown structures fronting the farm lane. Also visible is the rough-cut square post and board fence believed to be constructed by Haynes around the barn area and the barbed wire fence enclosing the rest of the farm. The Buffalo Road in the front of the house has yet to be improved.

Figure 18 is a photograph of the rear of the farmhouse taken sometime during the 1960s. The image shows the ell, smokehouse, loomery/joinery, and shed. Construction of the Garland subdivision has begun at this point. Outbuildings appear to have fallen into disrepair.

One other image is an aerial photograph taken around 1962 (Figure 19). The image shows the property prior to the state's acquisition and before major renovations to the site had begun. A close up of the core historic area shows the location of standing structures including three unidentified buildings in the yard (Figure 20).

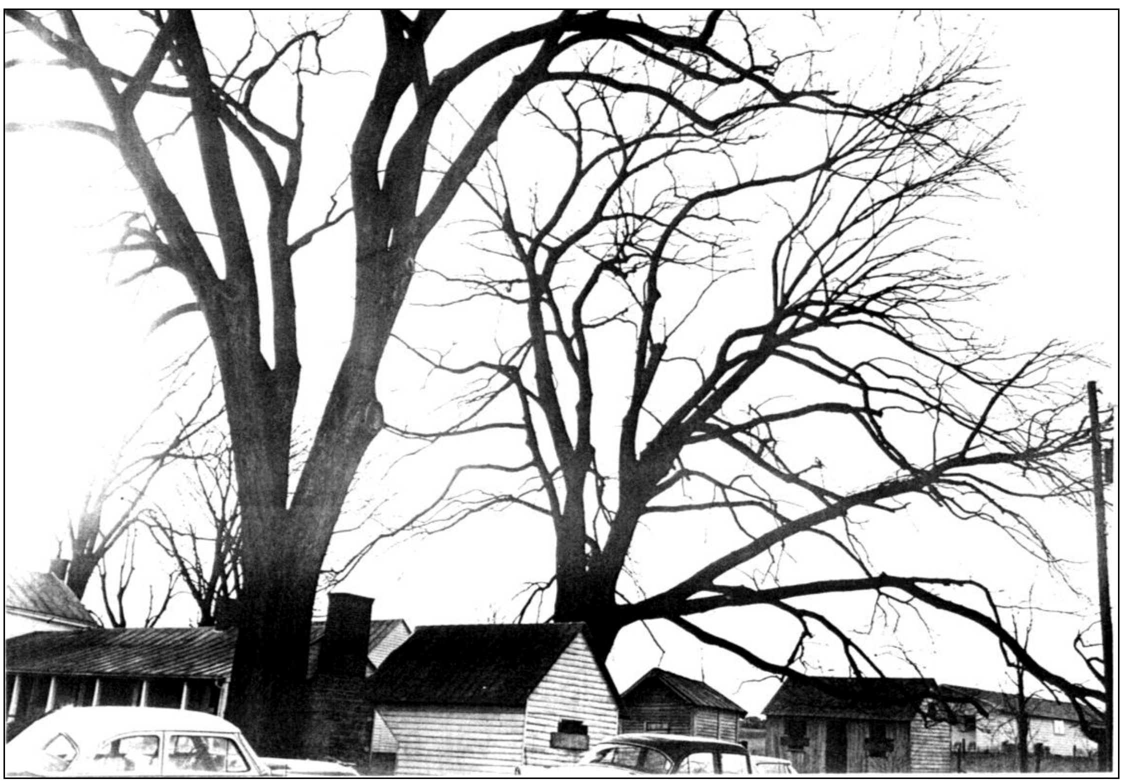

Figure 18. Tipton-Haynes site circa 1960s (On file Tennessee Historical Commission).

Figure 19. 1962 Aerial photograph of Tipton-Haynes property (On file Tipton-Haynes Historic Site).

Figure 20. 1962 Aerial photograph of core historic area
(On file Tipton-Haynes Historic Site).

Sarah Simerly died in 1935 and was buried at the family cemetery passing the estate to Samuel Jr. and Lawson (Bailey 1991:56; Lawson 1970:121). After the death of their mother, the brothers are believed to have taken up residence in the ell of the house, abandoning the main section (Bailey 1991:56). The brothers auctioned the Haynes family personal property, furniture, and papers in 1954 and lived on its proceeds and railroad stocks the remainder of their lives never marrying nor having children (Bailey 1991:56).

Due to the significance of the site, the Simerly brothers agreed to convey the property to the State of Tennessee upon their deaths (Bailey 1991:63). In 1944, the state, on behalf of the newly formed Tennessee Historical Commission, purchased a portion of the site including the house and the surrounding 17 acres as well as the Tipton-Simerly Cemetery for $7,552.25

(Lawson 1970:121; Speer 2000:41; WCDB 227:344-345). The Simerly brothers, however, retained lifetime possession of the farm (Bailey 1991:56; Lawson 1970:121). The deed of sale also contained a reversionary clause guaranteeing that the state maintain the family cemetery (Bailey 1991:56). Because the Simerly brothers had no children, the remainder of the property was sold to Clinton and Ruby Garland in 1958 (Bailey 1991:56; WCDB 321:32, 407:111-116). It was converted into a subdivision in the 1960s.

In 1962, Samuel Jr. and Lawson Simerly both died thereby transferring ownership of the estate and all remaining personal property to the State of Tennessee (Bailey 1991:56-57). They were also buried in the family cemetery. After the death of the Simerly brothers, the Tipton-Haynes Historical Association was formed to restore and preserve the site as an educational institution (Cooper et al. 1993: 21). The state-owned site is today maintained by the nonprofit Tipton-Haynes Historical Association and was opened to the public in the early 1970s (Fields 1998:982).

State Ownership

The Tipton-Haynes site has been described as "the most historic site in Tennessee" (Bailey 1991:vii). In 1943, Governor Prentice Cooper recommended the purchase, restoration, and maintenance of several historic sites in the state including the Tipton-Haynes farm for celebration of the state's sesquicentennial (Tennessee Historical Commission Minutes 1943:A33-A34). That next year the measure was approved and the State of Tennessee on behalf of the newly formed Tennessee Historical Commission purchased a portion of the estate including the farmhouse making it one of the first historic properties to be purchased and maintained by the state as a state-owned historic site (Williams 1940:16). A total of 17.77 acres

including the house and cemetery was sold on November 25, 1944 for $7,552.25 (Figure 21) (WCDB 227:344-345). Another small tract was also purchased by the state at the time from Kittie Johnson, a widow. This was an 0.46 acre tract adjacent to Erwin Highway/South Roan Street purchased to complete the ownership of the core historic area in 1945 (Figure 21) (WCDB 227:450).

One of the first acts of the Tennessee Historical Commission was the erection of a granite monument on Erwin Highway/South Roan Street in cooperation with the Colonial Dames, Daughters of the American Revolution, the Daughters of 1812, and the United Daughters of the Confederacy (Williams 1940:16). On October 12, 1946, a four-sided monument was erected commemorating four eras of history seen at the site including the Colonial Period, the Revolutionary Period, the Period of 1791-1815, and the Civil War Period (Williams 1940:16). In 1951, it was proposed that a roadside park be constructed around the monument and that the springhouse should be restored (Lawson 1970:123). On November 16, 1953, a dedication ceremony was held at the site commemorating the finished springhouse restoration (Williams 1940:16).

Following the Simerly brothers' deaths, the state took control of the property in November of 1962. The property was owned by the state and administered by the Tennessee Historical Commission within the Department of Environment and Conservation.

In 1964, the city of Johnson City attempted to purchase the abandoned property for use as a city garage, creating outrage among the local community (Bailey 1991:63). In a response to this threat, the Tipton-Haynes Historical Association was formed in early 1965 and granted management rights by the Tennessee Historical Commission (Baratte 1970:125). The Tipton-Haynes Historical Association is a non-profit 501(c)(3) organization whose mission is to

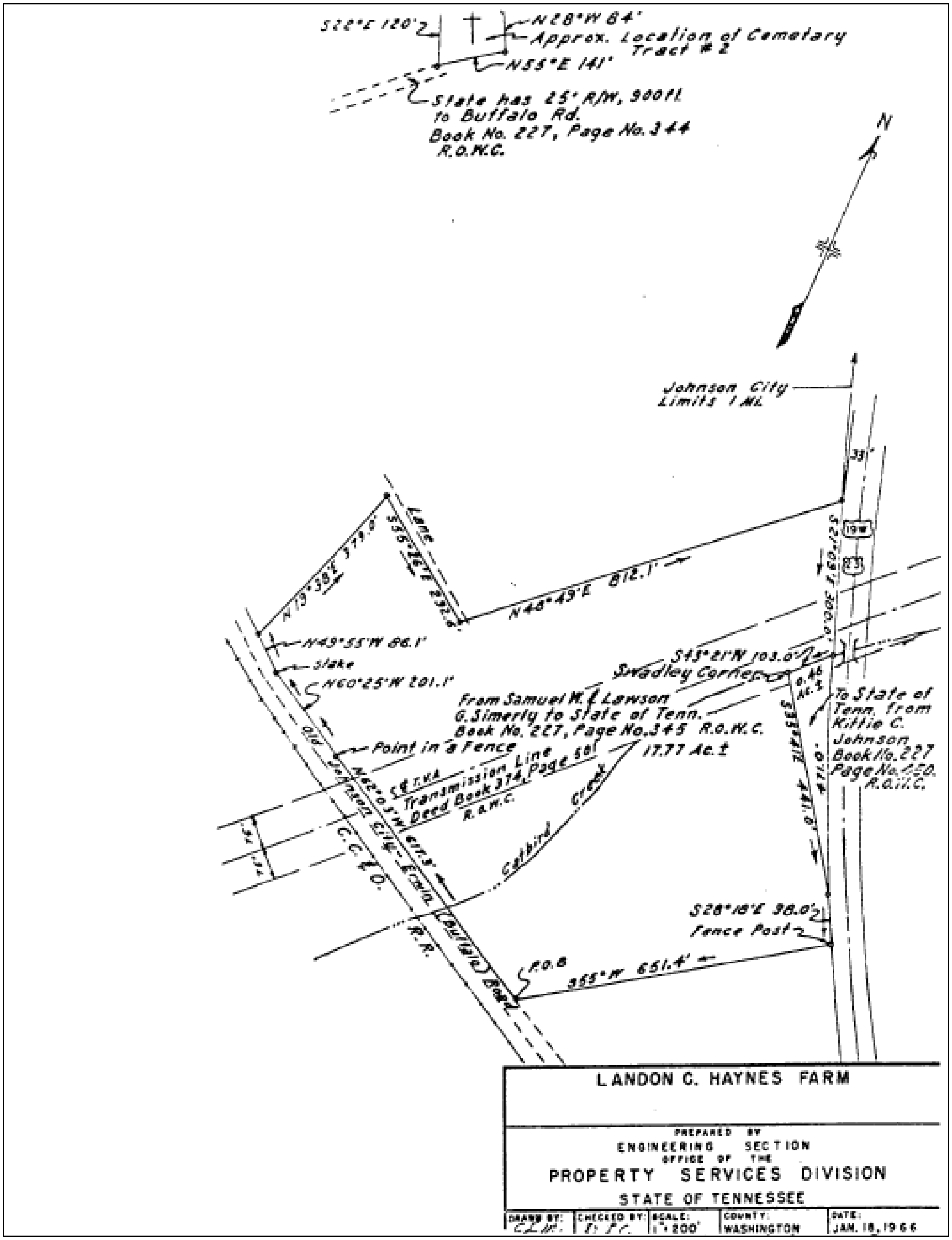

Figure 21. 1966 Tipton-Haynes property map (Bailey 1991:85; Washington County Miscellaneous Book [WCMB] 77:633).

preserve and protect the historic buildings and grounds and to provide educational programs for the public. The Tipton-Haynes Historical Association continues to preserve and manage the site as an educational institution to this day.

When the state acquired the property, the farmhouse, law office, and several outbuildings were standing. The house had been described as being in a sad state of disrepair but sturdy in an 1936 Historic American Building Survey (HABS) (Historic American Buildings Survey [HABS] 1936:1; Lawson 1970:123). The outbuildings also appear to have suffered the same fate as seen in the historic photographs (Figures 14-18).

The condition of the estate called for the restoration of the house and outbuildings to be completed in order to open the site to the public for interpretive purposes. With funds raised by the Tipton-Haynes Historical Association and appropriations from the State of Tennessee, restoration of the Tipton-Haynes house and outbuildings began in 1965 (Baratte 1970:125; Speer 2000:42). The law office, barn, smokehouse, stillhouse and other outbuildings were restored, and a visitor's center/museum was constructed (Speer 2000:42).

After completion of the restoration, in 1970, the Tipton-Haynes site was added to the National Register of Historic Places (2008). The following year the site was dedicated as the "Tipton-Haynes Living Historical Farm" (Speer 2000:43). Shortly after, another monument was placed at the site in 1975 by the Tennessee Society of Daughters of the American Colonists commemorating Needham and Arthur's journey and Daniel Boone's camp at the bold spring. The site has since seen several restorations of the house and outbuildings as well as the construction of the offices, museum, and interpretive structures to create the landscape we see today.

Three easements were acquired by, or were given to, the state since it obtained the title to the property. In 1964, an easement was purchased by the federal government to construct a transmission line across a portion of the property (Figure 21) (WCDB 374:501-504). After Clinton Garland purchased the property adjacent to the Tipton-Simerly Cemetery in 1958, he began development of a subdivision. The original easement owned by the State of Tennessee was violated with the development. In order to rectify the error, Clinton and Ruby Garland gave the state two separate tracts of land adjacent to the north and south of the cemetery totaling 0.54 acres in 1967 (WCDB 407:111-116). In 1978, the city of Johnson City was given an easement from the state to install a sewer line connected to the visitors' center (WCMB 77:633-636).

Additional property was also acquired to the south of the core site in order to preserve the scenic landscape and view of the Buffalo Mountain. In 2001, two tracts totaling 28.15 acres were purchased by the state from Newton F. Garland Trust with funds also acquired from the Tipton-Haynes Historical Association (WCDB 223:1772-1775). This addition brings the total acreage of the site to 47.23 acres for the entire state-owned property.

Today, the farm is known as the Tipton-Haynes State Historic Site, one of 13 state-owned sites in Tennessee. The site serves as a historical house and grounds museum which is intended to help preserve and interpret Tennessee's history. The state owns the 47-acre tract with 11 historic buildings, a new museum and education center, historic grounds and gardens, the Tipton-Simerly Cemetery, the Buffalo Trace, the "Tipton-Haynes Cave", and the Andre Michaux trail.

CHAPTER III

ARCHITECTURAL SURVEY

As part of the Tipton-Haynes Landscape Archaeology Project, an architectural survey of the extant buildings on the property was undertaken to understand the evolution of the Tipton-Haynes landscape. Dwellings in rural areas were often built in stages (Bailey 1991:17). Likewise, Tipton-Haynes also was built in numerous stages to arrive at the modern home seen today. With help from architectural historian and consultant for the project, Robbie Jones, a comprehensive but non-invasive architectural survey was completed to verify information provided in previous surveys and to provide a primary context with which to spatially arrange the standing buildings on the property and their development over time (Jones 2009a). The built environment at Tipton-Haynes, including the farmhouse and its historic outbuildings, provides a unique look at the evolution of architecture, style, and arrangement of space at the home. Non-standing structures are also briefly mentioned here as evidenced from previous historical research.

1936 HABS Survey

Prior to the 2008-2009 THLAP survey, at least three other architectural surveys had been previously completed at Tipton-Haynes in the past including the National Register nomination. On June 12, 1936, W. Jeter Eason of Memphis, Tennessee, documented and photographed the farmhouse and law office for the Historic American Building Survey (HABS), a New Deal program operated by the National Park Service (Eason 1936; Jones 2009a:7). Eason noted the uniqueness of the structure and recorded basic information about its architectural details and

history of construction and renovation. Eason (1936:1) also noted that the dwelling had been allowed to fall into a rather sad state of disrepair by its residents. The best information about the farmhouse comes from high-quality, black and white photographs provided by the survey (Figures 22-24). The photographs supply evidence about the site during the later Simerly period of occupation and provide data about the farmhouse and its surroundings prior to state ownership and restoration efforts.

1967 Architectural Survey

Another architectural survey was later conducted after the state took possession of the property and restoration efforts had begun. In 1967, an architectural report is thought to have been completed by William Bailey (1989:2). However, no copy of that report is available. The survey was completed to help with the restoration of the house and outbuildings and was most likely used for nominating the property to the National Register of Historic Places in 1970.

1989 Architectural Survey

In 1989, a restoration and stabilization project was undertaken on the farmhouse. In an effort to help with the restoration, another architectural survey was conducted by William Bailey (1989, 1991). Information obtained from this survey was documented by Bailey (1991) in a historic structures report and submitted to the Tennessee Historical Commission.

THLAP Architectural Survey

In 2008 and again in 2009, Robbie Jones (2009a) assisted the author in analyzing and documenting the built environment of the Tipton-Haynes site by conducting a low-level non-

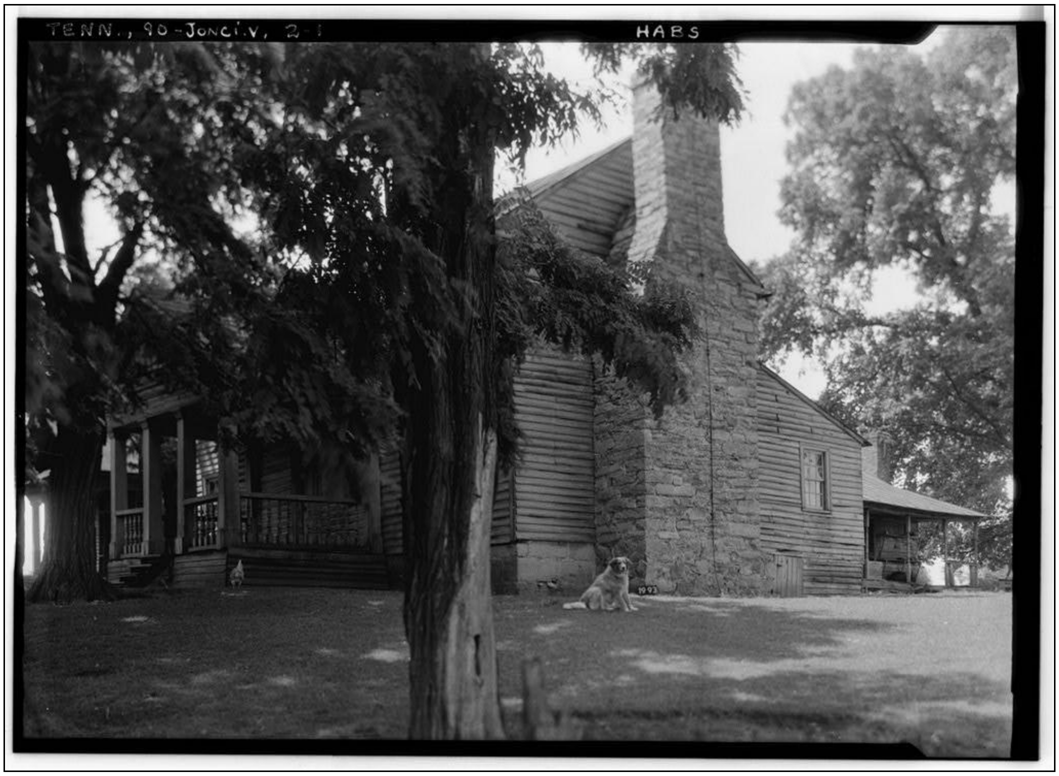

Figure 22. HABS Survey, Farmhouse 1936 facing northwest (Eason 1936).

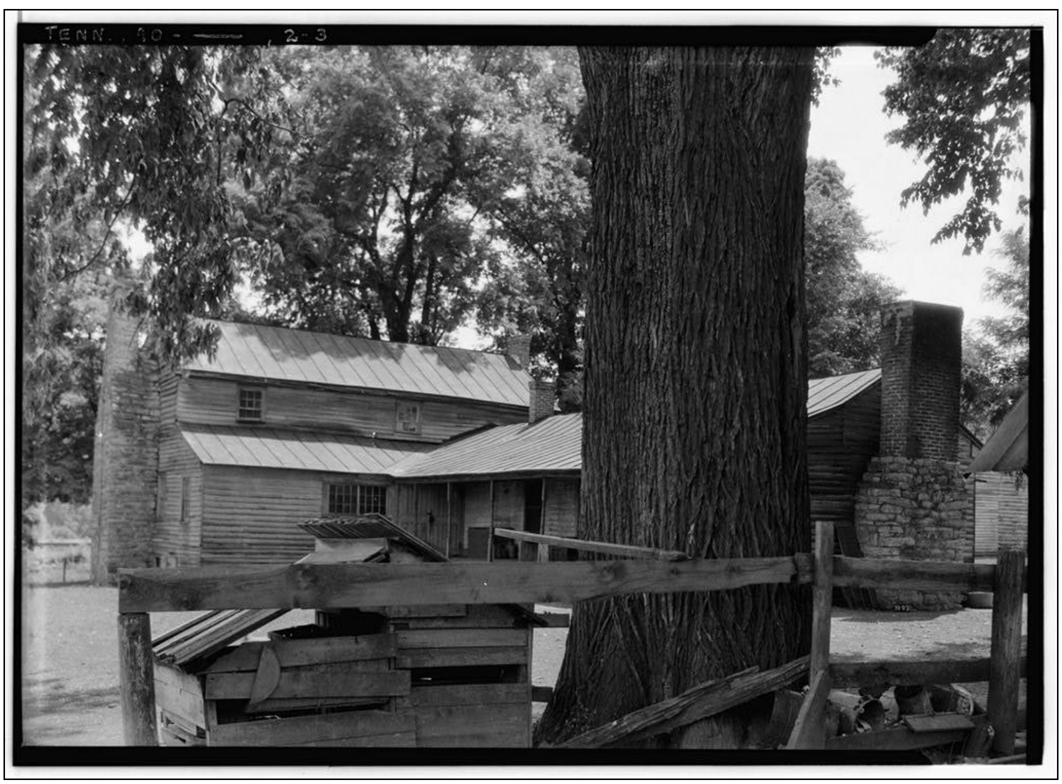

Figure 23. HABS Survey, Farmhouse 1936 facing southwest (Eason 1936).

Figure 24. HABS Survey, Farmhouse and Law Office 1936 facing west (Eason 1936).

invasive architectural survey. The survey was conducted to provide context for the standing structures on-site, to clarify any ambiguities presented by previous surveys, and to provide information about where to conduct dendrochronological investigations. The following survey is compiled from all previously mentioned sources.

Standing Structures

Farmhouse

Figure 25. Tipton-Haynes Farmhouse facing northeast.

Type: Restored Historic Farmhouse
Constructor: Colonel John Tipton
Construction Year: circa 1784
Renovation Year: John Tipton, Jr. 1820s, Landon C. Haynes 1857-58
Restoration Year: Major Restorations in 1965, 1969, and 1989.
Stories: 2
Rooms: 11
Dimensions: Front Section 30 x 40 ft, Rear Ell 46 x 23 ft
Construction Type: Log with V-Notching/Braced Frame additions with Weatherboard Siding.
Roof: Standing-Seam Metal Roof
Foundation: Limestone

The Tipton-Haynes Farmhouse was originally a log dwelling believed to have been constructed around 1784 by Col. John Tipton after he purchased the property that same year.

Later his son, John Tipton, Jr., would acquire the property and make improvements to the home by adding front and rear porches, adding on a west wing, and covering the home in clapboard siding during the mid- to late 1820s. Later, Landon C. Haynes also made improvements between 1856 and 1857 including the addition of the portico and ell. The final residents of the home, the Simerly family, also made some minor improvements during their tenure. Today, the home stands as a representation of Landon Haynes' Greek-Revival farmhouse as restored by the State of Tennessee and Tipton-Haynes Historical Association (Figures 25-27).

Colonel JohnTipton Cabin

Colonel John Tipton is believed to have constructed a log cabin to serve as his home upon acquiring the land in 1784. One of the only known surviving descriptions of the log dwelling comes from Colonel Thomas Love's account of the Battle of the Lost State of Franklin given to Draper. In it he states that, "Col. Tipton's house was a large size house, some 25 by 30 feet, hewn logs a story and a half – no windows below – two or three window holes, round, in each gable and above – a door in front" (Figure 7) (Draper 1944-1949:55). The cabin is believed to survive as the core of the farmhouse today. However, Col. Love's dimensions appear to be estimated based on the current dimesions of the farmhouse.

The surviving log cabin within the core of the Tipton-Haynes farmhouse was a substantial one-and-a-half story dwelling measuring approximately 20 x 30 ft built using a vernacular symmetry with the home fronting the old Buffalo Trace. The house is made of oak logs hewn on two sides, attached with V-notching, and chinked with limestone rubble and daubing made of mud and lime (Figure 28) (Jones 2009a:2). Two central doors were located at the front and rear of the cabin. Two or three windows are believed to have been located in the

Figure 26. Tipton-Haynes Farmhouse facing west.

Figure 27. Tipton-Haynes Farmhouse facing east.

Figure 28. Original logs exhibiting V-notching
with limestone and mortar daubing visible
in back porch attic.

upstairs loft on each face while no windows were remembered in 1788 on the first floor. However, it is thought that two windows on each face were cut on the first floor as they remain today (Jones 2009b). A large exterior chimney was constructed of unmortared hewn limestone on the east side of the dwelling which possibly served three fireplaces including one in the cellar, the first floor, and the attic loft (Bailey 1991:9). No visible interior evidence remains today of the second floor hearth. A gabled roof featured sash-sawn rafters, pegged at the top, with notched and pegged collar beams. The roof was originally covered in hand-split shingles (Eason 1936:2). The dwelling was supported by a hand-hewn limestone pier foundation which is visible in an old photograph (Figure 15) (Bailey 1989:4).

The interior of the cabin likely featured thin partition walls creating a hall and parlor plan on the first floor (Figure 29) (Jones 2009a:3). It also included an upstairs loft and a large cellar located under the east side of the home. The parlor was the main living and entertaining space of the Tipton family and the nexus of daily life while the hall typically was used as sleeping space. The parlor featured a chimney and it is believed windows which today exhibit molded edges on the jambs. Floors were built of hand-hewn joists covered with pineboard flooring (Eason 1936:2).

The farmhouse also had a large attic loft area that would have been used as a sleeping loft, possibly by slaves (Jones 2009a:2). The loft was reached by a ladder or steep stairway in the northwest corner of the cabin (Bailey 1991:9). Another hearth is believed to have been located on the east end. A beaded ceiling joist from within the loft remains today (Figure 30) (Bailey 1991:99, appendix III; Jones 2009a:3).

A walk-in cellar or basement was also constructed on the east end of the home to serve as the kitchen. It featured a large stone fireplace with an oak lintel (Eason 1936:2). The floor was of dirt. Access was located behind the stone chimney.

Based on available architectural evidence and construction techniques, the THLAP survey indicated the log dwelling was most likely constructed later than originally thought. The construction style of the cabin as well as the presence of an original 3/4 round (on both sides) beading ceiling joists point to a circa 1790s construction date (Jones 2009a:2). While historical documentation does put Col. Tipton at the site prior to 1790, the cabin standing today is believed to have been renovated around 1790 or constructed at a later date.

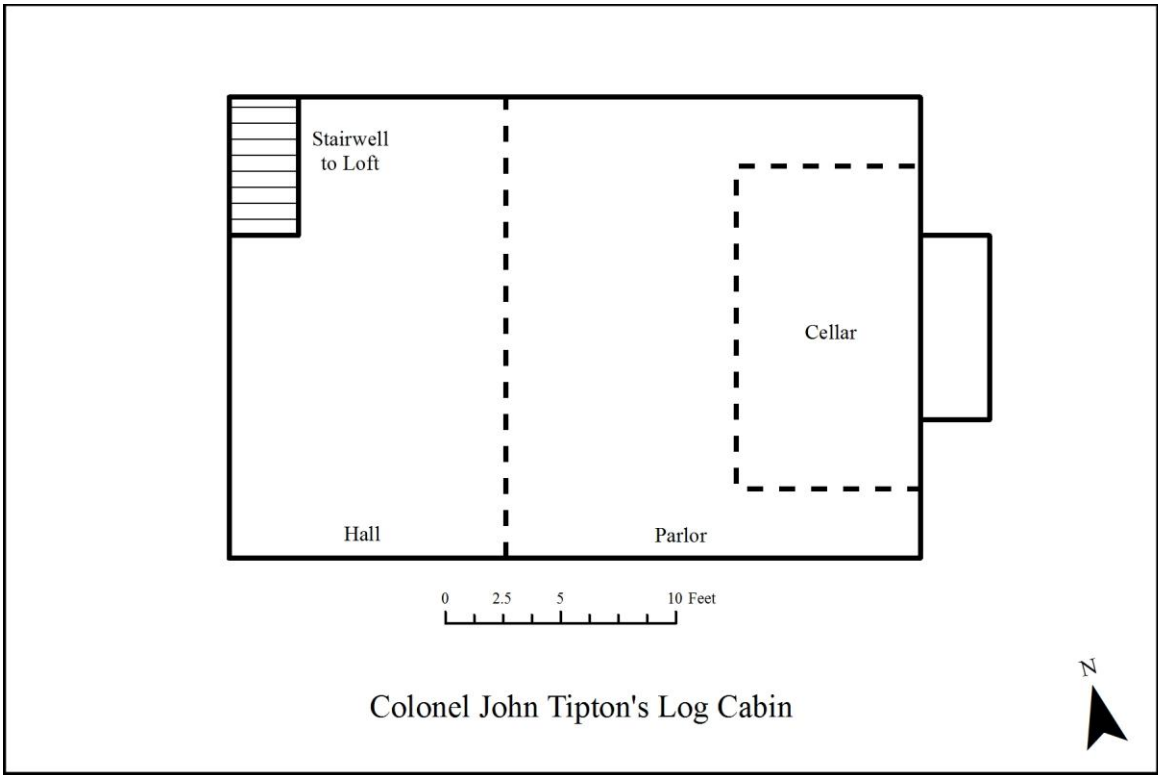

Figure 29. Architectural sketch of Col. John Tipton's vernacular log cabin.

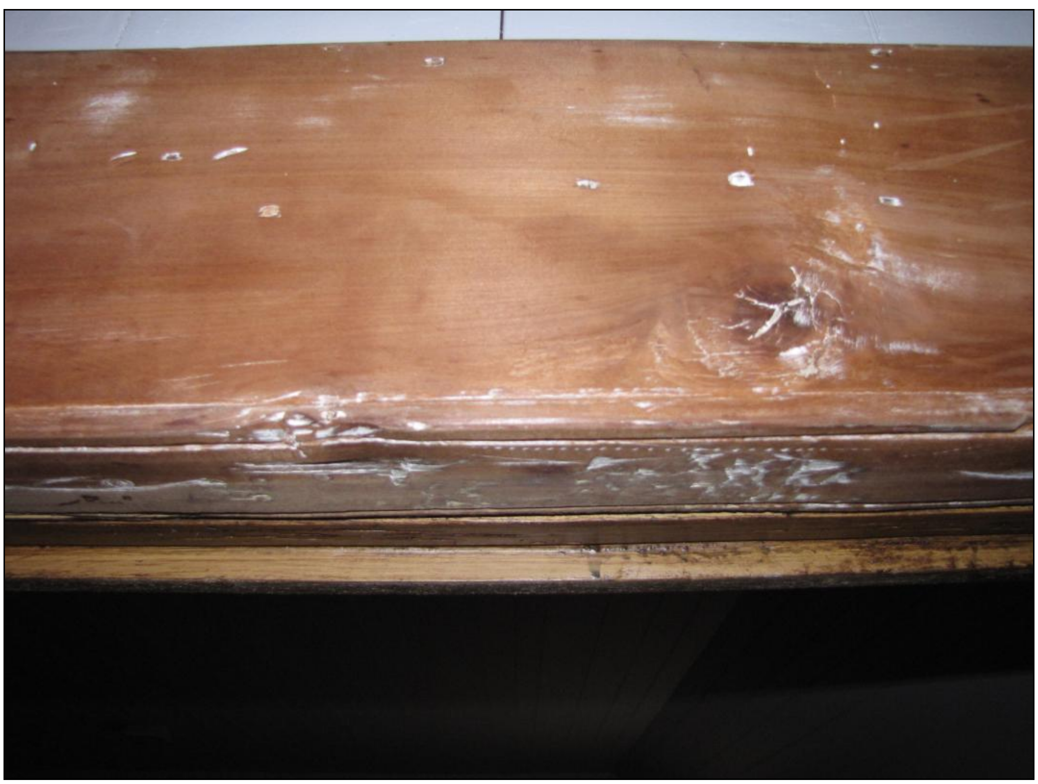

Figure 30. Original beaded ceiling joist located along partition wall in east bedroom.

John Tipton, Jr. Federal Farmhouse

John Tipton, Jr. moved into his father's home sometime between 1821 and 1825, possibly as early as 1819 (Bailey 1991:16; Hall and Merritt 1913:2605; Massengill 1942:22). Shortly after taking up residence, it is believed that Tipton, Jr. made alterations to the home. Assessed property values indicate a major improvement of the property between the years 1819 and 1825 (Bailey 1991:20). Improvements included the addition of a second story, a western addition, front and rear porches, and clapboarding siding. This enlargement would most likely have been completed after the introduction of local saw mills into the area (Bailey 1991:16).

Typically, the enlargement of homes was done by the wealthy (Bailey 1991:17). At the age of 50, John Tipton, Jr. had accumulated enough wealth to expand his father's home and recreate a Federal-style home. The Federal style was a popular national architectural style between the 1790s and 1830s typically consisting of a plain three or five bay façade with end chimneys and a Palladian-style front porch (Patrick 1981:81-102). It was a large, imposing structure adaptable to the workman, the farmer, and the gentleman's needs of the day (Bailey 1991:17).

Tipton, Jr. enlarged the log farmhouse by raising the ceiling to include a second story, extending a 10 foot frame addition on the western side, and constructing front and rear porches (Figures 8, 11). This created a 3-part Federal-style I-house with a traditional center hall plan (Jones 2009a:4). The log cabin was modified by the removal of the west wall and the attachment of a frame addition (Bailey 1991:20). The western addition was made of a heavy braced frame construction, consisting of sash-sawn timbers pegged and nailed together (Jones 2009a:4). The exterior of the home was also weatherboarded with cut wood clapboard siding (Speer 2000:43). The steep gabled roof featured a plain boxed eave and plain freize (Bailey 1991:20). A brick

chimney which served fireplaces on both floors was constructed alongside the western addition (Jones 2009a:5).

The foundation of the house was also renovated. The original cabin rested on a limestone pier foundation (Bailey 1989:4). The enlarged house rested on a fieldstone foundation laid without mortared joints (Bailey 1991:20). The house was raised using jack and tackle, and a hewn stone pier foundation was installed with the area between the piers being filled with loosely stacked fieldstone (Bailey 1991:20).

New entrances to the farmhouse were also constructed during the renovation. The original location of the front and rear doors were converted to windows and new centrally located doors were cut just to the west (Figure 8) (Bailey 1991:23; Goist 1994:5). Windows were also installed along the front and rear walls providing a narrow wood frame for windows containing a six-over-six sash (Bailey 1991:21). The windows on the first and second floor of the main house were the same size and had shutters which provided decoration and privacy (Bailey 1991:21). The symmetry of the three-bay façade is broken by the location of these converted vernacular windows (Speer 2000:43). Windows were also added along the east and west facades on the first and second floors. Smaller single one sash windows were also installed below the eaves on either side of the chimneys in the attic (Bailey 1991:39). All window openings were flat-headed with window trim that consisted of a wood cornice and plain wood sills (Bailey 1991:39).

Another major renovation to the log farmhouse was the addition of front and rear porches to the house. A one-story porch was constructed which stretched the width of the front façade and is estimated to extend 10 feet from the face of the building (Bailey 1991:21). A two-story porch was installed on the back façade of the farmhouse which also ran the length of the house

and extended an estimated 10 feet from its edge (Bailey 1991:21). During restorations made between 1965 and 1969, evidence was found of a second-story porch in the rear of the house. The second-story door frames can still be seen under the roofline of the rear porch shed roof (Bailey 1989:1). The second-story porch was accessed by exterior doors located in the center bedroom and the small room in the new west wing (Jones 2009a:5).

The front porch had a shed roof with plain projecting eaves, while the second story back porch had a flat roof (Bailey 1991:21). During the restorations exterior posts and railings were found enclosed underneath the walls of the back porch (Baratte 1970:125). Both the porch in the front and the porch in the back had square posts supporting the roof (Bailey 1991:21). Shadows indicating the porches attachment to the house are clearly visible under the present roofline (Bailey 1991:21).

The interior of the farmhouse was also dramatically altered during Tipton, Jr.'s renovation. With the removal of the western wall, the house was divided by new interior partition walls and the rooms were rearranged (Figure 31). The ground floor consisted of east and west rooms with a centrally located entry hall. The east room was used as the main parlor while the newly constructed west room is believed to have been used as the drawing room or library and possibly as Tipton, Jr.'s office (Bailey 1991:23, 24; Jones 2009a:4). In the older log section, he installed a partition wall to create a formal center hall, which featured an open, central stair and T-shaped landing (Jones 2009a:4). The open arm stairway had a hand-carved railing with newel and also featured panels and molded trim (Jones 2009a:4). The stairway also features walnut treads and a solid banister (Bailey 1991:45). A small closet was also created beneath the new staircase behind the thin tongue-and-groove Federal-style trim (Jones 2009a:4).

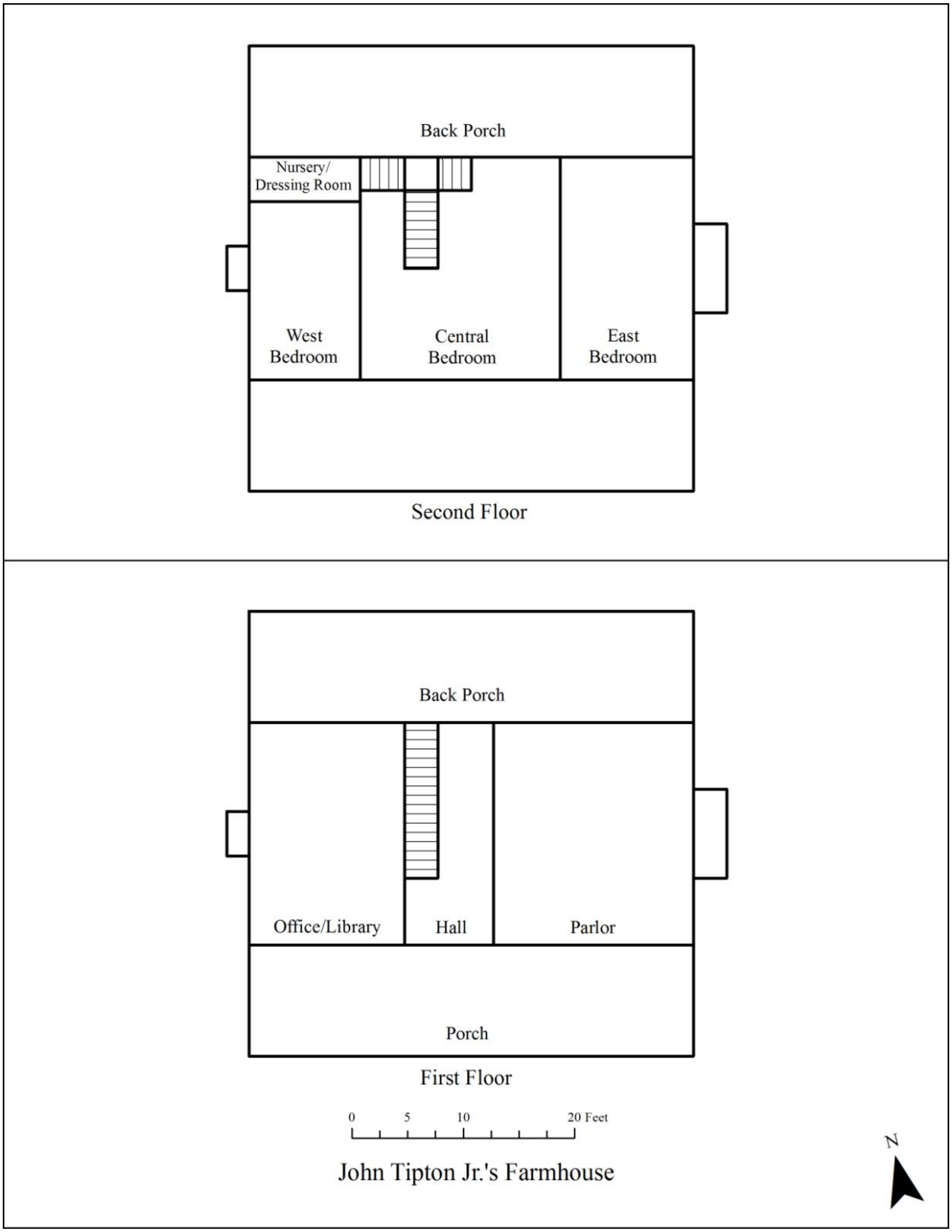

Figure 31. Architectural sketch of John Tipton, Jr.'s Federal Farmhouse.

Tipton also installed new Federal-style molded and beaded trim throughout the house including window and door trim, chair rails, and six-panel doors with raised panels (Jones 2009a:4). All of the interior log walls were hidden behind new wall panels featuring tongue-and-groove joinery and wrought L-head nails (Jones 2009a:4). New interior walls were constructed of wood studs with a wood finish (Eason 1936:2; Goist 1994:5). The walls were wallpapered with a solid color-on-color paper (Bailey 1991:47). The floors were built of hand-hewn joists and covered with pineboard flooring (Eason 1936:2). Tipton also installed new Federal-style mantels in the west rooms, on both the first and second floors. The west room did contain a fireplace with Herringbone patterned brickwork for a hearthstone with a bold flat-faced mantel; however, the brick was removed during restorations in 1969 (Bailey 1991:24). The east rooms probably retained their original mantels since they were relatively new at the time of renovation (Jones 2009a:4).

The second floor was also divided into three bedrooms. Two bedchambers were located in the original cabin section and one smaller bedchamber was located in the west end frame addition. The main bedroom was located in the east room while a smaller bedroom was located in the center of the house entered by the stairwell. The western addition was also subdivided by an interior partition wall creating a small dressing area in the northwest corner of the second floor (Jones 2009:4). Both the east and west bedrooms had fireplaces for heating and had doors which accessed the second floor back porch (Bailey 1991:24).

The ceiling of the second floor loft was raised in order to make it a more functional space. This was accomplished by removing the original ceiling joists and installing new ceiling joists about two to three feet higher and nailing them to the original pegged rafters (Jones 2009a:4). This created a small four to five foot loft above the second story possible used for

storage. One of the original 3/4 round beaded ceiling joists was retained and used to provide structural support for a new interior partition wall creating two bedrooms in the log portion of the second floor (Figure 32) (Jones 2009a:4). A carved out section of this ceiling joist may indicate an original door opening, which was enlarged due to its low height (Jones 2009a:4). An original cut ceiling joists also remains in situ above a window located in the portico loft.

The east bedroom would have been likely been used by Tipton, Jr. and his wife. The central bedroom was likely used by the male children and the west bedroom, which had its own door for privacy and small fireplace, was likely used by the female children or a married couple (Jones 2009a:4). The small room located in the new western addition could have been used as a dressing area or nursery (Jones 2009a:4).

The cellar is also believed to have been renovated at this time as well. Due to the

Figure 32. Area in east bedroom showing original ceiling joists.

alteration of the foundation, a larger cellar was created with a ceiling six-and-a-half feet high (Bailey 1991:20). Bailey (1991:20) states that at this time the access to the cellar changed. The cellar entrance was altered to descend westward under the east side of the back porch and then turned to enter the east corner of the north wall (Bailey 1991:21). The cellar is believed to have been used as the kitchen for the home. However, Bailey (1991:21-22) states that the current dining room located in the ell of the farmhouse was constructed from a relocated outbuilding to serve as Tipton, Jr.'s new kitchen.

Landon C. Haynes Greek-Revival Farmhouse

On February 28, 1837, David Haynes, purchased the Tipton estate (Bailey 1991:31; Speer 2000:27; WCDB 22:177-178). Shortly thereafter, Landon Carter Haynes married and was given the estate including the Federal-style dwelling house and other outbuildings as a wedding gift in 1839 (Figure 11) (Bailey 1991:31; Bellamy 1952:5; Speer 2000:27; Tomlinson 2008). Landon Carter and his family lived in the home for the next 20 years with no documented alterations. Sometime between 1857 and 1858, based upon Strother's woodcut and Shaver's portraits, Haynes renovated the farmhouse, constructing a Greek-Revival home and adjacent Law Office (Figure 33) (Baratte 1970:126; Price 1952:95; SIRIS 2009a, 2009b; Strother 1857:723).

The Federal-style house built by Tipton, Jr. was shaped by the utilitarian lifestyle of the gentleman farmer and by the popular taste of its time (Bailey 1991:43). Housing styles and lifestyles had changed during Landon Haynes' tenure. The function of the house was to be radically altered. Although it continued to serve as a political domicile, it was changed from a

Figure 33. Landon Haynes' Greek-Revival Farmhouse and Law Office facing northeast.

farmhouse to the country home of a prominent couple (Bailey 1991:43). Haynes built his home following the imposing Greek-Revival style buildings he would have been exposed to in Nashville (Jones 2009a:6). Inspired by Greek and Roman architecture, Greek-revival dominated as a national style between the 1820s and 1860s usually following Doric or Ionic styles consisting of elaborate door surrounds with porticos or entry porches supported by columns (Patrick 1981:118-140).

The exterior of the house was drastically changed to reflect the popular Greek-Revival style (Figure 25). The most prominent feature was the alteration of the front porch. The full-length front porch built by Tipton, Jr. was replaced with a Greek-Revival central portico. The single-story, gable-roof portico was supported by four tapered, square columns with molded capitals and by two rear pilasters (Jones 2009a:6; Speer 2000:43). The porch also featured

turned balusters and molded railings as well as elaborate molded cornice detailing (Jones 2009a:6). One unique feature of Haynes' portico was the addition of a distinctive board-and-batten trim within the front gable (Jones 2009b). The porch rested on an open pier hewn stone foundation and extended 10 feet from the façade face (Bailey 1991:37). The construction of the portico roof also covered the central window on the second floor. This created a small loft space accessed through the existing window. The front door was also replaced with a decorative five panel door (Bailey 1991:37).

The six-over-six windows of the house were also partially replaced. Haynes removed the shutters and replaced the windows on the front and west side of the house with double-hung two-over-two sash windows and added a decorative trim (Figures 22-24) (Bailey 1991:39). The smaller double-hung six-over-six sash continued to be located on the north wall of the second floor and the east wall. The window openings were flat-headed and the trim consisted of a wood cornice and plain wood sills (Bailey 1991:39). The bedroll trim which decorated the face of the windows was removed during later restorations (Bailey 1991:70).

In the rear of the house the two-story porch was removed along with second floor doors (Bailey 1991:38). The first-floor porch was retained and a shed porch roof constructed (Bailey 1991:38). During Haynes' ownership, horses and carriages could pull up to the north edge of the back porch (Bailey 1991:44). The back entrance was used as a main door while the front door remained a formal entrance which is still practiced to this day (Bailey 1991:44). Extending from the west side of the back porch an ell was attached.

At one time or in phases, Haynes constructed a detached rear ell to the farmhouse (Figures 26 and 27). This consisted of a single-story addition with three rooms which served as a

plantation-style service wing where slaves worked (Jones 2009a:6). It contained, from south to north, a pantry or butler's room, a dining room, and a new kitchen.

Evidence shows that the ell was built in stages. First, a free-standing outbuilding was relocated from an unknown location (Bailey 1989:2; Baratte 1970:125). This was a frame structure with clapboard siding which was partitioned to create the pantry/butler's room and main dining room (Jones 2009a:6). The building measured approximately 24 x 16 ft. A brick chimney was added to the north wall of the dining room. A kitchen addition was then attached to the north end of the ell. A large stone-and-brick chimney was installed on the north wall of the kitchen.

The exterior weatherboarding of the relocated outbuilding remains on the interior of the kitchen and in a void located between the current back porch and ell (Figures 34 and 35). The exterior of the brick chimney is also located in the kitchen. Bailey (1991:22) notes that scars are present on the underside of the mud sills from rolling the building on logs. All of this evidence points to a relocated outbuilding.

An open one-story porch was also constructed extending the width of the east face of the ell. The porch extends roughly seven feet from the building. The porch roof has plain projecting eaves and is supported by turned posts which had decorative brackets (Bailey 1991:38).

Other renovations to the home included painting the exterior, renovating the roof and altering the foundation. The weatherboarding on the exterior of the home was kept by Haynes and the exterior was painted white, indicative of Greek-Revival architecture (Speer 2000:44). Haynes also clapboarded and painted the exterior of the ell. It is believed at this time that Haynes also installed a standing-seam tin roof replacing the previous wood shingle roof. The valley of the roof descended to corner gutters fitted with downspouts (Bailey 1991:57).

Figure 34. Exterior weatherboarding located on interior south wall of attached kitchen.

The foundation of the house was again altered by Haynes. The stone pier supports on the south wall were removed and replaced with flat-faced hewn stones with the exception of beneath the front porch which remained unseen (Bailey 1991:38). The new foundation was constructed of limestone with hewn stones about one-and-a-half feet thick which wrapped around to the chimneys (Bailey 1991:38). The rest of the home and addition stood on individual hewn stone piers enclosed with stacked fieldstone and laid without mortar (Bailey 1991:39).

On the interior of the home, Haynes added the marbleized mantel pieces and faux graining on the millwork including window trim, baseboards, chair rails, and installed new ceiling molding throughout the house (Bailey 1989:2). He also installed bold and colorful Grecian wallpaper throughout the house, except the kitchen, as well as faux marbling and

Figure 35. Exterior weatherboarding located in
void between ell (*left*) and back porch (*right*).

graining (Jones 2009a:6). The entire house had hardwood flooring (Bailey 1991:44).

On the first floor of the main structure, Haynes made changes to the parlor and converted Tipton's library or office into a sitting room (Figure 36). The east room or parlor featured new crown molding as well as false-grained millwork and trim (Bailey 1991:47). The mantel in the east parlor was replaced with a more elaborate Greek-Revival-style mantel, featuring raised panels with tapered posts flanking the firebox as well as faux marbling and graining (Jones2009a:6). The room was fully wallpapered including the ceiling. The ceiling had a flat paper finish while the walls used a bold floral and scroll design (Bailey 1991:47). A wainscoting separated the walls at the base of the window sills (Bailey 1991:47). Behind the wainscoting was a solid color-on-color paper dated to the Federal period found during a previous renovation (Bailey 1991:47). The house was also furnished in the Victorian Louis XVI Revival,

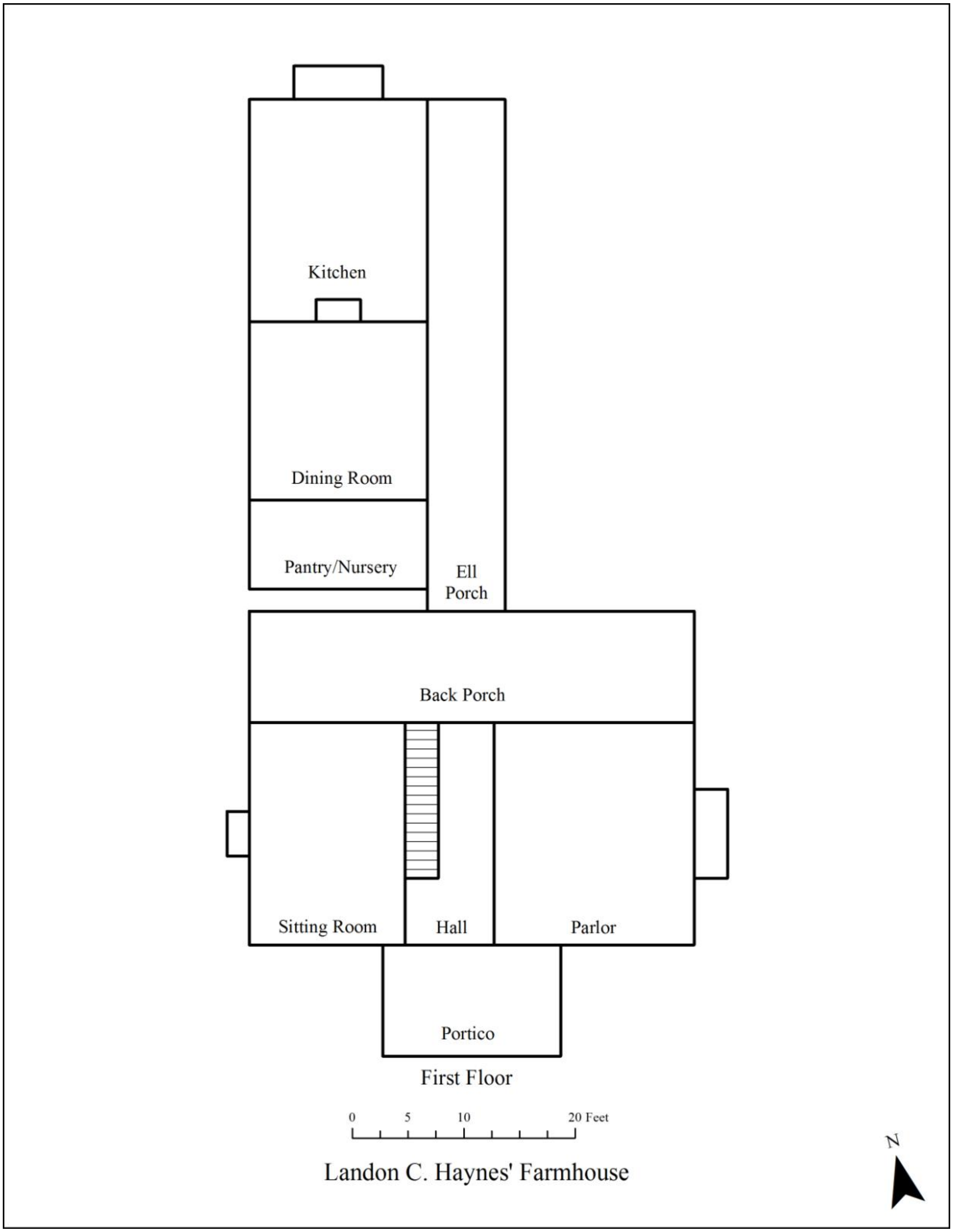

Figure 36. Architectural sketch of Landon C. Haynes' Greek-Revival Farmhouse (First Floor).

Hepplewhite, and Sheraton styles which were removed by family members during the Civil War (Bailey 1991:48).

A bronze chandelier was also installed in the main east parlor (Jones 2009a:6). The chandelier featured two tiers each with four arms (Bailey 1991:47). The candles were set in cups which rested between the wings of cherub figurines (Bailey 1991:47). It was also removed during the Civil War by one of Eleanor Haynes' relatives (Bailey 1991:47).

The family living room or sitting room was located in the west room previously used as a library or office. Traditionally, the sitting room was a utilitarian space and the center of the family's daily life (Bailey 1991:45). The sitting room featured wallpaper, crown molding, and false graining of the woodworking which included the mantel, baseboards, window trim, and doors (Bailey 1991:45). The door is a panel door with raised panels and contains a unique feature. The wood grain on the east face of the living room door contains a silhouette of a bird on the center left panel (Bailey 1991:45). The focal point is the fireplace which was decorated with a brick hearth laid in a herringbone pattern and finished with a false-marblized mantel (Bailey 1991:45).

The second floor (Figure 37) contained many of the features found on the first floor including hardwood floors, fully wallpapered paneled walls, false-grained wood trim, and false-marbled mantels. The east bedroom was used by Landon and Eleanor Haynes and contained a marbleized mantel. This mantel was discarded during previous restorations (Bailey 1991:73, 81). The smaller bedchamber or west bedroom was used by Haynes' two daughters and contained a brick fireplace with a marbleized mantel piece which still survives today. The small partitioned room adjacent to the west bedroom was used as a dressing room. The central bedroom was used by Haynes' four sons. Exits to the second-story porch were also closed off

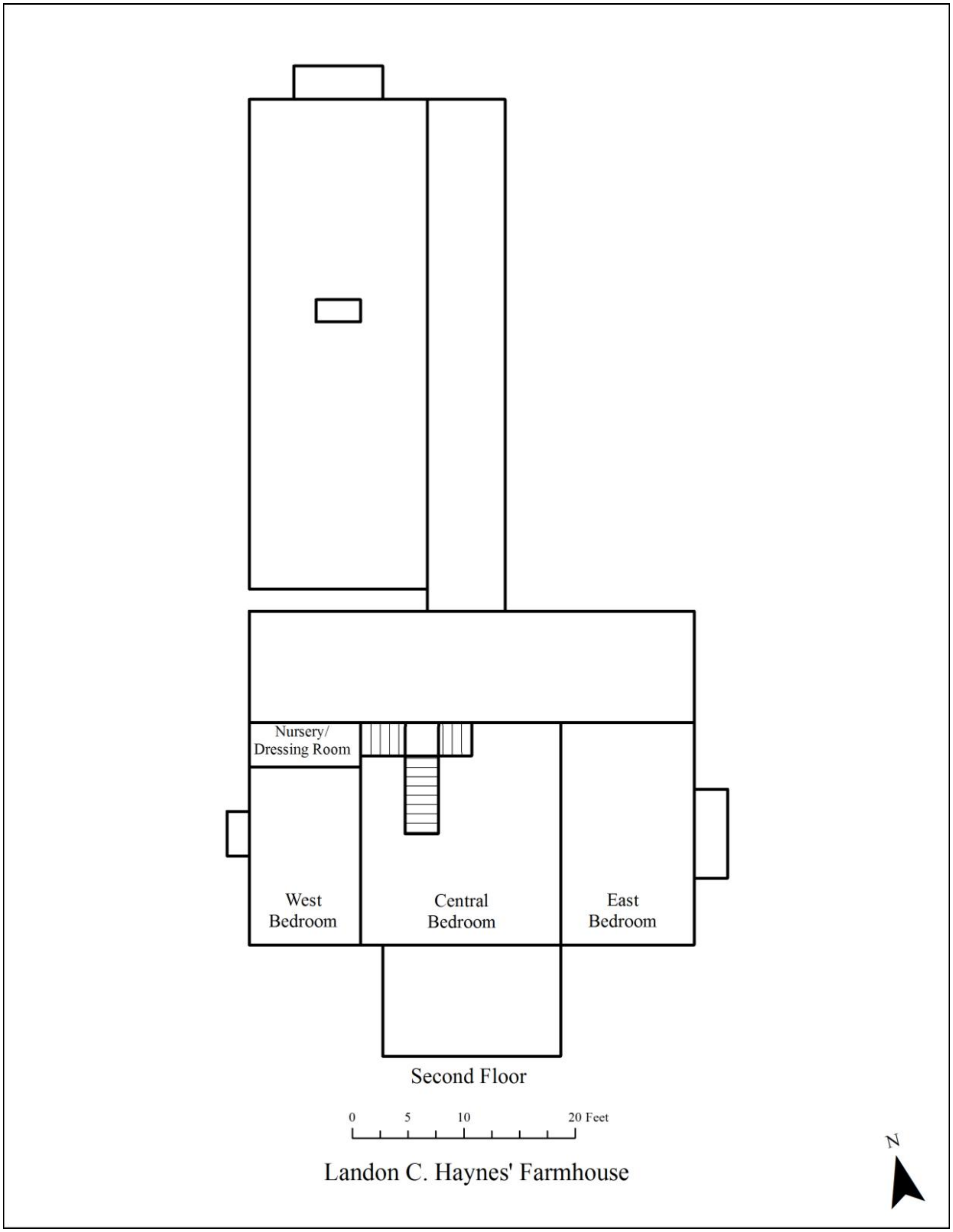

Figure 37. Architectural sketch of Landon C. Haynes' Greek-Revival Farmhouse (Second Floor).

during the renovation (Bailey 1991:38).

The cellar was also renovated by installing dressed limestone walls (Jones 2009a:6). Clapboard siding was also added to separate the cellar and crawlspace beneath the house (Bailey 1991:39). The cellar was then most likely used for storage of food items.

The interior of the ell contains the pantry or butler's room, dining room, and kitchen. Similar to the interior of the main house, the ell featured decorative trim including window trim and baseboards with false graining of the woodwork as well as crown molding and wallpaper (Bailey 1991:72). The interior walls and ceiling were constructed with yellow poplar while the floors were composed of hand-hewn joists covered with pineboard flooring (Baratte 1970:126). Floorboards are believed to be original and do not connect between the pantry and kitchen (Bailey 1989:2).

The south room of the ell served as a butler's pantry or birthing room/nursery and was accessed through the dining room (Bailey 1991:38). The room was wallpapered and featured a decorative stenciled motif (Bailey 1991:74). A single double-hung two-over-two sash window was installed on the west wall (Bailey 1991:39).

The dining room is located adjacent to the butler's pantry in the center of the ell. The dining room featured an entrance door and two-over-two sash window on the east wall. Decorative features included false-grained molding and wallpaper (Bailey 1991:47). A brick chimney with a false-marbleized mantel is located on the north wall of the dining room. A door was cut on the west side of the chimney to access the kitchen and the floors were redone (Bailey 1991:38). Another two-over-two sash window was also installed on the west wall. The dining room was extensively damaged by later restoration efforts including the removal of the wallpaper, trim, and mantel (Bailey 1991:73).

The north room of the ell contained the kitchen. Within the kitchen, the exterior clapboarded wall of the relocated outbuilding is located on the southern wall. The exterior of the brick chimney which services the dining room is also located along the south wall of the kitchen. One unique feature of this chimney is the presence of scouring marks along its edge for the sharpening of tools (Figure 38). Another large chimney was also constructed on the north wall of the kitchen and featured a large Greek-Revival mantel without false marbling. Shelves were also located within the kitchen but were removed during early restoration efforts due to their condition (Bailey 1991:74). A door was constructed on the east wall which accesses the porch and a single two-over-two sash window was installed on the west wall.

Figure 38. Exterior of dining room chimney located in kitchen exhibiting scouring marks.

Simerly Farmhouse

The Simerly family moved to the property in 1872 with Sarah Simerly receiving legal title in 1882 (WCDB 48:533-534). There the family lived until giving the home and adjacent acreage to the State of Tennessee in 1962 after the deaths of Samuel and Lawson (Bailey 1991:56-57). Some improvements were made to the house during their tenure, but overall it retained its former Greek-Revival aesthetic.

The most extensive renovation performed by the Simerly's was the enclosing of the back porch of the main house sometime during the 1880s (Figures 39 and 40) (Bailey 1991:57). This created a one-story sunroom. Six-by-six sash windows were installed on the east and west walls (Jones 2009a:7). A window on the north wall was also installed and featured a large double twelve-sash banded casement window on a sliding track with steel frames and copper-sheeting overlay (Bailey 1991:58). Double six-panel doors were also installed on the north wall creating an entrance from the ell porch (Jones 2009a:8). A brick fireplace was eventually installed on the northwest side of the room and later a stove was believed to be added (Bailey 1991:58). The room was also eventually partitioned into two rooms separated by a central hall (Bailey 1991:58).

As part of this renovation, a narrow passage was created in the area between the porch and ell which was eventually enclosed. The brick chimney for the fireplace was located in the enclosed separation of the main house and ell (Bailey 1991:57). During restoration efforts, the chimney was replaced by a vent for an oil furnace and brick was laid above the roofline to appear to be a chimney (Bailey 1991:75).

The roof of the back porch was also modified as part of the Simerly's renovation efforts. The roof was connected to the ell and the eaves were extended creating a deeper overhang

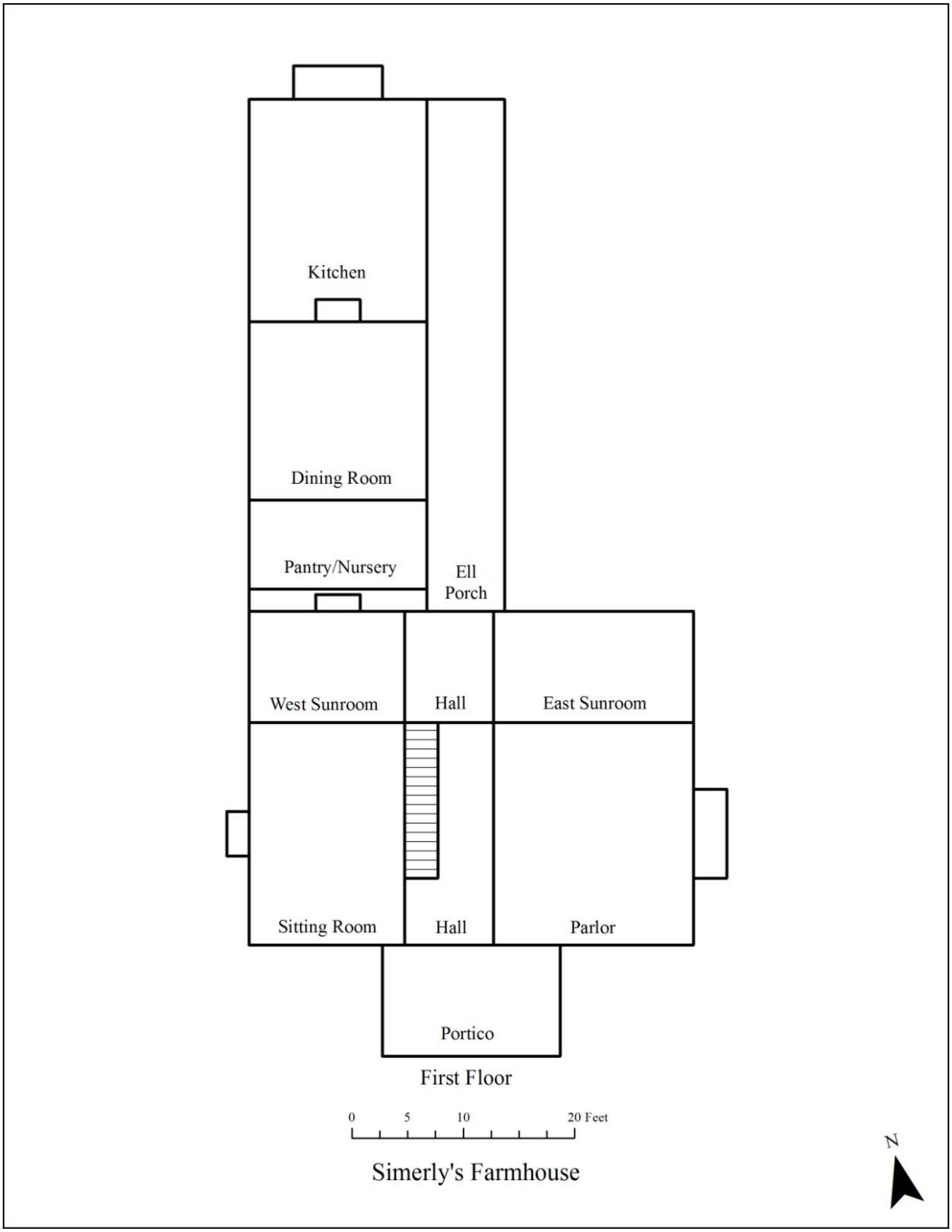

Figure 39. Architectural sketch of Simerly’s Farmhouse (First Floor).

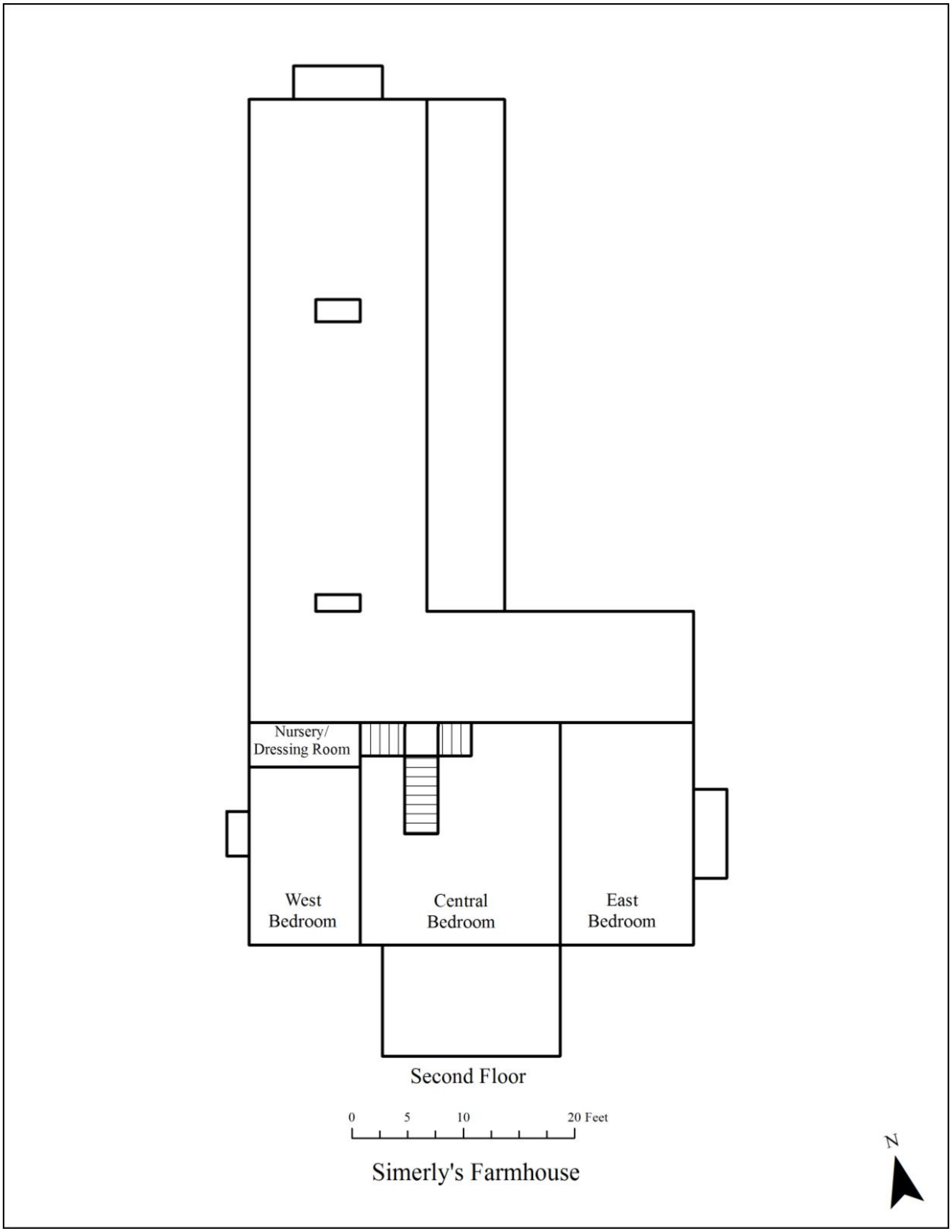

Figure 40. Architectural sketch of Simerly's Farmhouse (Second Floor).

(Bailey 1991:57). Flush barge boards and gable returns were also added (Jones 2009a:7). The gables of the main house were also modified with the removal of the attic windows (Bailey 1991:57).

Other small improvements to the house included enclosing the front porch foundation with clapboard (Figure 24) (Bailey 1991:70). The house also had wood steps leading to the entrances in both front and back (Bailey 1991:70). A ramp was also constructed off the north end of the back porch for Samuel who had lost a leg during the First World War (Bailey 1991:58). Brick was also laid between the limestone piers located in the rear of the main house and ell (Bailey 1991:70).

Modern improvements were also made during the Simerly occupation of the home. At least three stoves were also installed in the home located in the parlor, living room, and the kitchen (Bailey 1991:74). Another stove is also believed to have been installed in the partitioned sunroom (Bailey 1991:58). The stoves were later removed and sold for scrap iron during the 1965 restoration work (Bailey 1991:74). Electricity was also installed in the house in 1935 which included a fuse box located outside on the north end of the back porch near the kitchen door (Bailey 1991:57).

State Ownership

In 1962, Samuel Jr. and Lawson Simerly both died, thereby transferring ownership of the estate and all remaining personal property to the State of Tennessee (Bailey 1991:56-57). The property was owned by the state and administered by the Tennessee Historical Commission within the Department of Environment and Conservation. In 1965, the Tipton-Haynes Historical Association was formed and granted management rights by the Tennessee Historical

Commission (Baratte 1970:125). The Tipton-Haynes Historical Association continues to preserve and manage the site today.

Since the state has acquired the property, two major restoration efforts were conducted on the property between 1965-1971 and 1989-1991. Numerous small-scale restorations have also been conducted on the farmhouse and outbuildings over the years.

After state acquisition, standing-structures located on the site were deemed to be in a sad state of disrepair. The condition of the estate called for the restoration of the house and outbuildings to be completed in order to open the site for public interpretive purposes. With funds raised by the Tipton-Haynes Historical Association and appropriations from the State of Tennessee, the first restoration of the Tipton-Haynes house and outbuildings began in 1965 (Baratte 1970:125; Speer 2000:42).

The Tipton-Haynes Historical Association began restorations of the farmhouse and other outbuildings with no general plan as to the period of restoration. They eventually decided to restore each building on the property to the period of the builder (Bailey 1991:63). The first plan for farmhouse was to restore Col. John Tipton's original log cabin, thereby removing any later additions, but was rejected by the Tennessee Historical Commission (Bailey 1991:63). It was then decided to restore the home to Tipton, Jr.'s tenancy based on Strother's (1857) woodcut (Bailey 1991:63). This plan was enacted and demolition of the ell and removal of any later renovations to the main house were underway when it was stopped by a court injunction requested by the Tennessee Historical Commission (Bailey 1991:63, 68). It was then decided to complete restorations to the period of Tipton, Jr., but retain the ell as a caretaker's apartment (Bailey 1991:68). Some work was completed until this plan was also rejected by the Tennessee Historical Commission (Bailey 1991:68). The Tipton-Haynes Historical Association and its

Board of Trustees then decided to adopt a Statement of Purpose which defines the preservation efforts of the house to, “Present the Tipton-Haynes house and its occupants in a manner which is historically accurate for the 1845-1865 period” (Bailey 1991:68). The Tennessee Historical Commission then gave their full endorsement and cooperation for restoration of the home (Bailey 1991:68).

Because of problems associated with early restoration efforts, the farmhouse has had numerous alterations to the original structure. The exterior of the home received new weatherboarding and was painted (Bailey 1989:3). Doors were replaced including removal of the double doors located at the rear ell entrance. Windows and surrounding trim installed by Haynes was removed (Bailey 1991:70). The extended gables installed by the Simerly’s were retained but the cornice detail was questioned, removed, and then lost (Bailey 1991:69). Porches on the front and back of the home were also restored replacing materials and installing stone steps (Bailey 1991:71, 287, appendix VI).

The most drastic alteration to the exterior was the replacement of the foundation. During the 1965 restorations the foundations were entirely removed and rebuilt with stone and mortared joints (Bailey 1991:71). Due to water undermining the foundation, a stone retaining wall was built in 1972 to prevent damage to the rebuilt foundation (Bailey 1991:76).

The chimneys to the home were also dismantled and reconstructed using the original stones. During the first restoration effort, all chimneys to the farmhouse were razed and rebuilt (Bailey 1991:71; Baratte 1970:126). In 1965 the stone chimney was torn down and five dog irons were found inside (Bailey 1991:74). The chimney restoration was completed in 1969 and is marked with an engraved stone.

Other improvements to the home included modern conveniences. The house was rewired and a security system was installed (Bailey 1991:80). A heating unit was placed inside the former Simerly chimney in the enclosed area between the ell and back porch and included a 275-gallon underground oil tank (Bailey 1991:287, appendix VI). A door was also installed in the west dining room wall replacing a window to allow for a private entrance for the caretaker's residence (Bailey 1991:68).

In 1989, another major restoration and stabilization project was conducted on the Tipton-Haynes farmhouse. The house was found to be structurally unsound because of foundation problems (Bailey 1991:76). Major work was completed to stabilizing the house including the first floor addition and realigning the front porch with new footings (Bailey 1991:191, appendix V; Goist 1994:5).

Other restorations included repainting the exterior and installing new roofing (Bailey 1991:141, 191, appendix V; Goist 1994:5). The doors were replaced with custom wood doors to match originals and the windows were replaced with modern windows (Bailey 1991:191, appendix V). The basement fireplace was rebuilt and brick was added to the floor (Goist 1994:5). Gas was also installed to the fireplaces (Bailey 1991:192, appendix V). Another modern improvement included the installation of a new handicapped access at north end of ell (Bailey 1991:191, appendix V). The previous ramp constructed at the newly cut dining room door was removed and restored to a window (Figures 41 and 42) (Bailey 1991:132, 191, appendix V).

Figure 41. Installed doorway on west façade of dining room seen in 1985 (Photo courtesy of Cliff Boyd, On file Tennessee Division of Archaeology).

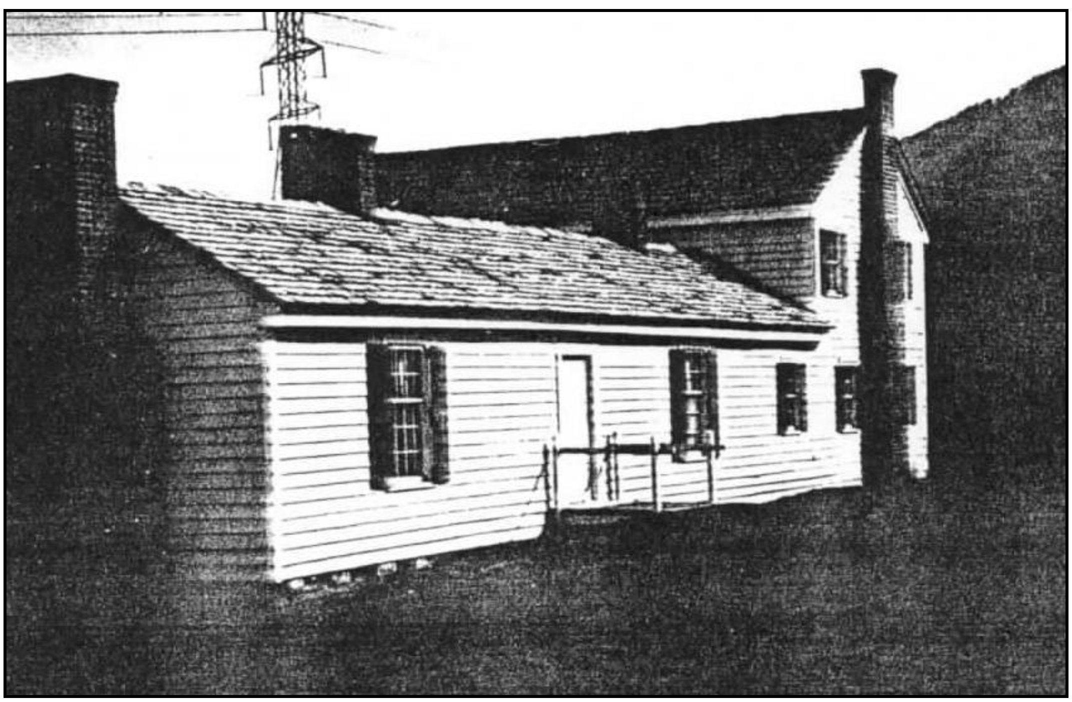

Figure 42. Installed doorway on west façade of dining room (Story 1989:B11).

Outbuildings

Law Office

Figure 43. Law Office facing northeast.

Type: Restored Historic Law Office
Constructor: Landon C. Haynes
Construction Year: 1857-1858
Restoration Year: 1965
Stories: 1
Rooms: 1
Dimensions: 26 x 20 ft
Construction Type: Braced Frame with Weatherboard Siding
Roof: Standing-Seam Metal Roof
Foundation: Limestone

The most notable outbuilding located on the property is Landon Haynes' Greek-Revival Law Office west of the farmhouse (Figures 43 and 44). The law office was constructed at the same time as the farmhouse renovation sometime between 1857 and 1858 based upon the dates

Figure 44. Law Office facing west.

of the woodcut published by Strother and the portraits drawn by Shaver which show Haynes standing in his law office (Figures 11 and 12) (Price 1952:95; SIRIS 2009a; Strother 1857:723). Haynes received his license to practice law in Washington County in 1851 (Speer 2000:37; WCCM 1851). Having temporarily retired from political service, Haynes devoted his time to his law practice (Lawson 1970:118). Haynes is reputed to be the first lawyer of Johnson City and the first to have constructed a free-standing law office (Lawson 1970:118; Williams 1940:20).

The law office is a 20 x 20 ft single-story, one-room structure constructed to mimic the farmhouse. It also features a full-length front porch with columns which extends out roughly six feet from the building. The exterior is covered in sash-sawn clapboard siding and painted white similar to the farmhouse. Constructed with heavy braced frame timbers, it rests on a continuous

limestone foundation and has an exterior brick chimney located on the north elevation (Goist 1994:5; Jones 2009a:6). The roof is also constructed of tin similar to the farmhouse.

The law office exhibits American vernacular construction in the classical Greek-Revival-style with architectural details that duplicate the farmhouse portico (Baratte 1970:126; Jones 2009a:6). One difference being the wood balustrade on the porch to the house and not the law office (Eason 1936:2). The vernacular tapered molded cornice detail of the law office is another unique feature that distinguishes it from the house (Figure 45). It does, however, retain its Greek-Revival style with the inclusion of a wide molded trim (Jones 2009b).

Also on the exterior is located a main entrance surmounted by a transom and flanked by sidelights (Jones 2009a:6). Two 12-over-12 sash windows are located on the east and west ends

Figure 45. Unusual cornice treatment on Law Office.

and are decorated with molded trim (Goist 1994:5; Jones 2009a:6). The windows featured shutters as seen in a HABS photograph (Figure 24) (Jones 2009a:8).

The interior features a vernacular Greek-Revival-style fireplace mantel (Jones 2009a:6). The interior walls and ceiling are constructed of yellow poplar (Baratte 1970:126). The walls are horizontal wood plank walls exhibiting sash saw marks (Goist 1994:5; Jones 2009b). The floors are constructed of hand-hewn joists covered with pineboard flooring (Baratte 1970:126). The interior also featured molded trim with faux graining on the windows and door (Jones 2009a:6; Jones 2009b).

Restoration of the law office was also conducted in 1965 (Bailey 1991:288, appendix VI; Jones 1970:2). This was the second major project of the restoration (Baratte 1970:126). During repairs, the chimney was rebuilt as well as the firebox (Jones 2009b). Other restoration efforts included reconstructing the door, removing the original shutters, and repairing the porch columns (Jones 2009b).

Joinery/Loomery

Figure 46. Joinery/Loomery facing west.

Type: Restored Historic Outbuilding
Constructor: Landon C. Haynes
Construction Year: circa 1857
Restoration Year: 1970s, 1989
Stories: 1
Rooms: 1
Dimensions: 20 x 12 ft
Construction Type: Braced Frame with Clapboard Siding and Originally Board-and-Batten Front Façade.
Roof: Originally Standing-Seam Metal Roof, Today Wood Shingles.
Foundation: Limestone Pier

Located behind the Law Office is the Joinery or Loomery (Figure 46). Both titles have been used synonymously to describe this structure of unknown function which would be more appropriately described as a domestic outbuilding. The term was kept to remain consistent with

Tipton-Haynes' interpretive title of the outbuilding. It has also been described as a slave or servants quarters which is doubtful as there is no evidence of a chimney or fireplace (Jones 1970:3). The original function of this building is unknown; however, it was most likely used as a utility structure such as a work shed or storage shed (Goist 1994:5). It is also likely other activities took place here such as laundering, canning, etc. The building was constructed by Landon Haynes most likely at the same time as the law office and renovations to the house between 1857 and 1858. Architectural features such as frame construction, two-over-two sash windows, and the original board-and-batten façade similar to that found in the gable to the law office point towards this being a Haynes' period construction (Figure 43).

The Joinery/Loomery is a whitewashed frame structure constructed with clapboard siding. Originally the front facade had an exterior of board and batten while the rest was done in clapboard siding (Figure 47) (Story 1989:18). Board and batten was a popular siding for houses between 1845 and 1865 (Jenson 1971:40). Originally, the roof was covered with tin, but today is shingled. The structure rests on a limestone pier foundation which at one time in the past was enclosed in brick (Story 1989:18). Hewn limestone steps are located at the door.

Other exterior features include a single doorway located in the center of the front façade and two double-hung two-over-two sash windows (Bailey 1991:50). On the north and south façade, there are small double-hung gable windows (Bailey 1991:50). At one time, an access door was cut in the north wall in order to store maintenance equipment (Story 1989:18). This has since been covered with new siding.

The interior is a single room utility area. It is paneled with vertical rough-sawn planks (Bailey 1991:50). A loft was also created by the placement of planks over exposed hickory beams (Bailey 1991:50).

Figure 47. Joinery/Loomery prior to restoration circa 1960s.

During early restoration efforts, the joinery/loomery was minimally restored. This must have taken place after 1970 as Jones (1970:3) claims that, “no investigation or restoration has been done.” Later in 1989, original features of the structure were changed including the removal of the board-and-batten façade, the tin roof, and the brick enclosing the foundation (Story 1989:18). The original state of the structure prior to restoration can be seen in Figures 47-49.

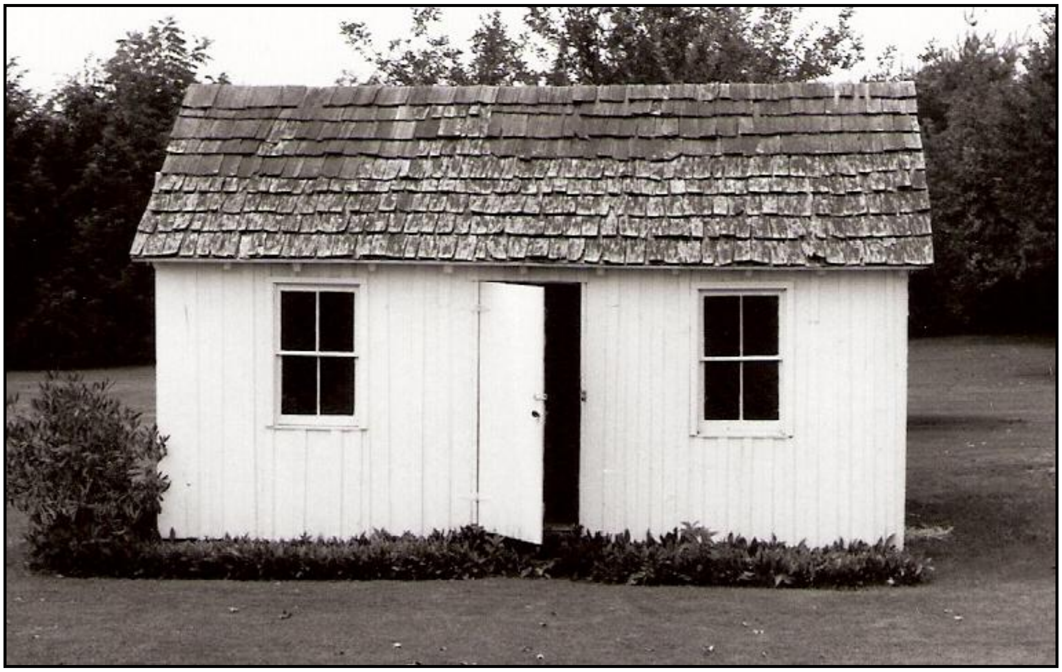

Figure 48. Joinery/Loomery 1985
(Photo courtesy of Cliff Boyd, On file Tennessee Division of Archaeology).

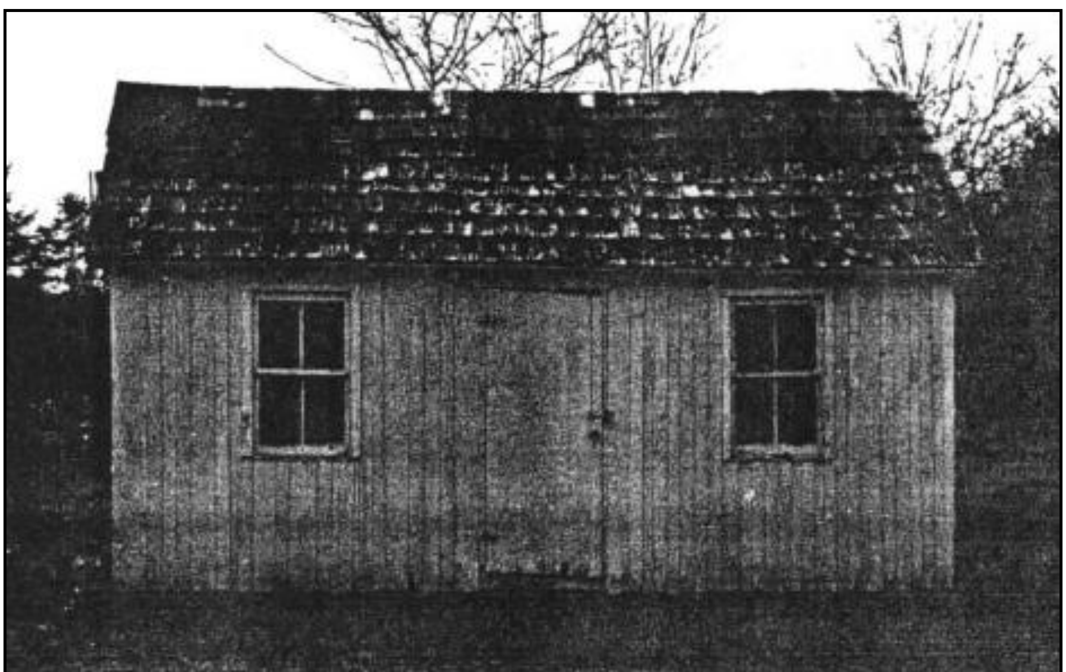

Figure 49. Joinery/Loomery 1989 (Story 1989:B7).

Necessary

Figure 50. Necessary facing north.

Type: Restored/Reconstructed Outbuilding
Constructor: Landon C. Haynes/Simerly
Construction Year: circa 1857
Reconstruction Year: 1969-1970
Stories: 1
Rooms: 1
Dimensions: 5 x 4 ft
Construction Type: Frame with Vertical Board Siding
Roof: Wood Shingles
Foundation: Limestone Pier

The necessary is a small outbuilding originally believed to be constructed by Landon C. Haynes during the renovation of his home (Figure 50). The structure is constructed of whitewashed vertical boards with a wood shingle roof and a limestone pier foundation with no

windows and a single door. The outbuilding was, however, continually in use by the residents of the site until the passing of the Simerly brothers in 1962.

The structure is thought to have been dismantled and a new one reconstructed during the early restorations to the property. Goist (1994:4, 5) describes the present construction as a Simerly period building, but it is believed that the reconstruction was considered during his assessment since it had long since been removed. The original structure is visible in the 1962 aerial photograph (Figure 19), but as Jones (1970:6) suggests, no necessary was standing at the time of his assessment. Therefore, it is believed that a reconstruction was added after 1970. The reconstruction is also believed to have been moved from the necessary's original location.

Smokehouse

Figure 51. Smokehouse facing north.

Type: Reconstructed Outbuilding
Constructor: John Tipton, Jr.
Construction Year: circa 1820s
Renovation Year: circa 1857
Reconstruction Year: 1969
Stories: 1
Rooms: 1
Dimensions: 24 x 10 ft
Construction Type: Log with Half-Dovetail Notching
Roof: Wood Shingles
Foundation: Limestone Pier

The smokehouse is a log building resting on a limestone pier foundation used for smoking or curing meats (Figure 51). It was constructed 65 ft behind the north wall of the main structure of the farmhouse and measures approximately 20 x 10 ft. The logs are hewn on two

sides and exhibit half-dovetail notching with modern daubing.   A single door is located on the south wall and a small window on the north wall. Over the front door a cantilevered roof extends out from the shingled roof an estimated four feet. On the interior, wood salt boxes were at one time installed on either side of the walls (Bailey 1991:51).

The smokehouse is believed to have been originally constructed by Tipton, Jr. (Bailey 1991:25). Later, the structure was razed and a frame structure covered in clapboard siding and a tin roof was added by Landon C. Haynes during his renovations to the property (Figures 52 and 53) (Bailey 1991:51). The smokehouse appears to be a smaller structure as it appears in an old photograph of the property (Figure 53) (Bailey 1991:59). During the 1960s restoration, the smokehouse was demolished and a new reconstructed log smokehouse was built in its place

Figure 52. Smokehouse prior to restoration circa 1930s-1940s.

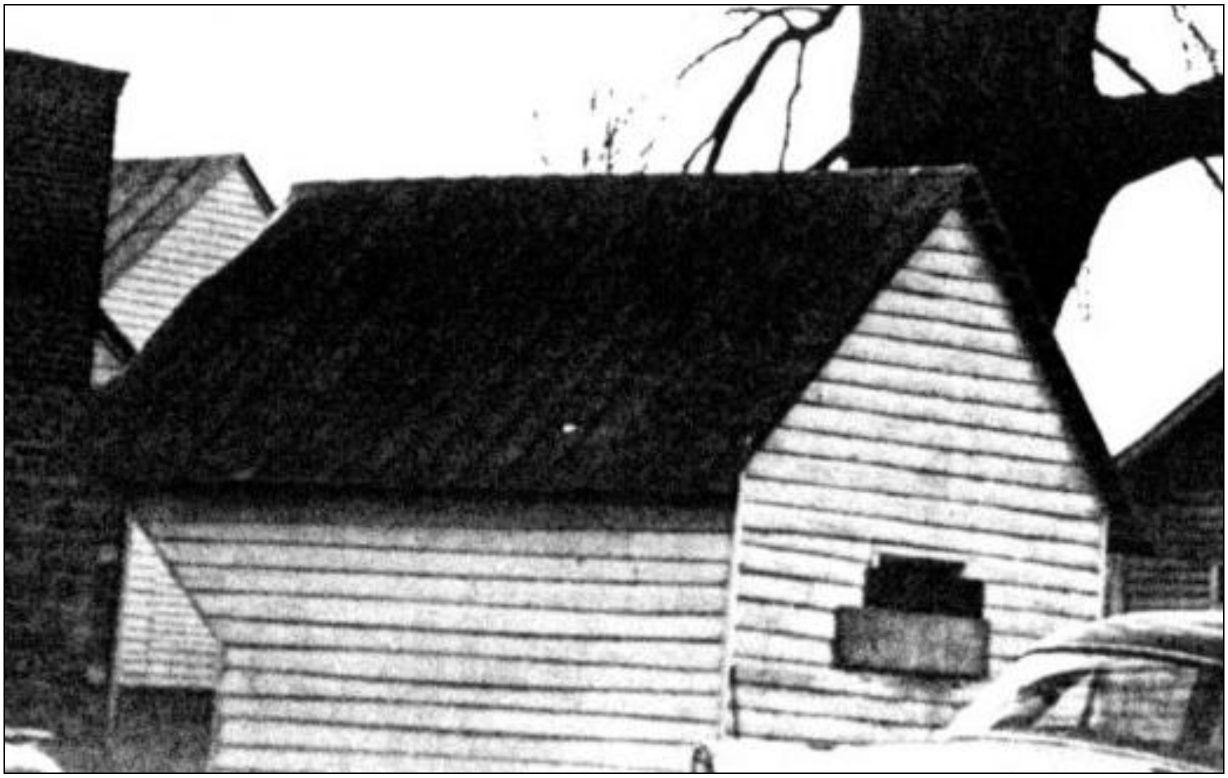

Figure 53. Smokehouse prior to restoration circa 1960s.

(Goist 1994:4; Jones 1970:3). It is unsure if this reconstruction was based on previously unknown archaeological investigations or if the building was conjectured on known historical information.

Double-Pen Barn

Figure 54. Barn facing northeast.

Type: Reconstructed/Restored Outbuilding
Constructor: Colonel John Tipton/John Tipton, Jr.
Construction Year: Late Eighteenth Century/Early Nineteenth Century
Renovation Year: 1850s
Reconstruction Year: 1960s
Stories: 2
Rooms: 2 Pens with Central Bay
Dimensions: 24 x 70 ft
Notching Type: Log with V-Notching
Roof: Wood Shingles
Foundation: Limestone Pier

The double-pen log barn is a reconstructed outbuilding or possibly a restored outbuilding originally believed to have been constructed by Col. John Tipton (Figure 54) (Bailey 1991:12; Goist 1994:4). The large two-story hay and horse barn consists of two pens measuring 24 x 24 ft

separated by a 22-ft breezeway. The logs are hewn on two sides and exhibit V-notching. The building rests on a limestone pier foundation with field stones stacked between. The roof is constructed of wood shingles.

During Haynes' tenure of the property, the barn had cantilevered sides placed on a 12-foot grid on all four sides with vertical siding running from the eaves to the ground (Figure 55) (Bailey 1991:26). Sliding track doors and a tin roof were also installed on the newly enclosed barn. Landon Haynes owned a total of six buggies, two carriages, as well as luggage limber and other farm vehicles during his ownership of the property (Bailey 1991:51). The renovated barn served as Haynes' carriage house having space for both domestic and agricultural vehicles, horse stalls, and hay storage (Bailey 1991:51). The barn is seen in the Strother's (1857) woodcut prior to Haynes' restoration (Figure 11).

The double-pen barn was restored or reconstructed during the 1960s restoration. The barn was the first outbuilding to be restored during the project which was described as, "a little less than a complete wreck" (Baratte 1970:127). The logs of the barn, which were in good condition, were numbered and then the structure was disassembled (Bailey 1991:86; Baratte 1970:127). The remaining logs were burned (Bailey 1991:319). The building was then reassembled using original and replacement logs which were then all numbered for their position (Baratte 1970:127). The building was again dismantled and the logs were soaked in creosote to preserve them and the barn was reassembled excluding chinking between the logs and the cantilevered roof (Bailey 1991:86; Baratte 1970:127).

The barn was deemed to be a reconstruction rather than a restored outbuilding during the THLAP survey. A few logs exhibited embossed painted lettering possibly from the first restoration and they appeared in new condition. Creosote was also not evident on the logs and

Figure 55. Barn with Corn Crib in foreground circa 1930s to 1940s.

only one log was found which contained cut nails while all other visible nails were wire. This would make the structure as a whole less of a restored outbuilding and more of a reconstruction due to the few original remaining structural elements.

Pig Pen

Figure 56. Pig Pen facing south.

Type: Reconstructed Outbuilding
Constructor: Colonel John Tipton
Construction Year: Late Eighteenth Century
Reconstruction Year: 1960s
Stories: 1
Rooms: 1
Dimensions: 16 x 10 ft
Construction Type: Log with Half-Dovetail Notching
Roof: Wood Shingles
Foundation: Limestone Pier

The pig pen is a small outbuilding believed to have been originally constructed by Col. John Tipton sometime after his arrival in 1784 (Figure 56) (Bailey 1991:13). The pen is also visible in the Strother's woodcut drawn in 1856 (Figure 11). The structure is a hewn log reconstruction with half-dovetail notching and no chinking. The structure measures 16 x 8 ft and

is covered with a slanted wood shingle roof extending a few feet from its western edge. A single small door fronts the north face and a small window opening is cut into the west face. The current building is a reconstruction built around 1970 based on Strother's (1857) woodcut (Jones 1970). The pen is believed to have been moved from another location as it appears to be a Smoky Mountain pen for protection from bears rather than the type of structure associated with the local area (Goist 1994:6; Jones 1970:4).

Double-Pen Corn Crib

Figure 57. Corn Crib facing southeast.

Type: Restored Historic Outbuilding
Constructor: Colonel John Tipton/John Tipton, Jr.
Construction Year: Late Eighteenth Century/Early Nineteenth Century
Restoration Year: 1960s
Stories: 1
Rooms: 2 Pens with Central Bay
Dimensions: 45 x 18 ft
Construction Type: Log with Half-Dovetail Notching
Roof: Wood Shingles
Foundation: Limestone Pier

The large double-pen log corn crib has been interpreted as being constructed by Col. John Tipton during the late eighteenth century (Figure 57) (Bailey 1991:12; Goist 1994:4). The building was assessed to be a later construction possibly dating to John Tipton, Jr.'s tenure during the THLAP survey (Jones 2009:5). The corn crib is known to have been standing by 1856 and is visible in Strother's (1857) woodcut (Figure 11).

Each pen of the cabin measures 18 x 9 ft with plank floors and a nine-foot breezeway between which would have been used as a workspace. One entry port is located on each pen within the breezeway. The logs are of poplar and hewn on two sides. Logs were joined using half-dovetail notching with no chinking. A cantilevered shed roof extends nine feet from the west face of the structure. The roof is supported by pegged structural timbers and is covered with wood shingles (Jones 2009a:5). The structure rests on a limestone pier foundation. At one time, the corn crib featured a tin roof and clapboard siding along a portion of the exterior (Figure 17, 55). The eastern section of the breezeway was also cut off by wood planking. The corn crib was restored during the 1960s restoration (Jones 1970:4). It is believed to have been restored at the same time as the barn and in a similar fashion (Baratte 1970:127). The roof as well as a few logs have since been replaced.

Stillhouse

Figure 58. Stillhouse facing south.

Type: Reconstructed Outbuilding
Constructor: Colonel John Tipton
Construction Year: circa 1784
Reconstruction Year: 1960s
Stories: 1
Rooms: 1
Dimensions: 20 x 18 ft
Construction Type: Log with Half-Dovetail Notching
Roof: Wood Shingles
Foundation: Limestone Pier

Located in the east field, the stillhouse is a reconstructed outbuilding believed to have been constructed by Col. John Tipton for the production of whiskey (Figure 58). The structure is mentioned in descriptions of the Battle of the Lost State of Franklin being located near the eminence of rocks where two women were fired upon (Draper 1944-1949:56; Fink 1957:211;

Williams 1933:200). The structure is a log reconstruction with half-dovetail notching and modern chinking. Logs are hewn on two sides. A single door fronts the western face and a wood shingle roof with a covered ventilation shaft covers the building. The structure rests on a limestone pier foundation. An undocumented archaeological investigation was conducted in the 1960s which located the foundation of the structure (Bailey 1991:86; Baratte 1970:127-128). The cabin was reconstructed in the 1960s based on the foundations and configuration specified by the archaeologist (Bailey 1991:86).

Springhouse

Figure 59. Springhouse facing south.

Type: Reconstructed Outbuilding
Constructor: Colonel John Tipton
Construction Year: Late Eighteenth Century
Restoration Year (Spring Box): 1953
Reconstruction Year: 1960s
Stories: 1
Rooms: 1
Dimensions: 20 x 10 ft
Construction Type: Log with Half-Dovetail Notching
Roof: Wood Shingles
Foundation: Limestone

The springhouse is a reconstructed outbuilding believed to have been constructed by Col. John Tipton (Figure 59). The structure is a log reconstruction with half-dovetail notching and no

chinking measuring 16 x 10 ft. Logs are hewn on two sides. A single door fronts the northern face and a wood-shingled cantilevered roof extends an estimated four feet from the building. The spring box was the first renovation at the site in 1953 shortly after the state acquired the property (Lawson 1970:122). An undocumented archaeological investigation was conducted in the 1960s which located the foundation of the structure (Bailey 1991:86; Baratte 1970:127-128). The building was reconstructed during the 1960s restoration of the property and erected on the restored stone encasement for the spring (Jones 1970:5). In 1970, the area fronting the springhouse was dammed and flooded to create a reflecting pond.

Slave Quarter (George Haynes Cabin)

Figure 60. George Haynes Cabin facing north.

Type: Relocated/Reconstructed Outbuilding
Constructor: John Tipton, Jr./Landon C. Haynes
Construction Year: Early to Mid-Eighteenth Century
Reconstruction Year: 1999-2001
Stories: 1 and a Half
Rooms: 1
Dimensions: 20 x 24 ft
Construction Type: Log with V-Notching
Roof: Wood Shingles
Foundation: Limestone Pier

The George Haynes Slave Cabin is a relocated historic structure reconstructed for interpretive purposes in the area believed to have housed the slave quarters (Figure 60). George Haynes was one of Landon C. Haynes slaves as listed in the 1860 Federal Census (USBC 1860a.

A single slave quarter is also listed in the 1860 Slave Schedule (USBC 1860b). The structure was repositioned to fit the location of the building seen in the Strother's (1857) woodcut which is believed to have been the slave quarter.

The relocated structure measures 20 x 16 ft and is constructed of hewn logs with V-notching and chinked with modern materials. A half brick, half limestone chimney was rebuilt on its southern façade and an eight foot front porch with overhanging shed roof was constructed on the eastern façade. The features a single story with loft space. Entry doors are centrally located on the east and west facades and a single window is located on the east and north facades. A window is also located on the north gable of the loft. The structure is covered with a wood-shingled roof and rests on a limestone pier foundation.

The original cabin is described by Bailey (1991) during his architectural survey of the property. He describes a single-story log cabin constructed by John Tipton, Jr.:

> "The building, built on a brick foundation, was of stacked and pegged logs. The ceiling was of round saplings beams or joists, with a wood shingle roof. The windows were double-hung sash formed by cutting holes in the logs. The chinked single story log building was entered through a door hung on wooden hinges on the east façade, opposite the farm lane, facing the corn crib. On each side of the door was located a window, which was repeated on the opposite wall. The brick chimney was located on the south side of the building and was reflected by a single window located directly opposite it. The cabin had a shed roof porch supported by square posts and at a later time the building was covered with shiplap siding. The building measured approximately twenty-two by thirty feet" (Bailey 1991:25-26).

During the early restoration years, an undocumented archaeological excavation on the property found the original foundation of the slave quarters (Baratte 1970:128). This building was then reconstructed as a visitor's center on the east side of the barn (Baratte 1970:128). Another letter from Bailey (1990) also describes another structure as the slave quarters seen in the 1960s aerial photograph (Figures 19 and 20) and also seen in Figure 17. This was believed to be a log cabin covered in clapboard siding located opposite the corn crib (Bailey 1990). The 20 x 30 ft structure was removed due to its advanced deterioration and structural instability leaving a depression in the lawn (Bailey 1990; 1991:86). This is the cabin believed by Bailey (1990; 1991:86) to have been exactly reproduced in the construction of the log visitor's center in use at the site.

Offices and Museum

Figure 61. Offices and Museum facing south.

Type: Reconstructed Outbuilding/Modern Interpretive Facility
Constructor: Tipton-Haynes Historical Association
Construction Year: 1969
Renovation Year: 1974, 2000
Construction Type: Modern

After the state acquired the property and the management rights were given to the Tipton-Haynes Historical Association, a visitor's center was constructed for interpretative purposes in 1969 (Figure 61) (Goist 1994:4). The building was originally a simulated log construction built to the exact size and configuration of the demolished outbuilding thought to be the slave quarter previously located west of the barn (Figures 17, 19-20, 62) (Bailey 1990; Goist 1994:4; Jones 1970:6). The Carroll Reese Visitor's Center was built northeast of the barn to provide access

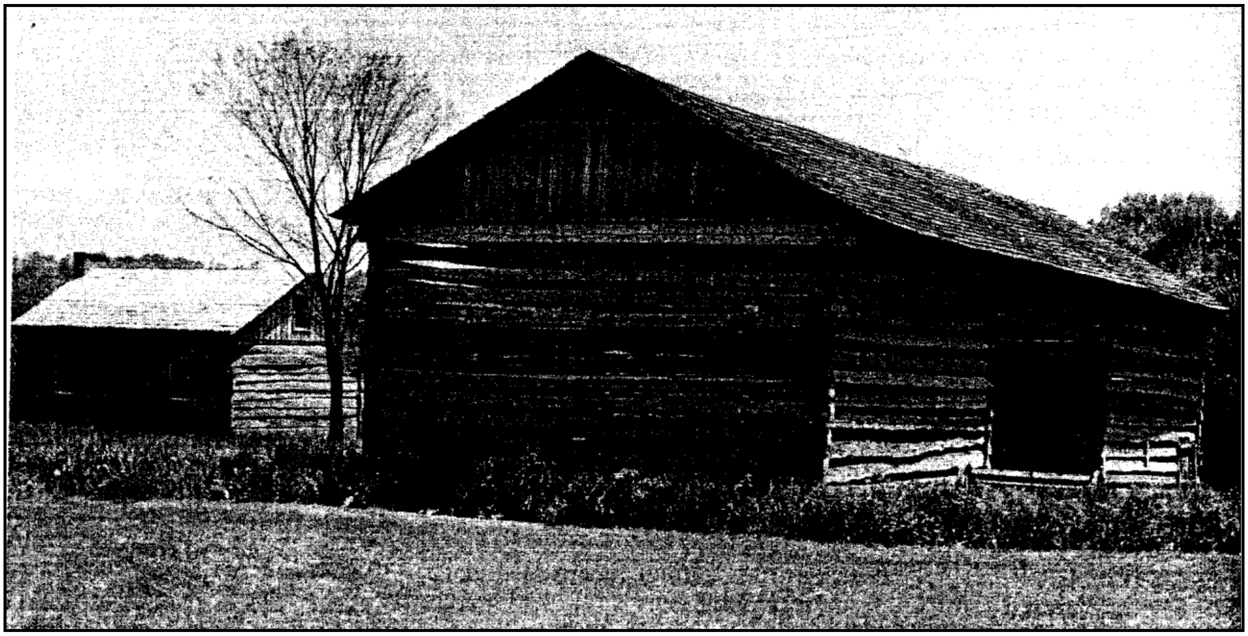

Figure 62. Newly constructed Visitor's Center behind restored barn
circa 1970 facing northeast (Baratte 1970:112).

from the entrance on South Roan Street. In 1974, renovations were made to the log visitor's center including two additions (Goist 1994:4). Onto the original structure was added a 20 x 40 ft gallery and a four room caretaker's apartment both constructed of brick (Bailey 1991:86). Prior to this, a mobile home served as the caretaker's residence (Jones 1970:6). Again in 2000, renovations were made to the visitor's center creating the building seen today (Figure 61) (Speer 2000:44). The visitor's center serves as a modern interpretive center and houses the museum, archives, offices, and apartment space. Besides the visitor's center, another small modern structure was constructed in 1984 to serve as a tool shed in the northwest corner of the property (Figure 3). A modern log shelter was also constructed in the northeast field of the property for visitors. Other constructions included a brick fire pit and free-standing sorghum press.

Non-Standing Structures

Other non-standing structures are also known to have been located on the property from previous historical research. Col. John Tipton's barn and stable to the west of the farmhouse are seen in the memory map provided by the Draper Manuscripts (Figure 6) (Draper 1944-1949). Within Strother's (1857) woodcut, one previously unidentified structure is present possibly representing a possible kitchen addition (Figure 11) (Strother 1857:723). A kitchen outbuilding is mentioned by Bailey (1991:9) as having been constructed where the current kitchen stands today measuring 20 x 16 ft and built 27 ft north or rear of Tipton's log cabin. Historic photographs also show the location of a chicken coop (Figure 23), a small shed (Figures 19 and 20), and another unidentified farm outbuilding, possibly the slave quarter described by Bailey (1990) (Figures 17, 19-20). Another storage shed, believed to have been constructed by the Simerly family, stood behind the law office until 1970 (Figures 14, 18-20) (Bailey 1991:86). An archaeological survey in 1985 also uncovered a previously unknown structure located west of the current dining room (Boyd 1989; Boyd and Riggs 1986, 1990).

CHAPTER IV

DENDROCHRONOLOGY

Dendrochronology was also included in this contextual investigation of the Tipton-Haynes landscape in order to temporally place some of the extant structures on the historic landscape. Dendrochronology is the study of the chronological sequence of annual growth rings in trees (Stokes and Smiley 1968). In a more formal sense, "dendrochronology is the science that uses tree rings dated to their exact year of formation to analyze temporal and spatial patterns of processes in the physical and cultural sciences" (Grissino-Mayer 2010). By crossdating wood samples, undated samples can be correlated with dated samples to attain accurate cutting dates for logs used in the construction of structures. In respect to the cultural sciences, the use of dendrochronology to date historic structures in the southeast has increased over the past few years (DeWeese Wight and Grissino-Mayer 2004; Grissino-Mayer 2009; Grissino-Mayer and van de Gevel 2007; Grissino-Mayer et al. 2009; Henderson et al. 2009; Lewis et al. 2009; Mann 2002; Slayton et al. 2009). This research has allowed for the exact dating of historic structures whose construction dates are unknown or whose proposed dates of construction are usually suspect.

For this project, dendrochronological methods and techniques were applied in an archaeological context to date the construction and any renovations of existing historic structures. Primary testing was conducted on structures which were known to be original including log sections of the farmhouse and corn crib. An unsuccessful attempt was also made to collect a core sample from the large elm tree in front of the farmhouse thought to be planted during Tipton, Jr.'s residency. The application of this technique provides an understanding of

the history of construction on site and allows for an assessment of the changing landscape through time. Specifically, dendrochronology is used in this project to supply a construction date for the original Tipton cabin and later additions to the farmhouse, as well as to establish a construction date for the corn crib. The cabin is believed to have been constructed in 1784 to as late as 1790 by Col. Tipton based on the THLAP architectural survey with later additions added during the nineteenth century. The corn crib is also believed to have been constructed by Col. Tipton during the late eighteenth century.

Field Collection

Field collection included collecting samples from areas with exposed logs within the farmhouse and log sections of the corn crib. Dr. Grissino-Mayer from the Laboratory of Tree-Ring Science at the University of Tennessee along with students enrolled in his dendrochronology course assisted the author in collecting core samples from the farmhouse and corn crib (Figures 63-65). Dustin Lawson and the author also completed collection within exposed portions of the farmhouse.

Cores were collected as necessary to maximize the sample size and integrity necessary to establish an accurate cutting date for each log. Sampled logs were selected based on their state of preservation, accessibility, and minimal invasiveness with the overall goal being to collect samples that would yield information about construction and renovation episodes. The logs were first inspected for rot or insect damage, then for rounded surfaces at the edges of the planed surface in order to find the exterior of the tree and the last year of growth. Logs were finally selected based on their position, sometimes taking two samples from a single log to ensure crossdating accuracy.

Samples were collected using a hollow drill bit designed to extract half-inch diameter cores connected to an electric hand drill (Figure 63). Logs were cored from the outermost ring to the pith of the timber if possible. If the condition of the core was deemed poor, it was discarded and another sample was taken. Once extracted, the cores were glued onto a wooden core mount, positioning them with their cells aligned vertically in order to obtain a transverse plane for accurate measuring and then labeled with the sample number (Figure 65). The provenience information was also recorded on sketches completed by Lisa LaForest and the author. A total of 45 samples were collected from 26 logs within both structures with seven samples and four logs unable to be accurately dated due to poor preservation. The following section summarizes collection methods from each structure.

Figure 63. Coring of Double-Pen Corn Crib.

Figure 64. Half-inch diameter core extracted from Corn Crib (Photo courtesy Grant Harley).

Figure 65. Mounting of core extracted from Corn Crib.

Farmhouse

As previously discussed in the architectural survey chapter, the original Tipton cabin is a single pen 20 x 30 ft cabin built from hewn oak logs with V-notching. The cabin was thought to have been constructed by Col. Tipton when he purchased the property in 1784 which would make it one of the oldest extant structures in Tennessee. However, during the architectural survey, the structure was believed to have been constructed after 1790 based on architectural features such as beaded ceiling joists (Jones 2009a:2). Tipton, Jr. made later additions to the farmhouse including constructing a western addition and raising the roof around 1820. Assessed property values indicate a major improvement between the years 1819 and 1825 (Bailey 1991:20). Later, Landon C. Haynes made improvements to the home between 1857 and 1858 based upon Strother's woodcut and Shaver's portraits (Baratte 1970:126; Price 1952:95; SIRIS 2009a, 2009b; Strother 1857:723).

Collection of core samples was aimed at refining the dates of construction and renovation to the farmhouse. A total of 21 core samples were collected from 13 logs in four different sections of the farmhouse with exposed logs suitable for testing. Logs averaged 0.8 ft in height and 0.5 ft in width and were hewn on two sides with exposed bark present. Collection areas include the back porch, the back porch attic, the portico attic, and the crawl space under the stairwell.

Back Porch

The easiest section available for testing was located on the first floor within the enclosed back porch. The north wall of the original log cabin was left exposed during early restorations to the farmhouse for interpretive purposes (Figure 66). Exposed sections lacked bark, but the

Figure 66. Exposed logs within enclosed back porch.

preserved smooth exterior or last year of growth of the tree was present allowing for accurate dating. Four logs were cored from this area taking a total of seven samples labeled “BP” and the log’s estimated position above the sill log “1 - 6” (Figure 67). If more than one sample was taken from a single log or log section, “A” or “B” was added as the suffix.

Back Porch Attic

Access to the rear first-story attic is located above the back porch. Within this space, the second story of the log cabin was available for testing (Figure 28). Poor preservation, however, yielded only two samples from separate logs (Figure 67). These were labeled “UBP1” and “UBP2” consecutively. Samples were able to be obtained only from the lower section of the original one-and-a-half story cabin.

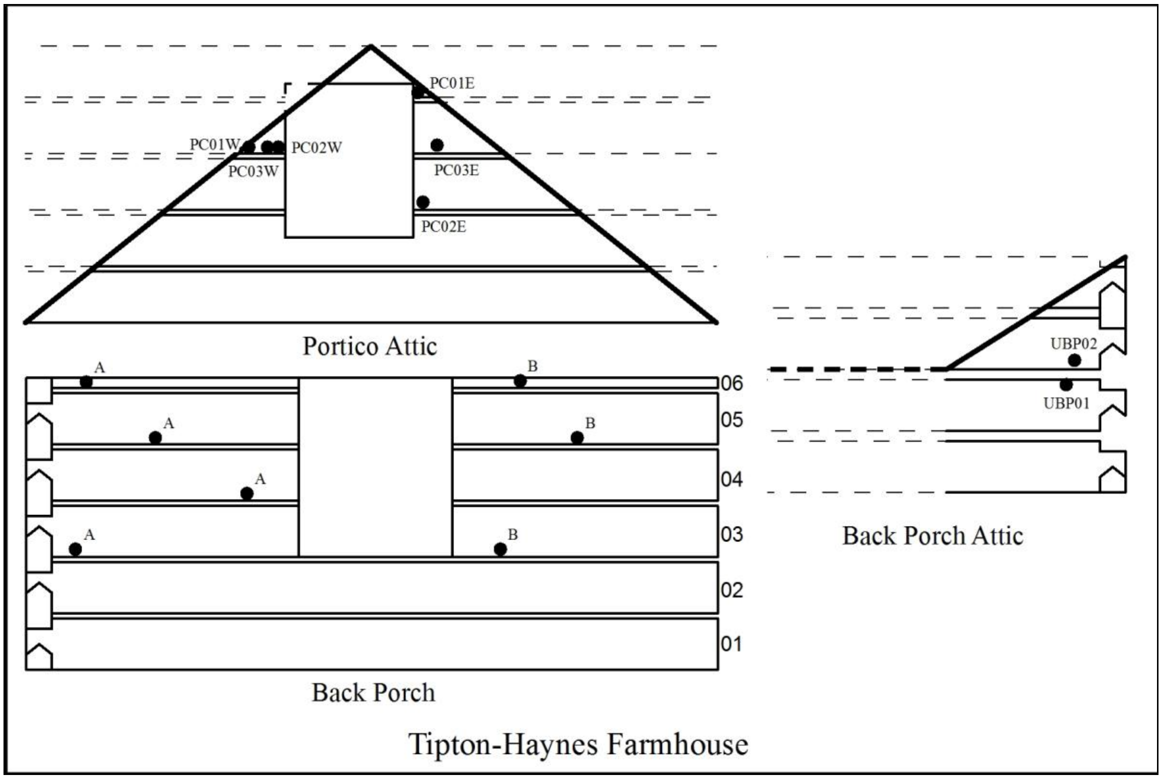

Figure 67. Core sample collection from Farmhouse.

Portico Attic

Testing was also possible on the south wall of the original cabin located on the second story above the portico (Figure 68). Here is located a small attic space accessed through the enclosed central window. Six cores were extracted from three logs (Figure 67). These were labeled consecutively "PC#East" or "PC#West" depending on their location on either side of the window. Samples collected here were also only able to be obtained from the lower section of the original one-and-a-half story cabin.

Crawlspace Underneath Stairwell

The crawlspace located underneath the stairwell allowed access to sill logs for the later western addition and back porch addition installed by Tipton, Jr. (Figure 69). Four logs were

Figure 68. Portico attic accessed through second-story window.

cored, collecting a total of five samples labeled consecutively as “Floor 01-05” (Figure 70). These were the only samples accessible for dating any later additions to the core cabin.

Corn Crib

The double pen corn crib is a 45 x 18 ft structure built from hewn poplar logs with half-dovetail notching (Figures 57, 63). The log corn crib is made up of two pens each measuring 18 x 9 ft separated by a nine-foot breezeway. The large grainery is thought to have been constructed by Col. John Tipton during the late eighteenth century (Bailey 1991:12; Goist 1994:4). During the THLAP architectural survey, however, the building was assessed to be a later construction, possibly dating to John Tipton, Jr.’s tenure based on construction techniques

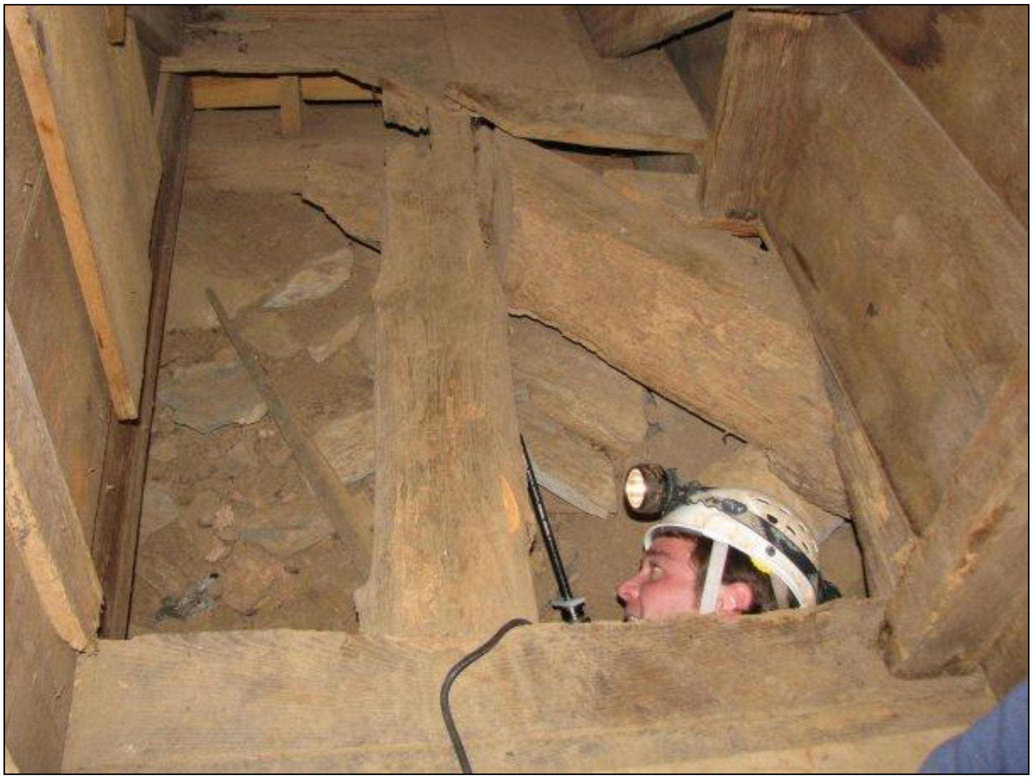

Figure 69. Coring sill logs in crawlspace underneath stairwell (Photo courtesy Lisa LaForest).

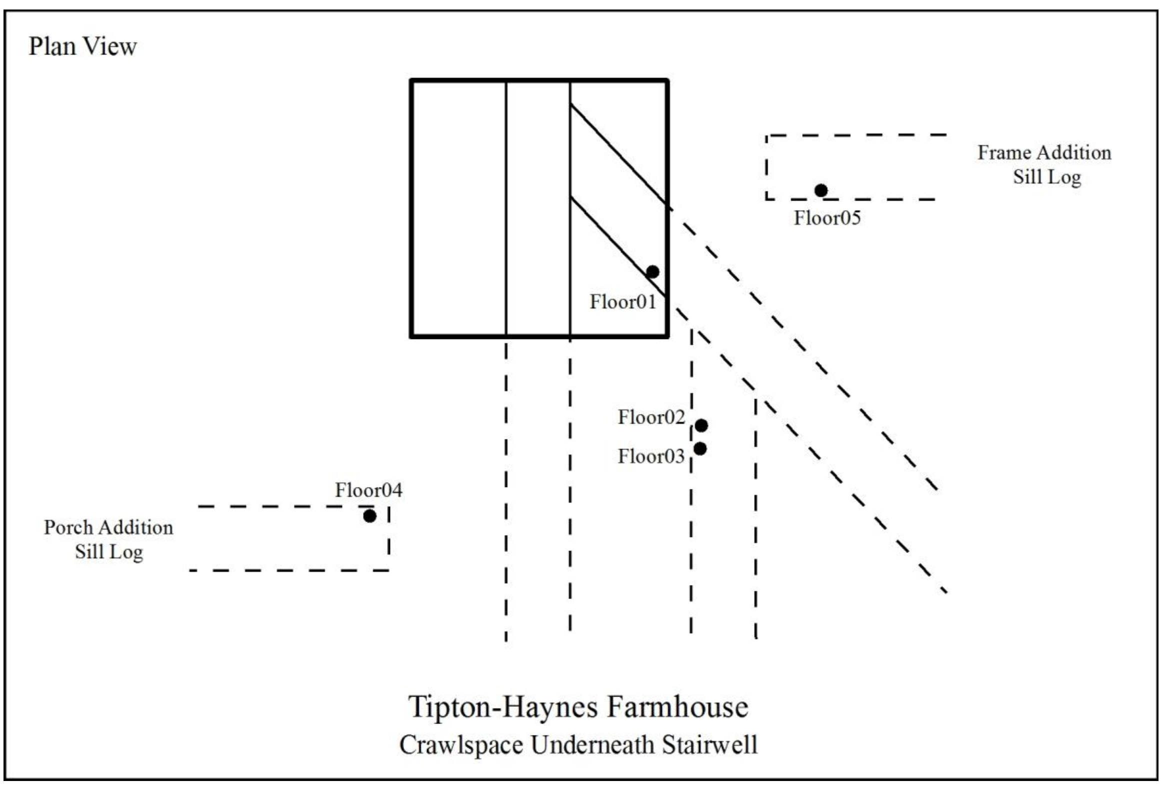

Figure 70. Core sample collection from Farmhouse.

(Jones 2009a:5). The corn crib is known to have been standing in 1856 and is visible in Stother's (1857) woodcut (Figure 11).

Core samples were collected from the corn crib specifically to date its construction. Samples from both pens were collected totaling 24 cores from 17 logs. Each pen was labeled by its cardinal direction north or south. Logs averaged 1.2 ft in height and 0.5 ft in width and were hewn on two sides with bark present on the exterior.

North Pen - Pen 1

The northern pen was tested on three walls including the northern, southern, and eastern faces. Eleven samples were collected from a total of nine logs. Samples from the north pen were labeled "CC1" with their corresponding cardinal wall direction "N, S, E, W", log number above the sill "1-6", and "A" or "B" for consecutive samples from each log (Figure 71).

South Pen - Pen 2

The southern pen was tested on three walls including the northern, eastern, and western faces. Thirteen samples were collected from eight logs. Samples from the south pen were labeled "CC2" with their corresponding cardinal wall direction "N, S, E, W", log number above the sill "1-6", and "A" or "B" for consecutive samples from each log (Figure 72).

Laboratory Methods

Mounted core samples were then transported to the University of Tennessee's Laboratory of Tree-Ring Science for processing. Cores were first examined for correct positioning to ensure their cells aligned vertically in order to get a transverse plane for accurate measuring. Once

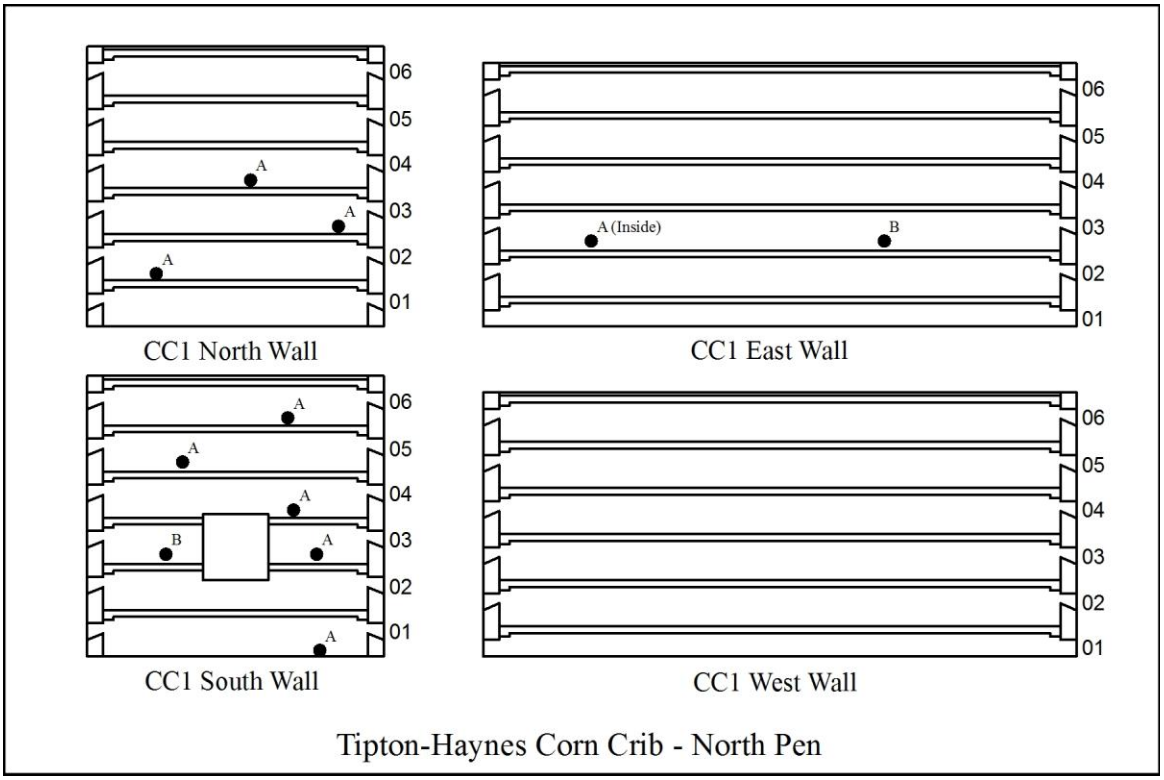

Figure 71. Core sample collection from Corn Crib (North Pen).

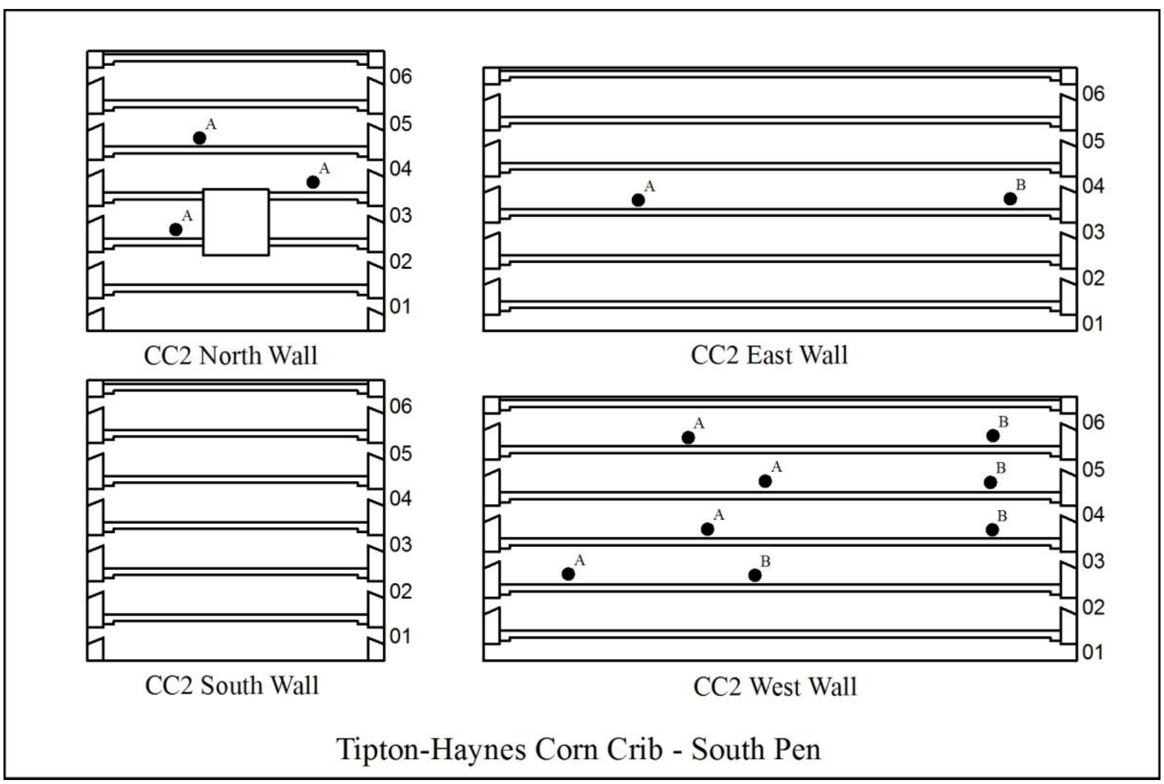

Figure 72. Core sample collection from Corn Crib (South Pen).

dried, the samples were then sanded at finer and finer increments beginning with 100-grit sandpaper and ending with 220-grit to allow for proper inspection under the microscope (Orvis and Grissino-Mayer 2002). If a core was incorrectly mounted, the sample was sanded along its traverse plane.

Sanded cores were then inspected under a microscope. All samples from the farmhouse were identified as a ring-porous hardwood belonging to the White Oak Group (*Quercus alba L.*) due to the noticeable large earlywood vessels and flame-shaped tracts in the latewood pores (Maryland Archaeological Conservation [MAC] Lab 2009a; Panshin and De Zeeuw 1980:569). (Figure 73). All samples from the corn crib were identified as a diffuse-porous hardwood commonly known as Tulip Poplar (*Liriodendron tulipifera L.*) from the greenish-brown hardwood, conspicuous narrow and uniform rays, and growth rings delineated by a narrow white band of marginal apotracheal parenchyma at its outer edge (Figure 74) (MAC Lab 2009b; White 1980:60).

Some samples also showed evidence of beetle galleries and a few had rot on their outermost rings. After examination, seven cores from four separate logs were deemed unsuitable for crossdating due to poor preservation, insect damage, or incorrect mounting and were removed from the study (CC1S04A, CC2E04A, CC2W03B, PC02East, Floor 1-3). One sample (CC1S01A) was unsuitable to use for dating due to missing rings but was kept to help crossdate other samples. The rings on the remaining samples were then counted assigning the innermost complete ring the relative year “1” and marking every tenth year thereafter to the last complete ring. The rings of each core were then measured to the 0.001 mm using a Velmex micrometer and MeasureJ2X software which records the measurements. These measurements were then saved as a text file and entered into the computer program COFECHA.

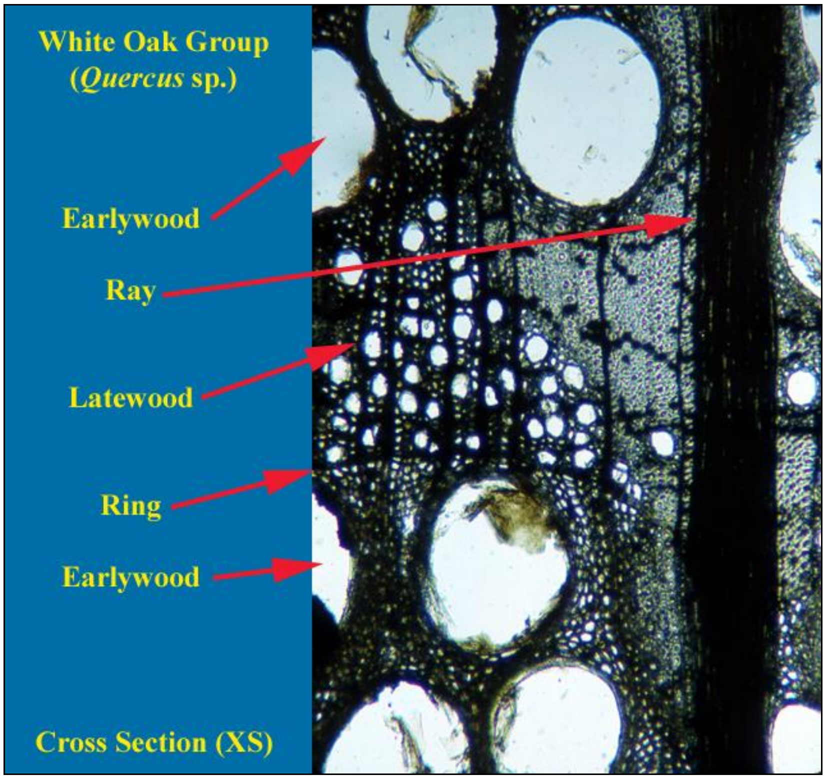

Figure 73. White Oak cross section showing characteristic traits (MAC Lab 2009a).

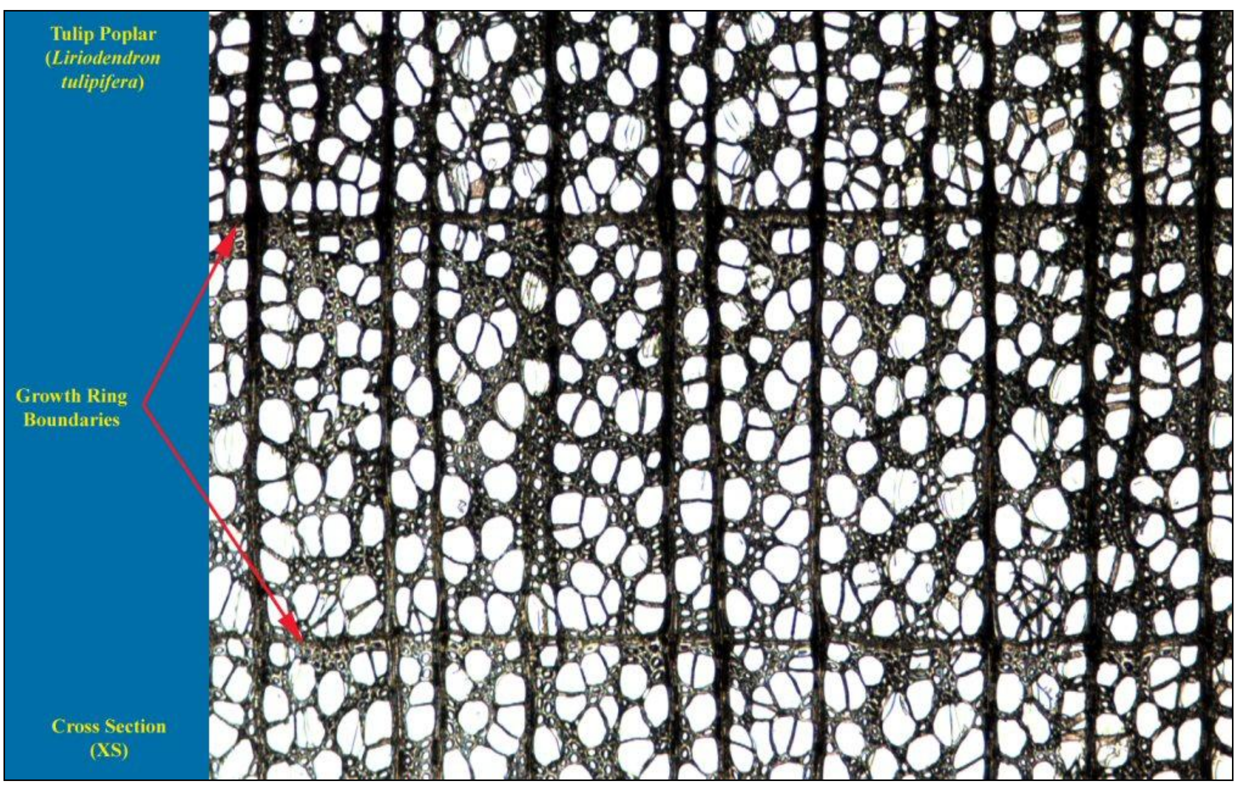

Figure 74. Tulip Poplar cross section showing characteristic traits (MAC Lab 2009b).

Crossdating

The samples were then crossdated. This process ensures that precise dating is possible because tree growth is directly affected by variations in climate which is recorded by the trees (Fritts 1976:2). The technique refers to the identification of a ring to its exact year of formation by matching patterns between different trees or wood samples. By applying crossdating, undated samples are correlated with dated samples using the program COFECHA to verify the last year of growth or rather the cutting dates of the logs.

"COFECHA is a computer program that assesses the quality of crossdating and measurement accuracy of tree-ring series" (Grissino-Mayer 2001:205). This program uses statistics to remove undesirable signals and exploit high-frequency trends that are necessary for crossdating. COFECHA uses a segmented time series correlation technique to determine whether a correlation coefficient exists that is significant at the 0.01 probability level allowing for accurate dating. The quality of the crossdating is assessed by examining two gauges, the overall average interseries correlation and the mean sensitivity of the series which is a measure of year-to-year variability. The average interseries correlation should be generally greater than 0.4 while the mean sensitivity should be around 0.2 for hardwoods in the Southeast to have enough variability to ensure accurate crossdating (Grissino et al. 2009:67).

To crossdate the core samples, two dated chronologies provided by Dr. Grissino-Mayer of the University of Tennessee's Laboratory of Tree-Ring Science were used to create a master chronology. The master chronology consists of two sites located in Tennessee including White Oak (*Quercus alba* L.) chronologies from Norris Dam State Park (1633-1980 AD) (100 miles west) as well as dated White Oak (*Quercus alba* L.) cores from the William Cobb House and Massengill Dining Room at the Rocky Mount site (1667-1829 AD) in Piney Flats (nine miles

north) (Grissino-Mayer and van de Gevel 2007; Grissino-Mayer et al. 2009). The Norris Reservoir chronology consists of 71 dated series with a high average interseries correlation of 0.61 and an average mean sensitivity of 0.2 (Slayton et al. 2009:26). The Rocky Mount chronology consists of 88 cores or series with an interseries correlation of 0.6 and an average mean sensitivity of 0.24 (Grissino-Mayer et al. 2009:67). Because climate is a regional phenomenon, these chronologies provided useful data for crossdating the Tipton-Haynes samples.

The undated sample measurements of each structure were then placed into COFECHA against the master series to date the cores. The output displayed a high correlation value above 0.4 ($p<0.01$) for most samples. The dates were then plugged into the measurement file using EDRM software and run again through COFECHA against the master. An interseries correlation was then computed on the suggested dates to check accuracy. Once this was completed, those samples that had low correlations (>0.4) or problems were removed from the sample and treated as undated. The undated samples were then run against the master chronology and the dated samples that had a high interseries correlation to see if a date could be established. The suggested interseries dates were then reentered using EDRM and run through COFECHA to assess the interseries correlation. At this point, any problem cores were remeasured as suggested by COFECHA. These were then run through the previous tests and added back to the sample. The final dated cores were then run through COFECHA to produce an interseries correlation providing a statistically valid date for all samples. Cutting dates were also assessed and assigned standardized symbols describing the condition of the sample’s outer ring (Bannister 1962; Grissino-Mayer et al. 2009; Nash 1999). Once each structure was dated, the final chronologies were combined and again run through the previous steps to assess its quality. The results of each

structure and the combined master chronology are reported in the next section and provided in Appendices II-VIII.

Results

Farmhouse

A total of 17 cores from 10 white oak logs were accurately crossdated from the farmhouse cabin using COFECHA. The final results show a high average interseries correlation of 0.64 and a mean sensitivity of 0.181 just below the standard (Table 41). Though below 0.2, the sample is believed to have enough variability to be suitable for accurate crossdating.

Of the 55 segments tested, two were flagged suggesting an alternate date (Tables 41 and 42). These flagged segments were both from PC01W and rechecked to verify correct temporal placement. The alternate placement suggested by COFECHA was illogical. Two other samples from the same log section (PC02-03W) and an additional two samples on the same log (PC03-04E) helped to verify this placement (Figure 67; Table 42).

Cutting dates for the farmhouse cabin are shown in Table 43. Results show that the farmhouse cabin logs were cut in 1798 and 1799. The lower logs on the first story and rear second story all date to 1798 while the front second story logs date to 1799. Two sill logs located in the crawl space below the stairs were also dated to 1798 and 1821. Sample Floor 4 located under the porch addition was considered to be near a cutting date due to missing rings at the tip with the presence of sapwood. One other sample, BP06B was also a near-cutting date though the log was dated to 1798.

Table 41. Dating statistics for white oak logs from Farmhouse.

Back Porch	Length	Begin Year	End Year*	No. Segments Tested	No. Flagged Segments	Inter-series Correlation	Mean Sensitivity
BP03A	48	1751	1798	2	0	0.886	0.158
BP03B	45	1754	1798	2	0	0.739	0.140
BP04A	60	1739	1798	4	0	0.537	0.162
BP05A	44	1755	1798	2	0	0.483	0.191
BP05B	49	1750	1798	2	0	0.785	0.197
BP06A	58	1741	1798	3	0	0.720	0.156
BP06B	63	1733	1795	4	0	0.635	0.176
Back Porch Attic							
UBP01	60	1714	1798	4	0	0.493	0.218
UBP02	85	1735	1798	5	0	0.674	0.200
Portico Attic							
PC01East	65	1735	1799	4	0	0.463	0.219
PC03East	48	1752	1799	2	0	0.610	0.170
PC04East	47	1753	1799	2	0	0.828	0.180
PC01West	70	1729	1798	5	2	0.592	0.210
PC02West	71	1729	1799	5	0	0.810	0.154
PC03West	70	1730	1799	4	0	0.789	0.164
Crawlspace Underneath Stairwell							
Floor04	64	1758	1821	2	0	0.742	0.181
Floor05	57	1742	1798	3	0	0.390	0.174
Total or Mean:				55	2	0.654	0.181

*Last measurable ring on the series.

Table 42. COFECHA results: Correlation testing for white oak cores from Farmhouse.

			40 Year Tested Segments*				
Series	Begin Year	End Year**	1720-1759	1730-1769	1740-1779	1750-1789	1760-1799
BP03A	1751	1798				0.9	0.9
BP03B	1754	1798				0.75	0.73
BP04A	1739	1798		0.53	0.52	0.49	0.56
BP05A	1755	1798				0.47	0.49
BP05B	1750	1798				0.84	0.81
BP06A	1741	1798			0.77	0.75	0.8
BP06B	1733	1795		0.44	0.72	0.82	0.82
UPB01	1739	1798		0.53	0.52	0.54	0.45
UPB02	1714	1798	0.56	0.59	0.84	0.82	0.75
PC01E	1735	1799		0.58	0.62	0.46	0.47
PC03E	1752	1799				0.63	0.62
PC04E	1753	1799				0.89	0.83
PC01W	1729	1798	.37B	.37B	0.81	0.86	0.83
PC02W	1729	1799	0.66	0.66	0.87	0.91	0.9
PC03W	1730	1799		0.67	0.88	0.9	0.87
FLOOR04	1758	1821				0.74	0.79
FLOOR05	1742	1798			0.48	0.48	0.41
Average Segment Correlation			0.53	0.55	0.71	0.72	0.71

*A = Correlation below 0.37 benchmark. (p>0.01); B = Correlation higher at an alternate position.
** Last measurable ring on the series.

Table 43. Cutting dates for white oak logs from Farmhouse.

Back Porch	Ring Total	Inner Date	Outer Date	Ring Type*	Cutting Date**	Comments
BP03	48	1751	1798	r	CD	Last Ring
BP04	60	1739	1798	r	CD	Last Ring
BP05	49	1750	1798	r	CD	Last Ring
BP06	66	1733	1798	r	CD	Last Ring
Back Porch Attic						
UBP01	60	1714	1798	r	CD	Last Ring
UBP02	85	1735	1798	r	CD	Last Ring
Portico Attic						
PC01East	65	1735	1799	r	CD	Last Ring
PC01-03W/PC03-04E	71	1729	1799	r	CD	Last Ring
Crawlspace Underneath Stairwell						
Floor04	64	1758	1821	v	Near-CD	Near Last Ring
Floor05	57	1742	1798	r	CD	Last Ring

*Ring Type: r = the outermost ring is continuous and intact, but no bark present;
v = The date is within a few years of cutting date (Bannister 1962; Grissino-Mayer et al. 2009; Nash 1999).
**Cutting Date: CD = Cutting Date; Near-CD = Near-Cutting Date.

Corn Crib

A total of 21 cores from 16 tulip poplar logs were accurately crossdated from the double-pen corn crib using COFECHA. The final results show a relatively high average interseries correlation of 0.564 and a high mean sensitivity of 0.307, both well above the standard (Table 44). Flagged segments were again rechecked to verify correct temporal placement. The alternate placement suggested by COFECHA was unrealistic and most samples were verified by referencing another sample from the same log.

Table 44. Dating statistics for tulip poplar logs from Corn Crib.

North Pen	Length	Begin Year	End Year*	No. Segments Tested	No. Flagged Segments	Inter-series Correlation	Mean Sensitivity
CC1N02A	57	1794	1850	4	0	0.477	0.313
CC1N03A	74	1778	1851	6	0	0.541	0.387
CC1N04A	92	1760	1851	7	0	0.574	0.274
CC1S01A	51	1775	1825	3	0	0.752	0.273
CC1S03A	87	1765	1851	7	0	0.734	0.268
CC1S03B	88	1764	1851	7	0	0.681	0.322
CC1S05A	74	1778	1851	6	0	0.485	0.295
CC1S06A	87	1765	1851	7	3	0.409	0.234
CC1E03A	103	1749	1851	9	1	0.577	0.278
CC1E03B	106	1745	1850	9	2	0.562	0.325
South Pen							
CC2N03A	96	1756	1851	8	0	0.694	0.329
CC2N04A	111	1741	1851	9	0	0.608	0.375
CC2N05A	80	1772	1851	6	2	0.379	0.346
CC2E04B	100	1752	1851	8	0	0.596	0.305
CC2W03A	98	1754	1851	8	2	0.427	0.264
CC2W04A	78	1774	1851	6	0	0.740	0.309
CC2W04B	85	1766	1850	7	0	0.634	0.314
CC2W05A	75	1777	1851	6	0	0.462	0.252
CC2W05B	105	1746	1850	9	2	0.528	0.290
CC2W06A	100	1752	1851	8	5	0.367	0.360
CC2W06B	95	1757	1851	8	0	0.648	0.320
Total or Mean:				148	17	0.564	0.307

*Last measurable ring on the series.

Of the 148 segments tested, 17 were flagged suggesting an alternated date (Tables 44 and 45). Flagged segments were again rechecked to verify correct temporal placement. The alternate placement suggested by COFECHA was unrealistic and most samples were verified by referencing another sample from the same log.

Cutting dates for the corn crib are shown in Table 46. Results show that the corn crib logs were cut in 1851. One log was also dated to 1850 (CC1N02) and represents a near-cutting date based on the lack of a final year of growth due to rot (Table 46). One date for log CC1S01 is a non-cutting date due to missing rings on the sample.

Table 45. COFECHA results: Correlation testing for tulip poplar cores from Corn Crib.

			40 Year Tested Segments*								
Series	Begin Year	End Year**	1740-1779	1750-1789	1760-1799	1770-1809	1780-1819	1790-1829	1800-1839	1810-1849	1820-1859
CC1N02A	1794	1850						0.56	0.58	0.56	0.49
CC1N03A	1778	1851				0.55	0.58	0.67	0.58	0.6	0.59
CC1N04A	1760	1851			0.47	0.5	0.63	0.67	0.64	0.64	0.62
CC1S01A	1775	1825				0.7	0.7	0.75			
CC1S03A	1765	1851			0.81	0.82	0.76	0.72	0.67	0.69	0.68
CC1S03B	1764	1851			0.76	0.77	0.73	0.68	0.67	0.62	0.6
CC1S05A	1778	1851				0.5	0.43	0.54	0.61	0.54	0.49
CC1S06A	1765	1851			.13B	.19B	.24B	0.38	0.61	0.62	0.61
CC1E03A	1749	1851	0.41	.40B	0.55	0.65	0.79	0.77	0.73	0.63	0.63
CC1E03B	1745	1850	.30B	.27B	0.54	0.65	0.8	0.81	0.64	0.62	0.61
CC2N03A	1756	1851		0.8	0.89	0.9	0.83	0.8	0.69	0.6	0.6
CC2N04A	1741	1851	0.5	0.62	0.73	0.7	0.67	0.67	0.68	0.69	0.68
CC2N05A	1772	1851				0.59	0.66	0.65	0.57	.25B	.22B
CC2E04B	1752	1851		0.69	0.74	0.75	0.59	0.53	0.46	0.5	0.56
CC2W03A	1754	1851		0.48	0.62	0.63	0.47	0.48	.38B	.37B	0.37
CC2W04A	1774	1851				0.7	0.77	0.76	0.7	0.75	0.76
CC2W04B	1766	1850			0.51	0.55	0.54	0.65	0.75	0.77	0.76
CC2W05A	1777	1851				0.55	0.49	0.47	0.46	0.48	0.49
CC2W05B	1746	1850	.26B	.32A	0.47	0.5	0.63	0.65	0.62	0.66	0.65
CC2W06A	1752	1851		.31B	.06B	.14B	.16B	.24B	0.64	0.75	0.76
CC2W06B	1757	1851		0.68	0.65	0.61	0.59	0.65	0.61	0.7	0.69
CC1N02A	1794	1850						0.56	0.58	0.56	0.49
Average Segment Correlation			0.37	0.51	0.57	0.6	0.6	0.62	0.62	0.6	0.59

*A = Correlation below 0.37 benchmark. (p>0.01); B = Correlation higher at an alternate position.
** Last measurable ring on the series.

Table 46. Cutting dates for tulip poplar logs from Corn Crib.

North Pen	Ring Total	Inner Date	Outer Date	Ring Type*	Cutting Date**	Comments
CC1N02	57	1794	1850	v	Near-CD	Last Ring Partial/ Unmeasured
CC1N03	74	1778	1851	B	CD	Bark
CC1N04	92	1760	1851	B	CD	Bark
CC1S01	51	1775	1825	vv	Non-CD	Missing Rings
CC1S03	88	1764	1851	B	CD	Bark
CC1S05	74	1778	1851	B	CD	Bark
CC1S06	87	1765	1851	B	CD	Bark
CC1E03	106	1745	1851	r	CD	Last Ring
South Pen						
CC2N03	96	1756	1851	r	CD	Last Ring
CC2N04	111	1741	1851	B	CD	Bark
CC2N05	80	1772	1851	r	CD	Last Ring
CC2E04	100	1752	1851	B	CD	Bark
CC2W03	98	1754	1851	r	CD	Last Ring
CC2W04	85	1766	1851	B	CD	Bark
CC2W05	105	1746	1851	B	CD	Bark
CC2W06	100	1752	1851	B	CD	Bark

*Ring Type: B = Bark present; r = the outermost ring is continuous and intact, but no bark present; v = The date is within a few years of cutting date; vv = Date is indeterminable due to missing rings (Bannister 1962; Grissino-Mayer et al. 2009; Nash 1999).
**Cutting Date: CD = Cutting Date; Near-CD = Near-Cutting Date; Non-CD = Non-Cutting Date.

Combined Dates

A total of 38 cores from 26 logs were accurately crossdated from the Tipton-Haynes site. The final results show a high average interseries correlation of 0.567 and a mean sensitivity of 0.263. Final results for all samples are listed in Table 47.

Of the 206 segments tested, 29 were flagged suggesting an alternated date (Table 47). Flagged segments were again rechecked to verify correct temporal placement. Once again, the alternate placement suggested by COFECHA was unrealistic and most samples were verified by referencing another sample from the same log. A number of dates for the logs coincided perfectly attesting to their correct positioning. All samples were found to be statistically valid

Table 47. Dating statistics and cutting dates for Tipton-Haynes Series.

Series	Length	Inner Date	Outer Date	Ring Type	Cutting Date	Comments	Segments Tested	Flagged Segments	Interseries Correlation	Mean Sensitivity
BP03A	48	1751	1798	r	CD	Last Ring	7	0	0.751	0.268
BP03B	45	1754	1798	r	CD	Last Ring	7	0	0.703	0.322
BP04A	60	1739	1798	r	CD	Last Ring	6	0	0.492	0.295
BP05A	44	1755	1798	r	CD	Last Ring	7	3	0.392	0.234
BP05B	49	1750	1798	r	CD	Last Ring	9	3	0.512	0.278
BP06A	58	1741	1798	r	CD	Last Ring	9	3	0.476	0.325
BP06B	63	1733	1795	v	Near CD	Near Last Ring	8	0	0.701	0.329
UBP01	60	1714	1798	r	CD	Last Ring	9	0	0.631	0.375
UBP02	85	1735	1798	r	CD	Last Ring	6	2	0.383	0.346
PC01East	65	1735	1799	r	CD	Last Ring	8	0	0.586	0.305
PC03East	48	1752	1799	r	CD	Last Ring	8	3	0.476	0.264
PC04East	47	1753	1799	r	CD	Last Ring	6	0	0.664	0.309
PC01West	70	1729	1798	v	Near CD	Near Last Ring	7	0	0.636	0.314
PC02West	71	1729	1799	r	CD	Last Ring	6	0	0.451	0.252
PC03West	70	1730	1799	r	CD	Last Ring	9	4	0.436	0.29
Floor04	64	1758	1821	v	Near CD	Near Last Ring	8	5	0.391	0.36
Floor05	57	1742	1798	r	CD	Last Ring	8	0	0.626	0.32
CC1N02A	57	1794	1850	v	Near CD	Last Ring Partial/Unmeasured	2	0	0.796	0.158
CC1N03A	74	1778	1851	B	CD	Bark	2	0	0.658	0.14
CC1N04A	92	1760	1851	B	CD	Bark	4	0	0.513	0.162
CC1S01A	51	1775	1825	vv	Non-CD	Missing Rings	2	0	0.453	0.191
CC1S03A	87	1765	1851	B	CD	Bark	2	0	0.712	0.197
CC1S03B	88	1764	1851	B	CD	Bark	3	0	0.651	0.156
CC1S05A	74	1778	1851	B	CD	Bark	4	0	0.59	0.176
CC1S06A	87	1765	1851	B	CD	Bark	4	0	0.449	0.218
CC1E03A	103	1749	1851	r	CD	Last Ring	5	0	0.628	0.2
CC1E03B	106	1745	1850	v	Near CD	Last Ring Partial/Unmeasured	4	0	0.488	0.219
CC2N03A	96	1756	1851	r	CD	Last Ring	2	0	0.619	0.17
CC2N04A	111	1741	1851	B	CD	Bark	2	0	0.813	0.18
CC2N05A	80	1772	1851	r	CD	Last Ring	5	2	0.528	0.21
CC2E04B	100	1752	1851	B	CD	Bark	5	0	0.773	0.154
CC2W03A	98	1754	1851	r	CD	Last Ring	4	0	0.75	0.164
CC2W04A	78	1774	1851	B	CD	Bark	5	2	0.457	0.181
CC2W04B	85	1766	1850	v	Near CD	Last Ring Partial/Unmeasured	3	0	0.403	0.174
CC2W05A	75	1777	1851	B	CD	Bark	4	0	0.473	0.313
CC2W05B	105	1746	1850	v	Near CD	Near Last Ring	6	0	0.522	0.387
CC2W06A	100	1752	1851	r	CD	Last Ring	7	2	0.486	0.274
CC2W06B	95	1757	1851	B	CD	Bark	3	0	0.787	0.273
Total or Mean:							206	29	0.567	0.263

with high average interseries correlations generally above 0.4 ($p<0.001$) or greater.

A RESIDUAL index chronology was created for each structure and the combined series from Tipton-Haynes and compared to the RESIDUAL index master chronology. An index chronology is based on removing all autocorrelation within the chronology to remove age-related trends allowing for an average tree-ring series from a site to be created which represents average growth conditions per year on all measured series. The farmhouse cabin had a high correlation coefficient of $r = 0.572$ ($t = 3.96$, $p<0.0001$, $n = 108$ years). The corn crib had a high correlation at $r = 0.525$ ($t = 7.48$, $p<0.0001$, $n = 111$ years). The final combined Tipton-Haynes chronology also had a high correlation of $r = 0.546$ ($t = 7.48$, $p<0.0001$, $n = 138$ years). When graphically plotted, the Tipton-Haynes RESIDUAL index visually agrees with the Norris RESIDUAL index chronology helping to confirm crossdating accuracy (Figure 75).

Dendrochronological investigations of the farmhouse and corn crib yielded information concerning two of the only remaining extant log structures on the property, helping to revise and support the previous site history. The construction of the log core of the farmhouse was dated to 1799 with renovations shortly after 1821. The construction of the double-pen corn crib was dated to 1851. Using dendrochronology, the farmhouse and corn crib can now be accurately placed on the landscape in time.

Logs from the original one-and-a-half story farmhouse cabin were dated to 1799. This refutes the original construction date of 1784 and places it more in line with results from the THLAP architectural survey (Jones 2009a:2). The cabin that remains today is still a late eighteenth-century Col. Tipton construction; however, it is not the original cabin mentioned in the historical record. The dates for the logs correlated precisely to the year Col. Tipton retired from the state senate in 1799 (Hall and Merritt 1913:2602; Lawson 1970:116; Massengill

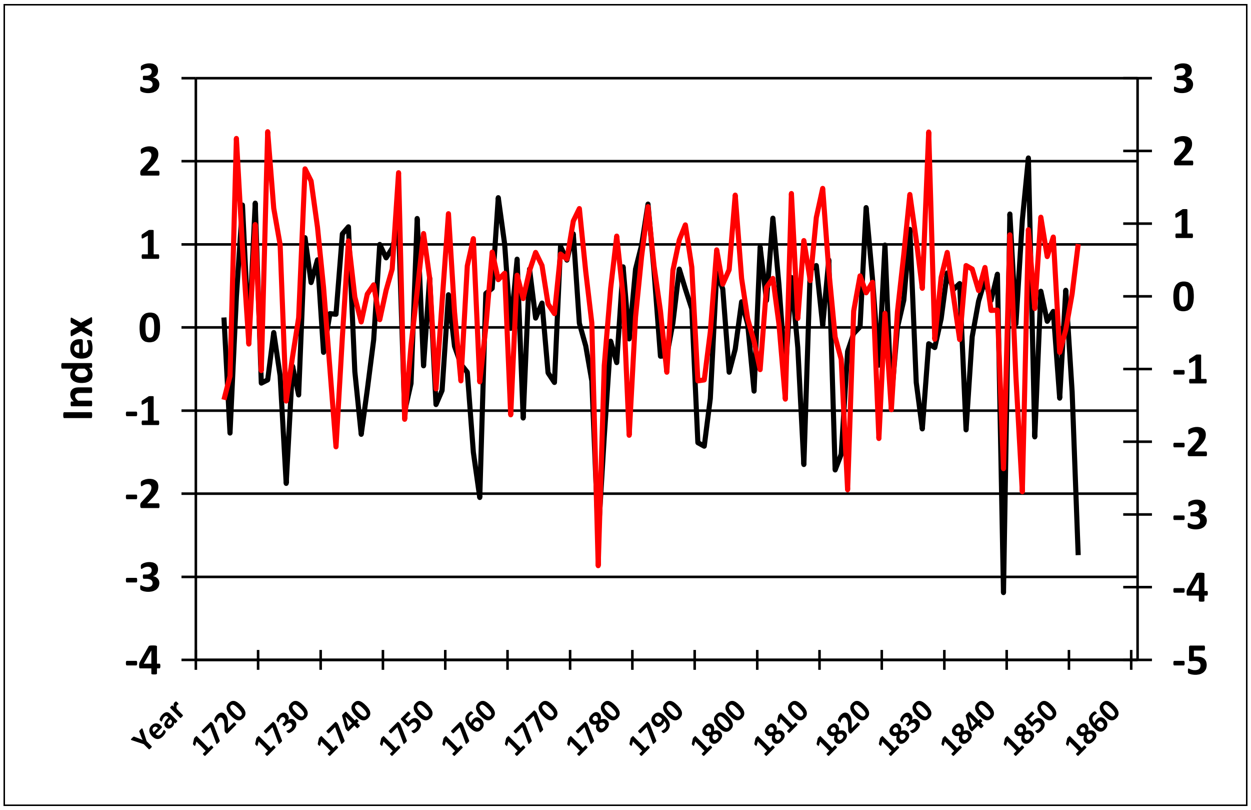

Figure 75. Crossdating between the Tipton-Haynes RESIDUAL Index Chronology (Red) with the Master Chronology RESIDUAL Index Chronology (Black) from 1663-1980 ($r = 0.546$, $t = 7.48$, $p<0.0001$, $n = 138$ years). The scales of the two Y-axes are slightly different to visually highlight the crossdating.

1942:19; Parrish 2008:7). Therefore, the cabin is believed to have been constructed for Col. Tipton's retirement home where he lived until his death in 1813.

The original Tipton cabin is believed to have been constructed after Col. John Tipton first purchased the property in 1784 (WCDB 1:301, 3:261). The structure is mentioned in descriptions of the Battle of the Lost State of Franklin and an eyewitness account by Colonel Thomas Love recorded in the Draper Manuscripts (Draper 1944-1949; Appendix I). Specifically, "Col. Tipton's house was a large size house, some 25 by 30 feet, hewn logs a story and a half – no windows below – two or three window holes, round, in each gable and above – a

door in front" (Figure 7) (Draper 1944-1949:55). The farmhouse cabin measures approximately 30 x 20 ft while Col. Love's dimensions appear to be estimated (Draper 1944-1949:55).

Tipton's home is also mentioned by Andre Michaux during his travels in 1795 and 1796 (Williams 1928:332, 342). Again Tipton's home is mentioned in an act for the creation of Carter County (TSLA 2009; Williams 1940:17). The historical documentation shows that Tipton was indeed residing at the site prior to 1799. It's location along the Buffalo Trace, the description of the battle, as well as other historical documentation help verify this assumption (Burgner 1981; Byron and Sistler 1998; Creekmore 1980; Griffey 2000; McCown et al. 1964; Rae 1991; WPA 1938, 1940). It is surmised that the original 1784 cabin was razed and a new one-and-a-half story cabin was constructed between 1798 and 1799 on the same site to serve as Col. Tipton's home after retirement from the state senate. It is also believed that at this time the large walk-in cellar was constructed as well as the eastern chimney.

The results beg the question, "What happened to Col. Tipton's original 1784 cabin?" It is not sure why a cabin would have been razed after only 15 years after being constructed. It is possible the cabin was constructed prior to Tipton's arrival on the property and was indeed older, but no historical data confirms this assumption. The cabin could have also suffered from damage caused by fire or wind, but again no data is available to support this supposition. The possibility also exists that the cabin was not rebuilt on its original footprint and that the cabin was located nearby. Again, however, the memory map provided by Draper (1944-1949) shows the house in the vicinity of its current location and other historical data support the interpretation that a cabin was located at the site before 1799.

Core samples collected from the crawlspace beneath the stairs also provide clues to later renovations. Two sill logs (Floor 4 and Floor 5) were successfully dated to 1798 and a near-

cutting date of post-1821. Both are considered part of the Tipton, Jr. renovation. Provenience of the logs shows that Floor 4 supports the back porch of the farmhouse while Floor 5 supports a portion of the frame addition. Both renovations were believed to have been conducted by Tipton, Jr. during the 1820s. Floor 4 dates the porch addition to a few years after 1821 which matches the historical record. Tipton, Jr. is believed to have moved into the home sometime between 1821 and 1825, possibly as early as 1819 (Bailey 1991:16; Hall and Merritt 1913:2605; Massengill 1942:22). He was most definitely in residence by 1825 due to his listing as John Tipton of Washington County when deeding acreage to his son-in-law (Tomlinson 2008). Assessed property values also indicate a major improvement of the property between the years 1819 and 1825 (Bailey 1991:20). A near-cutting date of 1821 for Floor 4 verifies that John Tipton, Jr. added the full-length rear porch addition seen in Strother's (1857) woodcut between 1821 and 1825. The date range provided from the dendrochronology and historical documentation can also be interpreted as dating other renovations to the home by Tipton, Jr. including the western addition, porches, and clapboard siding. Floor 5 dates to 1798 and is believed to be a recycled sill log possibly from the removed western log section. It is positioned in its present location for support of the frame addition and provides further evidence for the construction date of the log cabin.

Logs from the corn crib date the construction to 1851. The large double-pen log corn crib has been interpreted as being constructed by Col. John Tipton during the late eighteenth century (Bailey 1991:12; Goist 1994:4). However, during the recent survey the building was assessed to be a later construction possibly dating to John Tipton, Jr.'s tenure (Jones 2009a:5). A difference in preservation, wood types, and notching styles between the corn crib and Tipton

cabin hints at this assumption. However, the corn crib was known to have been standing in 1856 as shown in Strother's (1857) woodcut of the property.

The new information provided by the dendrochronological survey places the corn crib on the landscape during Haynes tenure of the property. The date of construction for the corn crib coincides with a period in 1851 when Haynes retired from politics for eight years and devoted his time to his law practice (Lawson 1970:118; Toncray 1987:67). It is believed that upon his return home, Haynes also devoted his time to creating a profitable farm through the construction of utility structures such as the large double-pen corn crib. The size of the corn crib was necessary to store the large amount of corn produced on the farm. The previous year, Haynes was recorded in the 1850 Agricultural Census as producing 1,200 bushels of Indian corn, the largest vegetable or grain item cultivated at the time on the property (USBC 1850b).

The final conclusions reached for this project date the construction of the extant Tipton cabin and corn crib to 1799 and 1851 respectively revising their supposed dates of construction. One sill log dating to 1821 also helped to support the historical record dating Tipton, Jr.'s renovations to the home. The results also show that construction and renovation periods matched periods in which the tenant had retired or taken a hiatus from political service. The overall benefit of using dendrochronology to date extant structures at Tipton-Haynes is that a better understanding of the site's history was achieved, placing the farmhouse and corn crib temporally on the landscape.

CHAPTER V

GEOPHYSICAL SURVEY

In an effort to discover more about the past landscape at the Tipton-Haynes site, a geophysical survey was conducted with the help of Stephen Yerka and THLAP field assistant Dustin Lawson both from the University of Tennessee, Knoxville as well as volunteers. The primary purpose of the survey was to help locate any activity areas, structures, or subsurface features located within the primary 17-acre site to aid in reconstructing past activities on site and guide the archaeological survey. The survey included the use of gradiometer, soil resistance, and ground penetrating radar (GPR) technologies provided by the University of Tennessee's Anthropology Department and the Archaeological Research Laboratory. Field collection focused on surveying a majority of the site using the gradiometer then concentrating on certain areas of interest within the core historic area with soil resistance and GPR. Final processed results not included in this chapter were added to Appendix IX.

Archaeological geophysics can be defined as, "the examination of the earth's physical properties using non-invasive ground survey techniques to reveal buried archaeological features, sites, and landscapes" (Gaffney and Gater 2003:12). Archaeo-geophysical surveys can produce primary data suitable for the study of site content, structure, and organization as well as examining spatial patterns and relationships (Kvamme 2003:435). The benefits of conducting geophysical survey include cost effectiveness, noninvasive data collection, and it aids archaeological survey.

A geophysical survey was conducted at Tipton-Haynes because of these benefits and to help give a larger image of the landscape. Data provided by the survey allow for description and analysis of features and the landscape over a large area (a total of nearly 29,400 m^2 of data

collected). The primary objective of the survey was to locate features associated with standing or previously-standing structures for archaeological testing. Another aim of the survey was to delineate any historic landscape features such as boundary markers (fencelines or treelines), refuse disposal areas (middens), as well as auxiliary features such as paths, roads, or plantings.

Geophysics is "ideally suited for detecting the very kinds of cultural features that traditional landscape archaeology searches for including the buried architecture, dwellings, and other constructions that give structure and meaning to human occupations" (Kvamme 2003:454). Different components of buried buildings allow them to be detected including the remains of cellars, floors, foundations, debris scatters, fireplaces, and other features such as paths or pipes, as well as changes in soil chemistry (Bevan 2006:30). However, Bevan (2006) has found that success in the field has been limited to a 50 percent chance of identification with use of any type of geophysical equipment.

Archaeo-geophysics looks at near-surface deposits or features located at the upper-most one to two meters below surface (Kvamme 2003:439). Archaeo-geophysics is possible due to physical contrasts between archaeological features and the natural background. If an archaeological deposit or feature possesses physical properties different from the surrounding matrix, a distinct contrast referred to as an anomaly may be noticed between it and the natural background (Kvamme 2003:440). These anomalies then can be identified through processing and analysis of the data. Geophysical instruments only measure various physical differences that can be interpreted as the result of a specific type of archaeological feature (Gaffney and Gater 2003:55).

Most geophysical instruments excluding conductivity or resistivity primarily respond to one physical property of the earth (Kvamme 2003:439). Therefore, surveys with multiple

methods offer greater insight because buried cultural features not revealed by one may be made visible by another (Kvamme 2003:439).

To examine archaeological features, sample density of the data must be suitable for the expected archaeological feature size and contrast (Somers 2006:109). Sampling density determines the size of archaeological features that can be resolved, with a general rule being that the interval between measurements should be no greater than half the size of the smallest feature to be detected so that multiple measurements may delineate it (Kvamme 2006a:214). Resolving small portable artifacts and features like postholes is typically not possible, however, larger features like structures or ditches are frequently detected (Kvamme 2006a:214). For this survey, a 0.5 m spacing was used for each traverse of a grid on all instruments (therefore allowing for features 0.25 m or larger to be detected).

Prior to data collection, a site grid was established (offset 50 degrees east) and a site datum was set as coordinate N5000 E5000 (Figure 76). A previous grid had been created during Cliff Boyd's 1985 archaeological survey, but no control points from the survey could be located. However, using Boyd's notes provided by Tennessee's Division of Archaeology, the grid location was able to later be reconstructed in ArcGIS allowing relative placement of any previous archaeological testing. New permanent site control points were established and tied in to real-world coordinates using existing points provided by the city of Johnson City, TN (Figure 76). Control points consisted of either a concrete pylon or large plastic stake with a magnail inserted in the top making it easy to locate with a metal detector or probing. A 20 x 20 m grid was created using ESRI's ArcGIS and then mapped using a Topcon GTS 226 electronic total station (Figure 77). Each grid was labeled by its southwest corner coordinate. GPR data were, however, collected arbitrarily off-grid recording survey grid locations with the total station.

	Geophysical Grid (m)			Archaeology Grid (ft)			State Plane (ft)		
	Northing	Easting	Elev (AMSL)	Northing	Easting	Elev (AMSL)	Northing	Easting	Elev (AMSL)
cp1	5000	5000	517.0850	5000	5000	1696.4733	734061.6119	3048582.3115	1696.4733
cp2	5060	5000	516.2651	5196.8503	5000	1693.7834	734207.2714	3048714.7781	1693.7834
cp3	4931.7628	4971.8684	518.8689	4776.1206	4907.7164	1702.3257	733958.0826	3048363.4054	1702.3257
cp4	5008.1351	5042.3928	514.2814	5026.6970	5139.0823	1687.2749	733987.7807	3048703.1652	1687.2749
cp5	4895.5593	5014.5408	517.2661	4657.3499	5047.7234	1697.0675	733776.0151	3048387.0655	1697.0675
cp6	4881.0799	4964.9639	519.9504	4609.8425	4885.0540	1705.8740	733850.3248	3048234.7583	1705.8740
cp7	4942.6967	5149.9818	509.4013	4812.0227	5492.0751	1671.2641	733591.4587	3048819.8599	1671.2641
cp8	5216.7065	5051.8126	507.5003	5710.9868	5169.9526	1665.0272	734473.2351	3049186.4244	1665.0272

Figure 76. Tipton-Haynes control points.

Figure 77. Geophysical survey grids.

Magnetometer Survey

Magnetometry is concerned with the strength of the earth's magnetic field and is used as a prospecting method that maps local variations of the earth's magnetic field in the near-surface (Kvamme 2006a:206). It is a method that responds to numerous magnetic variations which point to subsurface features (Kvamme 2006a:205). Magnetic survey relies on the ability of a variety of instruments, such as magnetometers, to measure small magnetic fields associated with buried archaeological remains (Gaffney and Gater 2003:36). Magnetometry is a passive survey method because it employs the earth's magnetic field rather than generating an artificial field (Gaffney and Gater 2003:38; Kvamme 2006a:206).

The principle behind magnetic survey is based on variation in magnetic field strength of different materials. Differences in magnetism exist between various materials, deposits, and soils (Kvamme 2006a:214). These magnetic contrasts can be created by either induced (magnetic susceptibility) or remanent (thermoremanent) magnetization (Aspinall et al. 2008:21; Gaffney and Gater 2003:39). Magnetometers measure the sum of induced magnetism due to susceptibility and all forms of remanent magnetism (Kvamme 2006a:208).

The earth's magnetic field introduces a type of magnetism known as induced magnetism that exists only in the presence of a magnetic field (Kvamme 2006a:208). The ability of a material to become magnetized is a function of its magnetic susceptibility (Kvamme 2006a:208). The magnetic susceptibility of a material is defined by the degree of magnetization induced in the presence of a magnetic field whereby the more magnetized a material becomes the higher the susceptibility (Gaffney and Gater 2003:38). Magnetic susceptibility can only be measured in the presence of a magnetic field. Because the earth's magnetic field is active, susceptibility can be read at all times (Gaffney and Gater 2003:38).

Magnetic susceptibility depends on the presence of magnetizable minerals within a material (Kvamme 2006a:208). The basis for archaeological magnetic prospecting is the occurrence of weakly magnetized iron oxides in the soil (Gaffney and Gater 2003:37). There is a natural tendency for iron minerals to collect in topsoil because they are relatively insoluble and remain while less magnetic materials like calcites or silicates may be lost (Kvamme 2006a:208). Topsoil becomes magnetically enriched owing to physical and chemical processes that include weathering and the result of biogenic processes that include magnetotactic bacteria (Kvamme 2006a:214). Depending on the state of iron oxides, the material will exhibit either a weak or a strong magnetization (Gaffney and Gater 2003:37).

Mechanisms at work in enhancement of magnetic susceptibility of soils include heating and what is known as the fermentation effect (Gaffney and Gater 2003:38). There are essentially three types of iron oxides within soils relevant to archaeologists: hematite, magnetite, and maghemite, the last two being significantly magnetic (Aspinall et al. 2008:23; Clark 2000:100; Kvamme 2006a:208). The fermentation process occurs with alternating periods of wetness and dryness that affect oxides by transitioning hematites to more magnetic maghemites (Kvamme 2006a:208). This transition occurs via conditions of reduction followed by oxidation. Hematite reduces to magnetite which oxidizes to maghemite (Aspinall et al. 2008:24; Gaffney and Gater 2003:38).

$$\text{hematite} \xrightarrow[\text{reduction}]{} \text{magnetite} \xrightarrow[\text{oxidation}]{} \text{maghemite}$$

In fact, it is now believed that this mechanism is highly complex and involves the interplay between biological and pedological systems as well as the interaction of microbes, organic matter, and iron (Fassbinder et al. 1990:161-163; Gaffney and Gater 2003:38). A more appropriate term would be "microbially mediated" (Aspinall et al. 2008:23). Heating (sufficient at about 200 degrees Celsius) also reduces hematite to magnetite, which after cooling is partially reoxidized to maghemite, greatly increasing magnetic susceptibility (Aspinall et al. 2008:23; Kvamme 2006a:208). Anthropogenic activity intensifies some of these effects through the introduction of organic and fired materials to the topsoil which has a direct influence on the detection of buried features (Gaffney and Gater 2003:38; Kvamme 2006a:208).

Another type of magnetism is remanent magnetism. Any material that retains a magnetic field after magnetization is termed remanent because it remains after the process that generated it (Kvamme 2006a:207). Heating increases the magnetism of a material producing an effect known as thermoremanent magnetism, a type of remanent magnetism which is permanent (Kvamme 2006a:207, 214). "Thermoremanence magnetism describes weakly magnetic materials that have been heated and have acquired a permanent magnetization associated with the direction of the magnetic field within which they were allowed to cool" (Gaffney and Gater 2003:37). Most soils, clays, and rocks contain between one to 10 percent iron oxides which are aligned in random directions (Aspinall et al. 2008:21; Kvamme 2006a:207). At high temperatures, beyond the Curie point (about 600 degrees Celsius for iron oxides), content within the material is demagnetized wiping the magnetic properties of the material clean (Aspinall et al. 2008:21; Gaffney and Gater 2003:37; Kvamme 2006a:207). At the time of cooling, the magnetic minerals are re-magnetized and permanently realign parallel to the orientation of the earth's

magnetic field at the time (Gaffney and Gater 2003:37; Kvamme 2006a:207). This also forms the basis for archeomagnetic dating.

Various human behaviors interact with these natural processes to produce a predictable set of culturally-induced magnetic variations commonly seen in archaeological sites (Kvamme 2006a:214). Several cultural processes contribute to the formation of magnetic anomalies within archaeological sites (Clark 2000; Kvamme 2003; 2006a). These are typically located within the top few meters of the ground surface where most cultural activities take place.

Human occupation exacerbates magnetic enhancement of surface soils (Kvamme 2006a:217). This is due to the introduction of organic materials that promote bacterial growth, including magnetotactic and other bacteria that concentrate magnetic compounds like magnetite (Fassbinder et al. 1990:161-163; Kvamme 2006a:217). Another cultural modification includes the fact that people create fires producing a thermoremanent effect in soil or rock (Kvamme 2006a:216). People make iron or steel artifacts which, when introduced to the topsoil, noticeably alter the earth's magnetic field, producing large magnetic measurements commonly expressed as dipoles consisting of paired positive and negative extremes (Kvamme 2003:441; 2006a:221). People also introduce fired artifacts, such as ceramics, to deposits which intensify the magnetic field (Kvamme 2003:441; 2006a:217).

Other reasons for the creation of magnetic cultural features are tied to human construction. Removal of magnetically-enriched topsoil during excavation lowers the magnetic field over these features creating a negative contrast or anomaly (Kvamme 2003:441; 2006a:219). Accumulations of topsoil or in-filling of features create local magnetic field increases due to the concentration of magnetically-enriched materials (Kvamme 2003:441). This is the product of the relative differences between the subsoil and the magnetically-enhanced

topsoil that fills the feature (Gaffney and Gater 2003:39). People also build with stone which might be more magnetic (igneous rocks) or less magnetic (limestones) than surrounding soils creating a contrast (Kvamme 2003:441; 2006a:220). Human constructions also commonly use fired artifacts such as brick or tile which contrast with the relative background (Kvamme 2006a:216).

Magnetic survey uses a number of instruments to measure very small magnetic fields created by archaeological remains. Features can act as small magnets that produce distortions, or anomalies, in the earth's magnetic field (Gaffney and Gater 2003:36). These distortions are typically detected in archaeological geophysics by use of a magnetometer.

Magnetometers are instruments designed specifically to measure the strength of a magnetic field in nanoteslas (nT) (Kvamme 2006a:206, 208). Magnetometers are extremely sensitive recognizing changes as small as 0.1 nT (Gaffney and Gater 2003:39). The resulting signals have a bipolar response centered around zero with characteristic negative and positive anomalies occurring based upon the nature of the buried feature (Gaffney and Gater 2003:113).

Magnetometers can be configured in two different modes. A magnetometer can be used as a "total field instrument with a single sensor that measures the actual magnitude of the magnetic field at any locus or as a gradiometer that measures a difference between two sensors" (Kvamme 2006a:210). The most common type of gradiometer is based on the fluxgate sensor (Gaffney and Gater 2003:40). Fluxgate sensors are directionally sensitive and must be configured as gradiometers for practical application while other instruments can be utilized in either mode (Kvamme 2006a:210, 212). The instrument is available as a single fluxgate pair mounted in a tube (Gaffney and Gater 2003:66). These instruments use two fluxgate sensors placed vertically above one another, at a set distance apart and measure the vertical component

of the earth's magnetic field (Gaffney and Gater 2003:61). Some instruments record the difference between two total field measurements in gradiometer mode, while a fluxgate gradiometer only measures the vertical component of the magnetic field (Kvamme 2006a:212).

Field Collection

Specifically for this project, data were collected using a Bartington Grad601(-2) Dual Sensor Fluxgate Magnetic Gradiometer System (Figure 78). This instrument uses two dual sensors with one meter sensor separation in each housing. Sensor separation accounts for the depth of detection which is generally equal to the separation distance (Kvamme 2003:441). Magnetometry at archaeological sites is, however, typically confined to the uppermost one to

Figure 78. Bartington Grad601(-2) Dual Sensor
Fluxgate Magnetic Gradiometer System.

two meters for most soil features with a practical limit of about three meters for large features or deeply buried iron objects (Kvamme 2006a:222).

Magnetometry is one of the most productive geophysical methods available (Kvamme 2006a:205). The equipment, especially in the case of the Bartington system, is quick and easy to use, typically taking 15 to 20 minutes to collect a 20 x 20 m grid. It therefore allows for large areas to be surveyed which increases the likelihood that whole cultural features with regular, interpretable geometric shapes will be encountered and recognized (Kvamme 2006a:205). Magnetometry results in a higher probability in the detection of small and varied features over a broad landscape (Kvamme 2006a:206).

Field data collection consisted of collecting a total of 70, 20 x 20 m grids, across the core 17-acre site (Figure 79). Each grid was collected using a half-meter spacing taking eight readings per meter. A majority of grids were collected beginning from their southwest corners in a zigzag pattern. Based upon site conditions, some grids were collected from various corners in a parallel pattern.

Processing

After field collection and download, gradiometer data were processed using the program ArcheoSurveyor 2.5.11.0. Results that define cultural features in geophysical surveys are the object of the survey, referred to as the signal, while noise refers to everything else that obscures targeted features (Kvamme 2006b:236-237). When processing geophysical data, the aim is to remove any noise or defects and highlight or exaggerate features of interest for data display using prescribed methods (Kvamme 2006b:236). Survey grids were first assembled to make a single composite image for processing.

Figure 79. Gradiometer survey grids.

Processing steps included searching and replacing extreme readings with dummy values. Next the data were clipped to a range between -100 and 100 nT. Due to the collection of data on a timing system, where a fixed number of measurements are collected per second, a staggered effect is created due to pace. To correct for this, the data were destaggered (out and inbound by -2 intervals) which digitally moves every other transect a small amount until the stagger is removed (Kvamme 2006b:241). Another problem created due to collection is striping of the data introduced as a result of collecting in zigzag format or the use of multi-sensor arrays (Aspinall et al. 2008:120). To reduce the striping effect, data were destriped using a zero mean traverse. Zero mean traversing is a procedure to correct slight baseline shifts between traverses whereby the mean for each traverse is calculated and then subtracted from all data points along that line (Aspinall et al. 2008:121). Other spikes in the data caused by the interference of modern trash and metal artifacts were removed by despiking. Despiking algorithms remove isolated extreme measurements, typically by replacing them with average of neighboring measurements (Kvamme 2006b:237-238). Finally, the data were clipped at three standard deviations for a final composite dataset (Table 48). Grid files and images were then exported in ArcheoSurveyor and georeferenced in ESRI's ArcGIS.

Table 48. Gradiometer processing steps and resulting statistics.

Processing Steps	Parameters	Statistics	Values
Search and Replace:	32702 with Dummy	Min:	-81.54
Clip:	-100 to 100 nT	Max:	80.15
De Stagger Grids:	All grids by -2 intervals	Mean:	-.075
DeStripe Mean Traverse:	All by 2 SDs	Median:	-0.14
Despike Threshold:	1 Window size 3x3	Std Dev:	23.74575
Clip:	3.00 SD	-	-

Results

Primarily for this survey, the goal was to locate any non-standing structures or features associated with structures, as well as to locate landscape features such as middens, fencelines, or planting beds. The likelihood that these types of buried archaeological features will be detected by a magnetometer depends on the interaction of several factors including the size and depth of the feature, the amount of magnetic contrast between the feature and surrounding deposits, the level of noise, the degree of regular pattern that the feature exhibits, instrument sensitivity, and the quality of data acquisition (Kvamme 2006a:222). Small artifacts are also generally hard to detect excluding metal and possibly ceramic or brick (Kvamme 2006a:222). Iron noticeably alters the earth's magnetic field, producing large measurements commonly expressed as dipolar anomalies (Kvamme 2006a:221). Dipolar anomalies exhibit two magnetic poles (positive and negative) while monopole describes anomalies which exhibit a single pole (positive or negative) within the dataset. The dipolar "peaks" produced by iron will frequently line up along the principle axis of the object which can cause the poles to align in any direction (Kvamme 2006a:221). Dipolar anomalies such as hearths align magnetically north at the time of firing and therefore generally tend to align north (Kvamme 2006a:209). Larger constructions such as structures are more easily located because of their size and physical contrast from the surrounding matrix (Kvamme 2006a:222). Their geometric shapes also make them more easily recognized as cultural anomalies (Kvamme 2006a:222). Culturally-created anomalies like these are primarily created by construction, the thermoremanent effect, magnetotactic and other bacteria, as well as highly-magnetic artifacts deposited in the soil.

The resulting signals collected by the magnetometer have a bipolar response centered around zero and characteristic negative and positive anomalies arise depending upon the nature

of the buried feature (Gaffney and Gater 2003:113). Anomalies can be classified by the mean and range of the magnetometer dataset (Yerka 2010:65). Low contrast, or weak, anomalies are near the mean, or background, of the survey data while high contrast, or strong, anomalies depart from the mean substantially with boundaries ranging from abrupt to diffuse (Figure 80) (Yerka 2010:65). These anomalies can also be monopolar or dipolar depending on the source and orientation.

New approaches to geophysics call for collecting high-density data over a large area, then processing of the data to clarify regular, culturally formed patterns, and finally using pattern-recognition principles to aid in interpretation (Kvamme 2006b:236). Due to the large amount of data collected during the project it is not possible to analyze and interpret each individual anomaly. Specific representative anomalies or ones of special interest should be tested then

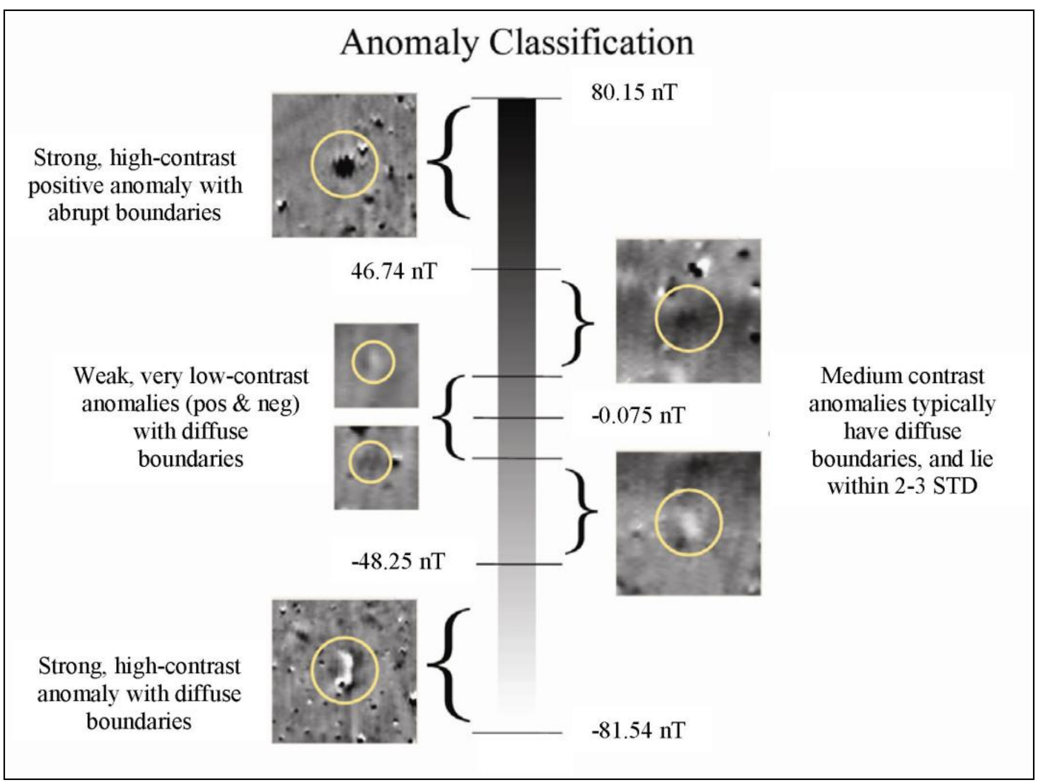

Figure 80. Magnetometer anomaly classification (Adapted from Yerka 2010:65).

conclusions reached might then be applied to other anomalies of similar form (Kvamme 2006b:236). To analyze the large dataset collected during the THLAP survey, contours were created from the gradiometer readings. Using contours allows for visual highlighting of anomalies. Two sets of contours were created outlining low contrast, weak anomalies and high contrast, strong anomalies. These were then combined to create a composite image showing both anomaly types.

The magnetometer dataset was then analyzed by means of the pattern-recognition approach to aid in the interpretation process (Kvamme 2006a:206). Anomalies which exhibit geometric shapes generally tend to be created by cultural activity such as fencelines, ditches, or foundations which exhibit regular patterning (Kvamme 2006b:236). By visually analyzing the processed output, anomalies that exhibited this patterning were identified as cultural.

Based upon the processed output, the following interpretations can be made. Figure 81 shows an image of the final processed output. Due to the vast amount of data, it is not possible to focus on every anomaly. Only larger features of interest and a selected number of smaller anomalies can be analyzed. Looking at the site-level some features are evident in the data. Most notable are the large number of anomalies created by modern disturbances. Other large features that prominently stand out are the old Buffalo Trace to the south, an access road to the spring, and the line of anomalies to the west that represent an old fenceline (Figures 81). Another prominent feature includes the activity area around the barn and corn crib with a large number of dipolar spikes in the data. Data spikes refer to isolated extreme measurements that typically stem from the presence of ferrous metal artifacts in magnetic datasets (Kvamme 2006b:237). Iron drastically alters the earth’s magnetic field, producing large measurements commonly expressed

Figure 81. Gradiometer survey data.

as dipolar anomalies (Kvamme 2006a:221). The large amount of metal refuse in the barnyard points to intensive use of this area over time.

A number of disturbances are also evident in the data. These are caused by either natural or modern disturbances including utilities, trees, gardens, ditches, and erosion. The most obvious anomalies are modern utility lines that surround the farmhouse. These disturbances made it difficult to process more subtle archaeological features out of the data, especially around the farmhouse. Other natural features tend to produce broader curving anomaly shapes than iron spikes or utilities as seen in an erosional gully created from the dirt road east of the barn (Figure 81) (Gaffney and Gater 2003:113). At many historic sites, modern trash is typically in the soil. The magnetic patterns of these unwanted artifacts can confuse the patterns from the archaeological features of interest (Bevan 2006:29). The complexity of archaeological deposits created by intensive occupations with dense cultural stratigraphy or superimposed constructions can also make anomaly identification and interpretation difficult (Kvamme 2006a:222). Prior to the recognition of significant historic or prehistoric cultural features, it was necessary to remove all noise from the dataset for accurate pattern analysis (Figure 82). Areas where no data were collected are also denoted due to above ground disturbances that prevented collection.

As a final step to interpretation, contours were created from the gradiometer readings to emphasize anomalies and help identify cultural features. Contours for the dataset were created below -50 nT and above 50 nT to highlight strong, high contrast contours. Contours were also produced to highlight weak, low contrast anomalies between -10 nT and 10 nT. Both contour sets were then combined to create a final image highlighting anomalies of interest for interpretation (Figure 82). Larger low contrast anomalies represent slight magnetic changes over a large area primarily from disturbances and possible fill episodes. In particular, large low

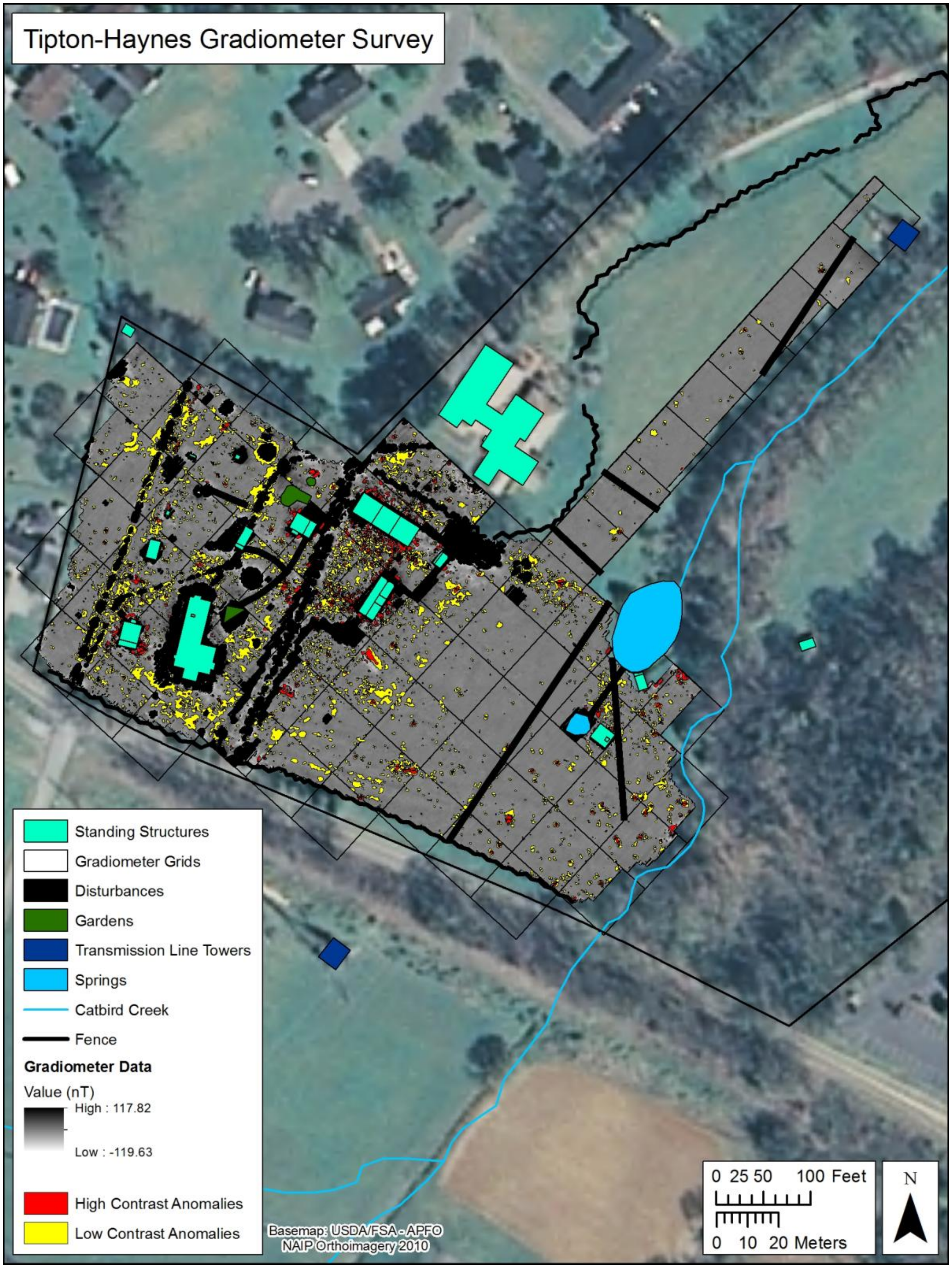

Figure 82. Gradiometer survey data highlighting high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

contrast anomalies in front of the farmhouse are believed to represent a low-gradient difference possibly created by modern fill from previous restorations.

Some of the larger features that present themselves in the data include roads, fencelines, planting beds, and a few locations of known previously-standing structures mentioned in the architectural survey. Figure 83 shows the conjectured location of proposed features evident in the data. Roads include the old Buffalo Trace to the south and an old dirt road headed towards the spring. Fencelines can be seen again near the western edge of the property and surrounding the barnyard. Due to their position around dated structures, it is believed that these fencelines were put in place during or after Haynes ownership of the property. Possible planting beds can also be seen in the east field. The location of previously-standing structures such as the necessary and the outline of the cantilevered siding addition to the barn constructed by Haynes can be seen. The necessary is also evident at the ground surface with a slight depression which was probed revealing much softer soil than that of the surrounding area. Other anomalies associated with the conjectured outlines of previously-known standing structures can also be seen. Because it is not possible to investigate every anomaly, a select few were chosen for later archaeological testing based upon their location and possibility of yielding information about the past landscape.

To conclude, magnetometry is one of the most beneficial and productive types of geophysics. It is quick and easy to use, allowing for large datasets to be collected over large areas (Kvamme 2006a:205). The collection of datasets over large contiguous areas increases the probability that complete cultural features with regular, interpretable geometric shapes will be recorded and interpreted (Kvamme 2006a:205). This gives magnetometry one of the highest detection probabilities in remote sensing for small and varied features over broad landscapes

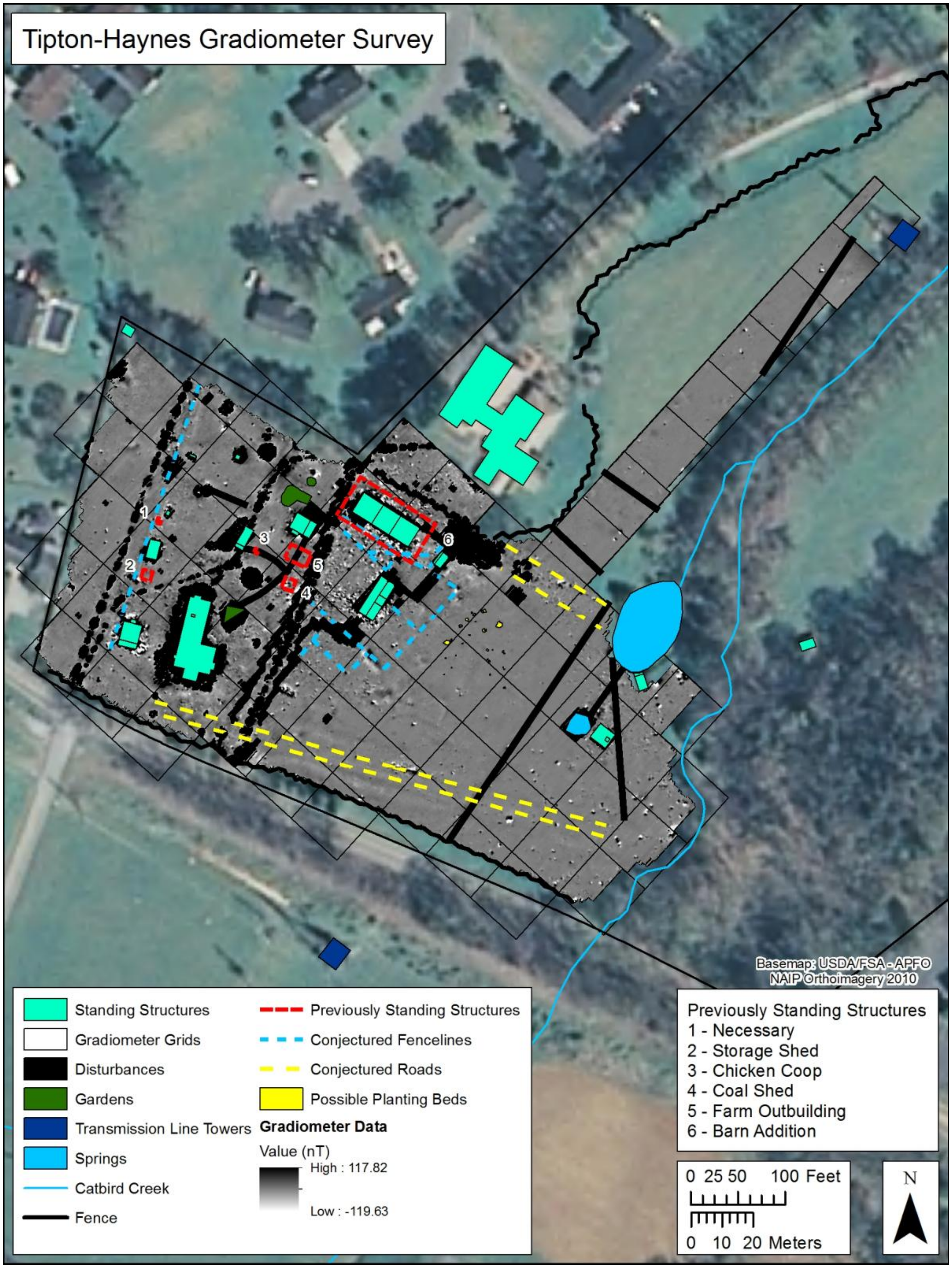

Figure 83. Gradiometer survey data highlighting identified features.

(Kvamme 2006a:206). While resolving small artifacts and features like postholes is usually not possible, detecting larger features like houses or ditches is more common (Kvamme 2006a:214). While magnetometry is good at detecting burnt features and negative features cut into the soil, it has been found not to be very reliable at detecting buildings unless they are made of fired brick or have been burnt or buried in more magnetic soil (Gaffney and Gater 2003:37). The data collected here has, however, allowed for a better understanding of what lies beneath the ground at Tipton-Haynes. By combining magnetometry with other geophysical datasets, a clearer picture of the site and its past landscape can be achieved.

Soil Resistance Survey

A soil resistance survey was also completed to complement the gradiometer survey in the hopes of identifying structural remains. With this geophysical method, electric currents are fed into the ground and the resistance to the flow of these currents is measured (Gaffney and Gater 2003:26). This is an active survey method because the probes actively inject electromagnetic energy into the subsurface (Somers 2006:109).

The principle behind soil resistance relates to the ability of soil to allow electric current to pass through it. This property is directly related to the interstitial water held within soil and the various salts present (Gaffney and Gater 2003:27). Soil resistivity to an electric current depends on material type, moisture, dissolved ion content, density, pore space, and other factors (Kvamme 2003:441). Soils with low resistivity have a large amount of highly mobile ions that are capable of carrying an electric current while soils with high resistivity typically lack an abundance of highly mobile ions and are less able to carry an electric current (Somers 2006:111).

The number of mobile ions is primarily governed by the amount of water-soluble compounds and moisture that is available in the soil (Somers 2006:111).

Resistance can be established by measuring the current flowing through a body of material and monitoring the change in voltage across the material (Gaffney and Gater 2003:28). This relationship is known as Ohm's Law which can be represented as: Resistance = Voltage (volts)/Current (amps). If the current is constant, then soil resistance, expressed in ohms, can be worked out by monitoring the change in voltage (Gaffney and Gater 2003:28).

To measure the resistance of the earth a current is made to pass between two electrodes, or probes, inserted into the ground by a resistance meter (Gaffney and Gater 2003:28). Two "current" probes send an electric current while two "potential" or "voltage" probes measure the voltage or resistance between these two points (Gaffney and Gater 2003:28). Probes can be configured in many different ways called arrays (Bevan 2006:29; Gaffney and Gater 2003:28). The distance between the current probe and the voltage probe is an approximate measure of the prospecting depth beneath the surface (Kvamme 2003:441; Somers 2006:113).

Field Collection

For the current survey, a twin probe array was used wherein there were two current-potential pairs, one mobile and another fixed at a distance (Gaffney and Gater 2003:29). The fixed distance should be at least 30 times the distance between the probe separation on the mobile frame which places the remote pair effectively at infinity (Gaffney and Gater 2003:31). A GeoScan RM15 Soil Resistance Meter with Multiplexer (MPX15) was used with a half-meter probe separation (Figure 84). The Multiplexer allowed for parallel twin survey recording of two traverses at one time which cuts recording time in half.

Figure 84. GeoScan RM15 Soil Resistance Meter with Multiplexer (MPX15).

Two 20 x 20 m grids of resistivity data were collected around the rear section of the farmhouse ell (Figure 85). In particular, the survey focused on the western side of the ell which is where the remains of a possible structure were located in a previous archaeological survey (Boyd 1989; Boyd and Riggs 1986, 1990). Each grid was collected at half-meter intervals, or traverses, taking two readings per meter in a parallel pattern. Grid N4920E45000 was collected from its NE corner while collection for N4920E4980 began at its southwest corner. During field collection, the remote probes were fluctuating ohms making it difficult to zero or normalize the data. This was thought to be caused from interference by localized farmhouse utilities, but it was hoped that this noise would not impede quality data collection.

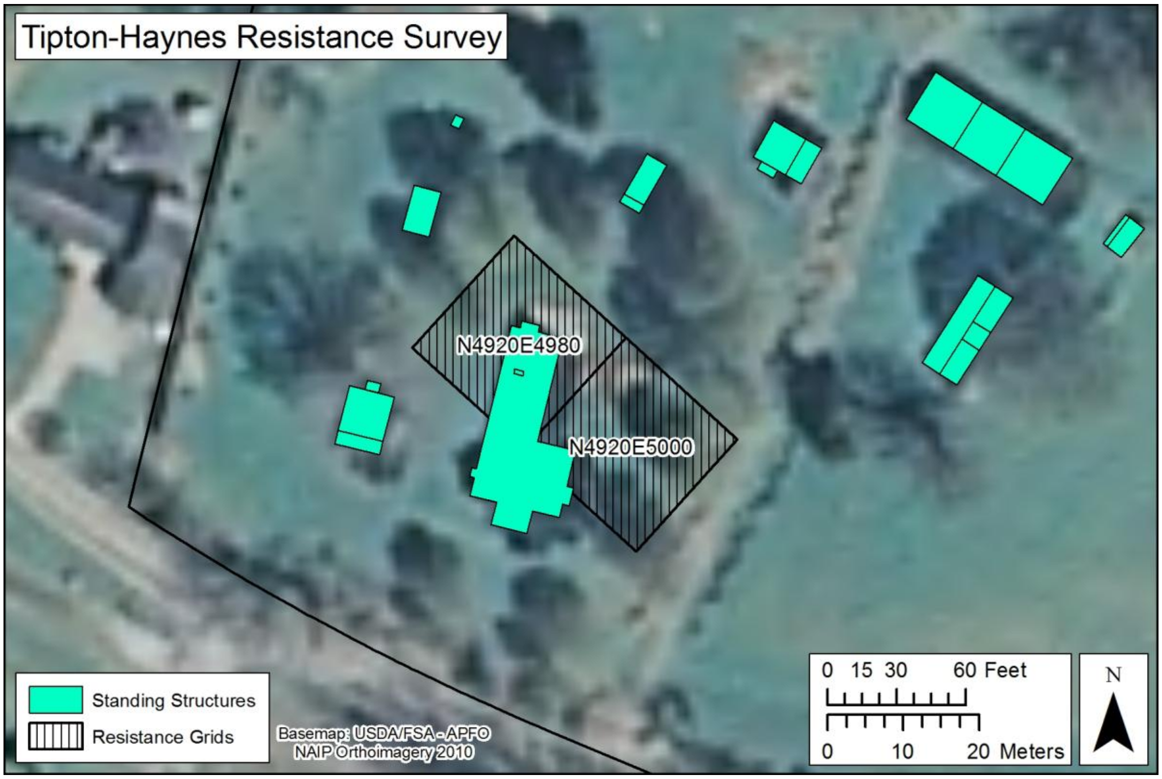

Figure 85. Resistance survey grids.

Processing

After field collection and download, the resistance data were processed using ArcheoSurveyor 2.5.11.0 (Table 49). Processing stages included first searching and replacing positive or negative spikes in the data with dummy values (any values below -205 and above 2040). Next, a high pass filter was applied using a Gaussian weighted filter with a 15 x 15 window size. A high pass filter subtracts the local average background from the survey data creating a new file with an average of zero increasing the visibility of small low-contrast features (Somers 2006:118). Data were then clipped to between -25 and 25 ohms. Finally, the data were smoothed using interpolation with the x and y axis doubled. Contours and images were then exported in ArcheoSurveyor and georeferenced in ESRI's ArcGIS.

Table 49. Resistance processing steps and resulting statistics.

Processing Steps	Parameters	Statistics	Values
Search and Replace:	2040 to 3000 with Dummy	Min:	-31.69
Search and Replace:	-205 to -200 with Dummy	Max:	32.19
High Pass Gaussian Filter:	Window 15 x15	Mean:	0.06
Clip:	-25 to 25 ohms	Median:	-0.09
Interpolate:	X and Y Doubled	Std Dev:	7.009999

Results

The goal of the resistance survey was to investigate the back yard of the farmhouse to locate features associated with the home or other structures. In particular, the survey focused on the western side of the ell which is where the remains of a possible structure were located in a previous archaeological survey (Boyd 1989; Boyd and Riggs 1986, 1990). The benefits of using resistance include its ability to locate foundation stones and the lack of interference from metal debris decreasing background noise (Bevan 2006:29).

The resulting signals collected by the resistance meter have a signal centered on zero, or the background, and characteristic negative or positive anomalies arise depending upon the electrical resistance of the buried feature. Low-resistance anomalies could possibly indicate pits or ditches, especially when waterlogged, while high-resistance anomalies could indicate limestone or possibly some other type of construction material. Similar to magnetometer data, anomalies can be classified by the mean and range of the resistance dataset. Low contrast, or weak, anomalies are near the mean, or background, of the survey data while high contrast, or strong, anomalies depart from the mean substantially with abrupt to diffuse boundaries.

To analyze the dataset, contours were created from the resistance readings allowing for visual highlighting of anomalies. The resistance dataset was then analyzed by means of the pattern-recognition approach to aid in the interpretation process (Kvamme 2006a:206). By

visually analyzing the processed output, anomalies that exhibited regular geometric patterning were identified as cultural. The following figures show the results of the processed resistance data (Figures 86-88).

The following interpretations can be made based upon the processed output. Figure 86 shows an image of the final processed output. Known disturbances within the dataset were then labeled for proper identification of cultural features. To highlight anomalies of interest, contours were created at 10 ohm intervals for visual highlighting (Figure 87). Some small anomalies are evident, but nothing substantial presents itself. More anomalies are noted in Grid N4920E4980 though no definitive features are obvious.

The resistance output was then overlain with the gradiometer data to highlight possible features of interest (Figure 88). One large feature evident in the data is a utility line located in

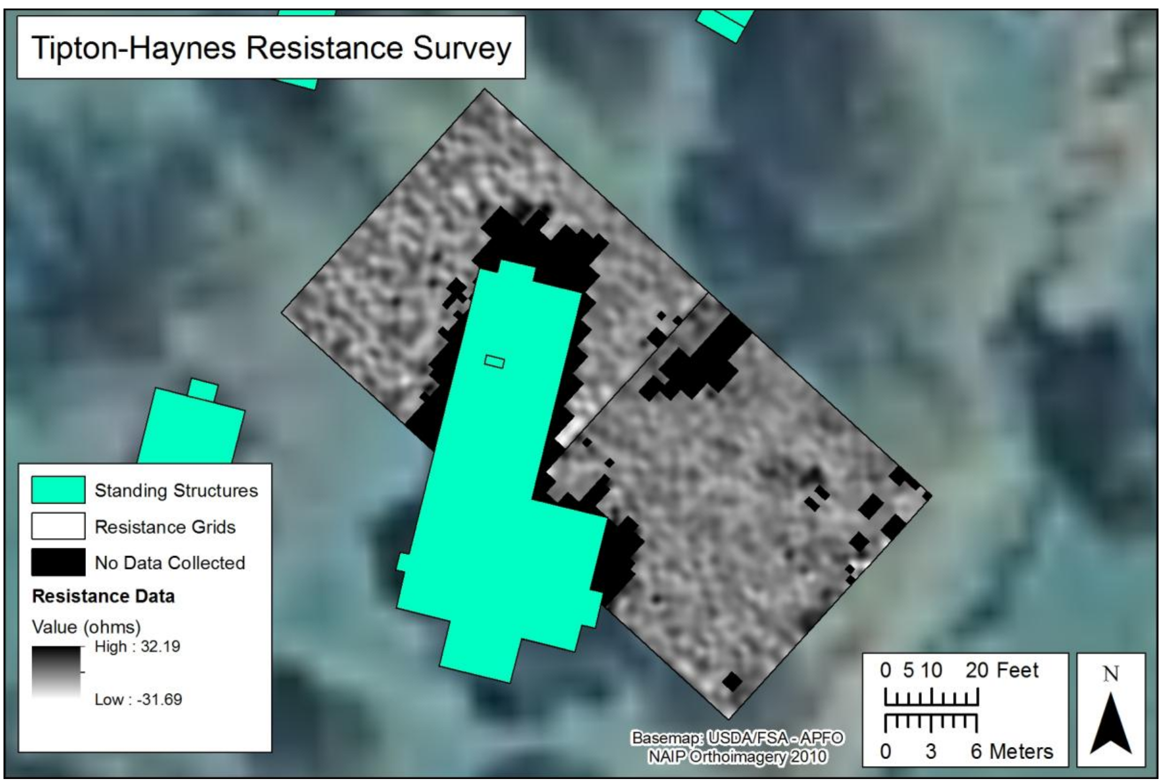

Figure 86. Resistance survey data.

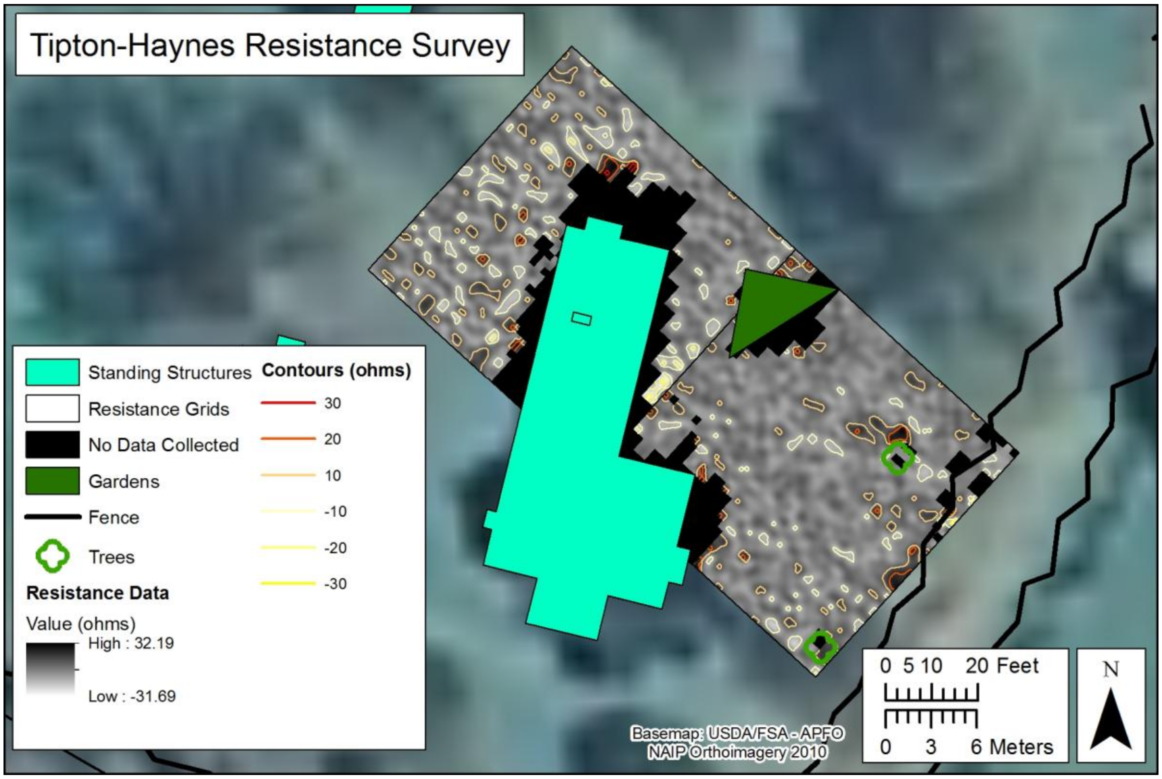

Figure 87. Resistance survey data with contours.

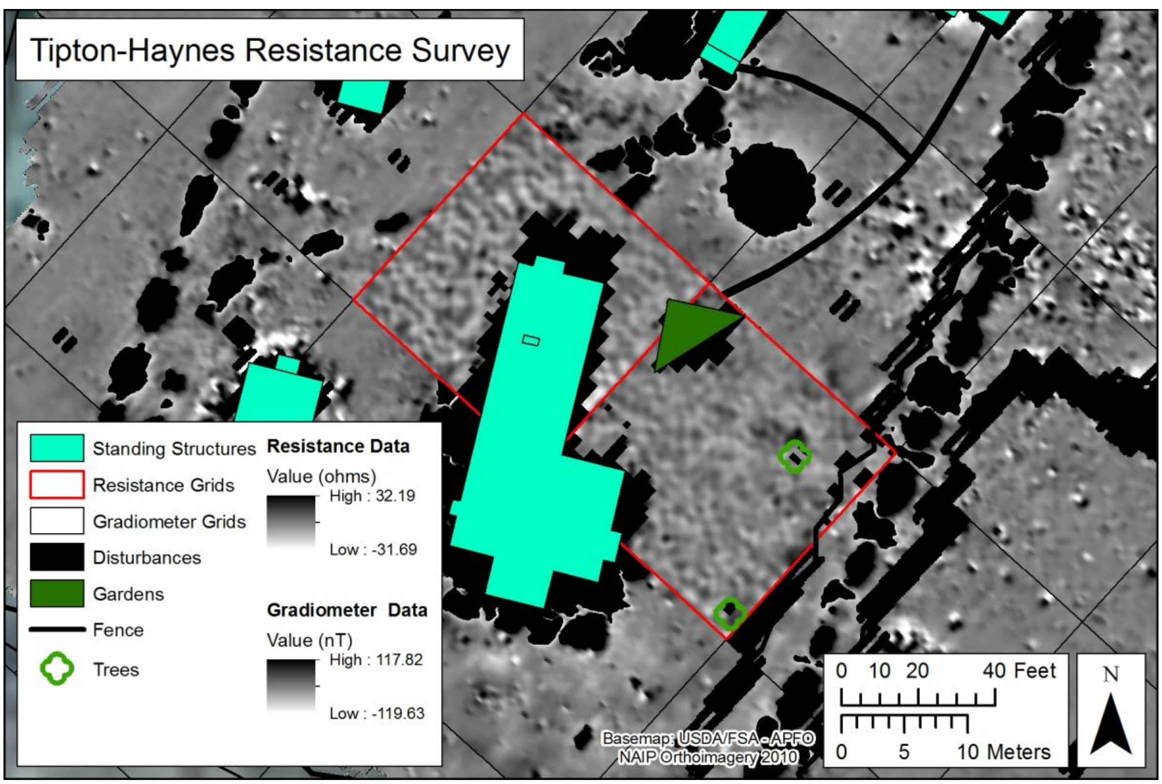

Figure 88. Resistance and gradiometer survey data.

the northwest corner of Grid N4920E4980 with a line of linear anomalies which was also seen previously in the magnetometer data. Based on the results, no other significant features or patterns could be elicited from the data. The obscurity of identifiable features is possibly due to interference from utilities located around the house since buried electrical lines can interrupt the current measurement (Clark 2000).

The resistance data was difficult to interpret due to the high amount of noise reflected in the dataset. The complexity of deposits can make anomaly identification and interpretation difficult, jumbling signals and making pattern identification unclear (Kvamme 2006a:222). Unfortunately, there was too much interference from the house or utilities seen in the resistance data alone to make any effective interpretations for subsurface anomalies. Targeted cultural features were too obscured by modern disturbance.

Ground Penetrating Radar Survey

Ground penetrating radar was also used in conjunction with other survey methods to help locate any previously-standing structures or features of interest between the main house and law office as well as in an area south of the reconstructed slave cabin using a GSSI Subsurface Interface Reader system. The radar equipment sends out an electromagnetic wave and reads the variation in the reflected signal created by subsurface features. GPR is an active survey method because it probes the subsurface by actively injecting electromagnetic energy into it (Somers 2006:109).

GPR is a geophysical method that can accurately map the spatial extent of near-surface objects and archaeological features or changes in soil ultimately producing three-dimensional images of those materials (Conyers 2006:136). GPR works on the principle that electromagnetic

differences between media are able to be interpreted by reading the reflection of a radio wave emitted from an antenna. Radar waves are sent in distinct pulses from a surface antenna, reflected off buried objects or surfaces, and then detected back at the source by a receiving antenna (Conyers 2006:136). When the radar waves meet discontinuities, or surfaces, some of these pulses are reflected back to a receiving antenna; others continue down to be reflected back from other buried features (Gaffney and Gater 2003:47). The travel times are recorded by a receiver antenna and converted into depth measurements, or reflection time in nanoseconds (Ns), giving a profile of the subsurface and ultimately a three-dimensional view (Gaffney and Gater 2003:48). The greater the contrast in the electromagnetic properties between two materials, the greater the strength of the reflected signal and amplitude of the reflected waves (Conyers 2006:136). The magnitude of the reflected wave indicates something about the nature of the materials in the ground (Kvamme 2003:442). Higher amplitude waves produce stronger reflections which can denote the presence of buried archaeological materials or natural stratigraphic interfaces while lower amplitude reflections usually occur when there are only small differences in the electrical properties between layers (Conyers 2006:140).

The depth of radar penetration is primarily dependent on the frequency of the transmitting antenna. Antenna frequency controls both the wavelength of the propagated wave and the amount of spreading and attenuation of the energy in the ground (Conyers 2006:138). For example, during this survey a 400 megahertz (MHz) antenna was used while a 100MHz antenna might have been used for a geologic survey due to its greater wavelength and depth penetration.

The depth of penetration is also dependent on the properties of the material being surveyed. As radar waves are transmitted through different materials, their velocity changes

depending on the physical and chemical properties of those materials (Conyers 2006:136). This change is based on the principle of Relative Dielectric Permittivity (RDP), which "is the ability of a substance to store and allow passage of electromagnetic energy when a field is applied" (Gaffney and Gater 2003:50). All sediment and soil layers, as well as archaeological features, have particular electrical and magnetic properties that affect radar velocity, reflection, and dissipation in the ground (Conyers 2006:139). The velocity of the radar energy differs greatly with soil type and moisture conditions depending on the medium's ability to hold and transmit an electrical charge (Kvamme 2003:442). For example, radar waves travel in the air at 0.3 m per nanosecond (the speed of light), dry sand at 0.15 m per nanosecond, and water-saturated sand or clay at 0.05 m per nanosecond (Conyers 2006:139). One difficulty with radar data is that the soil can attenuate the radar pulse reducing the penetration to an insufficient depth for proper collection (Bevan 2006:28). As shown, highly conductive deposits such as moist clays can impede radar penetration (Kvamme 2003:442). While loam may allow a profiling depth of three meters, clay may limit the profiling depth to less than half a meter (Bevan 2006:28). Generally, it has been found that most GPR surveys are effective between about 0.2 meters to five meters (Conyers 2006:131).

Field Collection

A GSSI SIR-3000 Ground Penetrating Radar Unit with 400 MHz Antennae was used for the survey. The GPR unit houses a 400MHz transmitting antenna and receiving antenna hooked to a mobile computer (Subsurface Interface Reader system) and collected using a wheeled cart assembly with odometer for data collection (Figure 89).

Two arbitrary grids of GPR were collected at the Tipton-Haynes site (Figure 90). In particular, the survey focused on the west side of the farmhouse which is where the remains of a possible structure were thought to exist (Boyd 1989; Boyd and Riggs 1986, 1990). An area just south of the Hayne's cabin was also investigated to locate another possible structure seen in the Strother's (1857) woodcut and structures noted in a 1960s aerial photograph (Figures 11, 20). A single 40 x 10 m grid labeled "Grid A" was collected just west of the farmhouse. Another 20 x 10 m grid labeled "Grid B" was collected south of the Hayne's cabin. Each grid was collected at half-meter intervals in a zig-zag pattern beginning in the southwest corner heading east taking 512 samples per scan with a depth range of 40 nanoseconds or an estimated two meters (Table 50).

Figure 89. GSSI SIR-3000 Ground Penetrating Radar Unit with
400 MHz Antennae and Subsurface Interface Reader system.

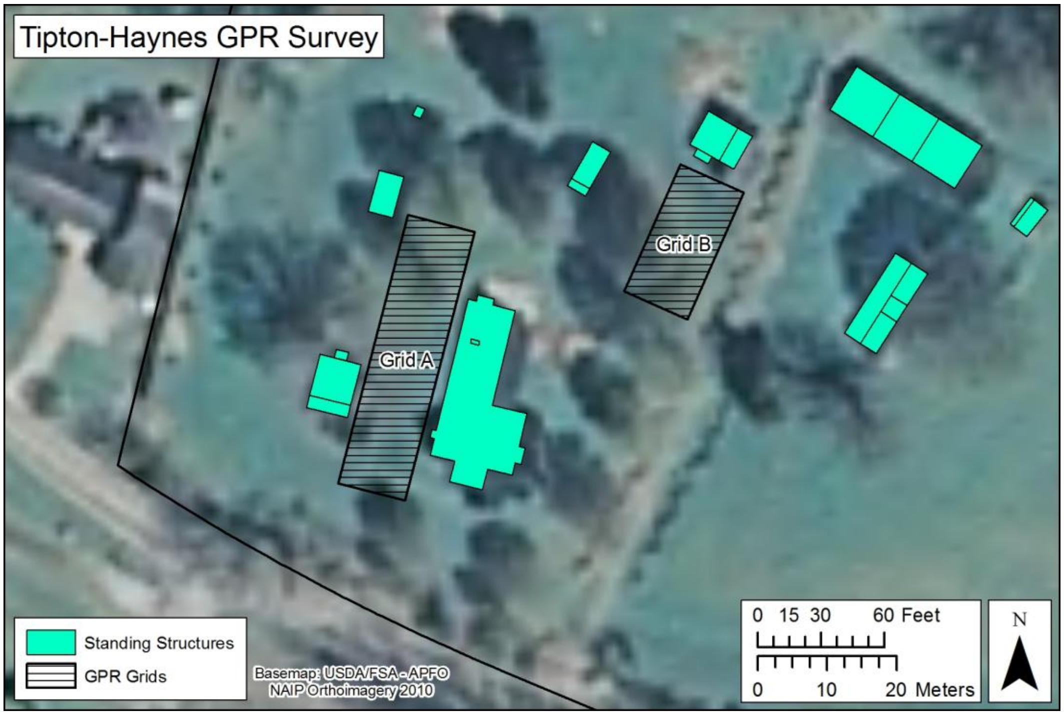

Figure 90. Ground Penetrating Radar survey grids.

Table 50. GPR field parameters.

Parameters	Values
Samples/Scan:	512
Bits/Samples:	16
Scans/Second:	120
Scans/Meter:	60
Meter Interval:	0.5
Range:	40 Ns or est. 2 m

Processing

During survey, data were collected as a series of profiles of the subsurface. Once the data are downloaded, software can correlate and interpolate reflection time as well as the strength of the signal between profiles allowing horizontal resampling and a three-dimensional data cube to be created (Gaffney and Gater 2003:47; Kvamme 2003:442). The outcome is a series of subsurface horizontal plans, at various reflection times (a proxy for depth), known as

"timeslices" (Gaffney and Gater 2003:47; Kvamme 2003:442). The data then can be displayed as a plan response at a particular depth range below the surface (Gaffney and Gater 2003:74).

After collection and download, data were processed using Radan 6. Processing stages included position correction and application of a finite impulse response (FIR) filter. Position correction is necessary to align the depth scale to the ground surface. Each profiles time-zero (0 nanoseconds), or first signal response from the radar wave pulse, is adjusted to offset the vertical difference between the collected data and the actual surface. This adjustment compensates for the travel time between the antenna and ground surface. A FIR filter was applied with parameters set to remove background scans of 512 (1019) scans with a boxcar filter type helping to make anomalies more symmetrical. After processing, various timeslice and profile images of each grid were exported and georeferenced in ESRI's ArcGIS.

Results

Ground penetrating radar was used at the site in conjunction with magnetometer and resistance data to located historic landscape features as well as non-standing structures and any associated features. GPR surveys are dependent on soil and sediment mineralogy, clay content, ground moisture, depth of burial, surface topography, and vegetation for successful collection (Conyers 2006:137). GPR varies from other methods by measuring different properties of the subsurface which creates an image based on compositional or water saturation differences (Conyers 2006:156). The advantage of using GPR is that a three-dimensional image is created during processing allowing for horizontal and vertical placement of existing features. GPR is an excellent tool for mapping stone and brick foundations or when depth information is required (Gaffney and Gater 2003:48).

GPR anomalies are created from changes in the velocity of the radar wave as it penetrates the ground surface due to differences in RDP. Higher amplitude waves are a product of reflection from the contact between highly different materials and produce stronger reflections which could possibly denote archaeological materials, voids, or natural stratigraphic interfaces (Conyers 2006:140). Low amplitude reflections occur when there are only small electrical contrasts between materials indicating uniform matrix materials or soils (Conyers 2006:142). Reflections will occur at buried discontinuities where there are changes in the electrical properties of the sediment or soil, variations in water content, lithologic changes, as well as at interfaces between archaeological features and the surrounding matrix (Conyers 2006:136). Abrupt changes between areas of low and high amplitudes can be significant and may indicate the presence of a buried interface (Conyers 2006:143). Voids within the ground such as tunnels or buried pipes will also generate strong radar reflections as a result of a significant change in radar-wave velocity (Conyers 2006:136). Radar waves will reflect off such buried features as stratigraphic contacts, walls, house floors, pit surfaces, rubble, or middens (Kvamme 2003:442). Reflective anomalies indicate some type of less permeable material such as foundations while non-reflective anomalies at certain depths could indicate negative features such as ditches or pits.

It is, however, important to recognize that reflection records do not necessarily exactly mimic what is below surface because radar energy travels not only in a vertical line but also in other complex paths (Conyers 2006:143). This is because “GPR antennas generate a transmitted radar beam that propagates from the surface down into the ground in a conical pattern, radiating outward as it travels deeper in the ground” (Conyers 2004, 2006: 136; Conyers and Goodman 1997:35). Radar waves leaving the antenna will therefore spread out with depth and be reflected from buried objects that are not directly below the antenna (Conyers 2006:136-137). Radar

waves often reflect multiple times from buried objects blurring distinct anomalies and can also refract the boundaries between distinct layers further confusing the subsurface (Conyers 2006:143).

Two non-adjacent GPR grids were collected and processed separately. Due to the three-dimensional aspect of GPR data and its processing ability, several different images of each grid were exported for analysis. Profiles of transects with significant features were generated as well as plan views of each grid. Plan views work best to visually locate features (Gaffney and Gater 2003:74). Plan views create images of the spatial distribution of reflected wave amplitude differences within a grid and allow for horizontal imaging at varying depths, also known as timeslices (Conyers 2006:141). Timeslices at different estimated depths, or nanoseconds, below surface were exported to highlight anomalies. To refine the dataset, a FIR filter was applied to resolve anomalies and transparency images were created to identify cultural features. For this analysis, both positive and negative amplitudes of reflections are compared to the norm of all amplitudes within a defined timeslice. The magnitude of amplitude deviation from the norm is expressed rather than differences between positive or negative anomalies (Conyers 2006:143). Cultural features were identified based on any possible pattern-recognition patterns. Images were created showing the data and also identified anomalies within the grid. These were then combined with other geophysical datasets to analyze observed anomalies.

Grid A

Grid A was collected in the causeway between the farmhouse and law office (Figure 90). The following interpretations can be made based on the final processed output. Figure 91 shows an image of a series of timeslices at different depths. Estimated depths were calculated resulting

in three nanoseconds equaling 0.15 meters, 10 nanoseconds equaling a half meter, and 20 nanoseconds equaling one meter. Anomalies were then identified based on their relative dielectric contrast highlighting any known disturbances (Figure 92).

At three nanoseconds, the data displays the surface or very near surface of the ground. Utility lines are evident which were also present in the gradiometer data. Also present is a large reflection thought to image standing water at the base of the topsoil. This could also represent standing water on top of a midden which was noted to be located in this area during previous excavations (Boyd and Riggs 1986, 1990). Particularly interesting is a square-shaped anomaly just to the north of the possible midden which could represent a previously-standing structure also noted by Boyd to be located in this area (Boyd and Riggs 1986, 1990).

At 10 nanoseconds, the data again displays evident utilities to the north. The location of

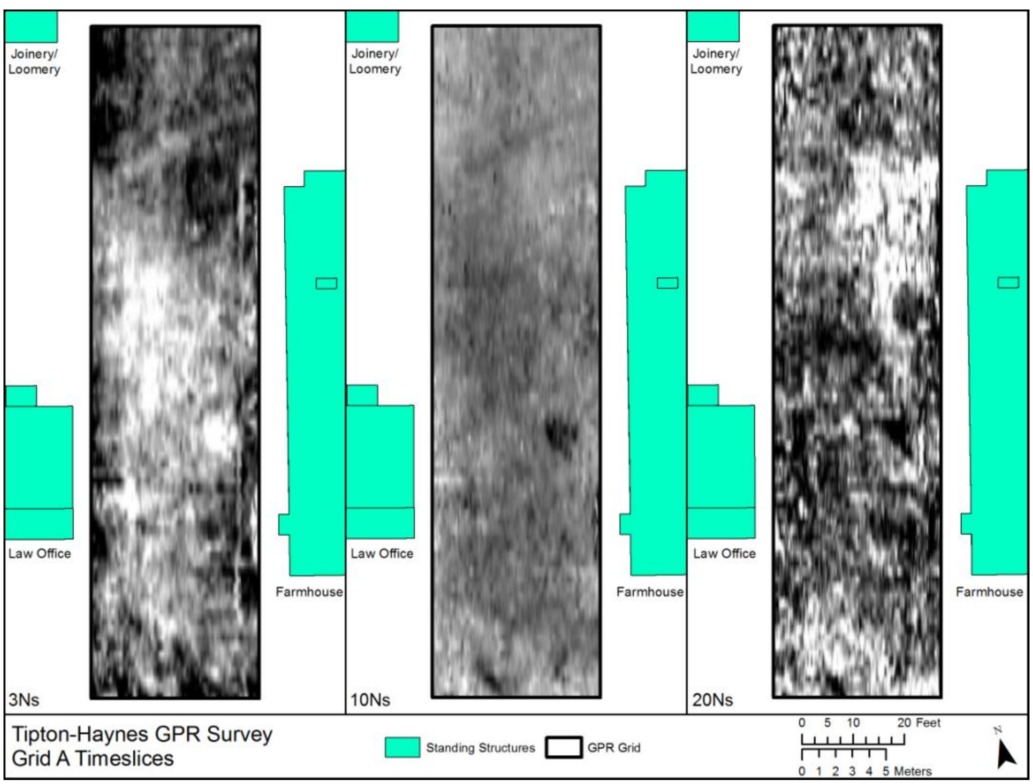

Figure 91. Grid A amplitude timeslices at varied depths.

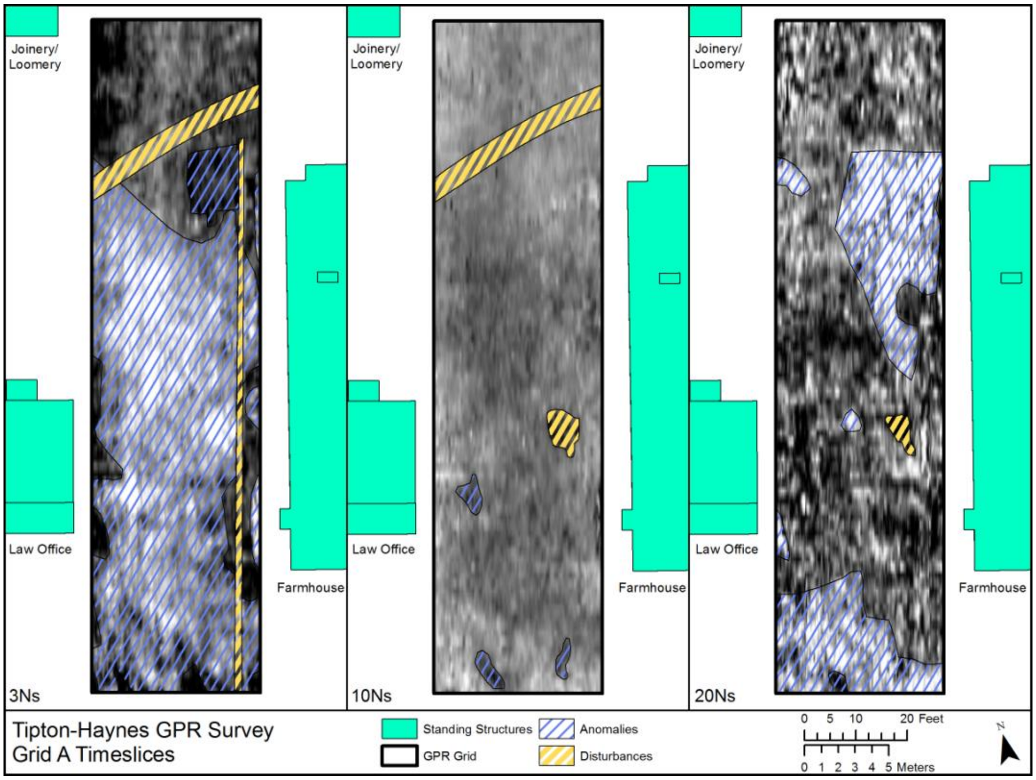

Figure 92. Grid A amplitude timeslices at varied depths highlighting identified anomalies.

a tree seen in previous archaeology survey photographs was also noted (Figure 41). Also seen at this depth are a few negative features to the south which represent voids and can be interpreted as possible pit features or other unknown tree disturbances.

At 20 nanoseconds, the tree disturbance is still noticeable as well as other large reflective surfaces. Two large anomalies are located to the northeast and southern portions of the grid. These are believed to represent rubble scatters from historic debris. It is believed that the northeast anomaly is associated with the possible structure located to the west of the current kitchen. It has been found that foundations are hard to identify because of the amount of construction rubble that typically obscures them (Bevan 2006:33). The aspect of a buried structure that is most commonly detected is the scatter of demolition rubble that overlies it

(Bevan 2006:42). Three other smaller reflective anomalies are also seen within the grid and are interpreted as stone debris associated with the midden or previously-standing structure.

To further refine the data, a FIR filter was applied to the GPR dataset. Figure 93 shows an image of a timeslice at 10 nanoseconds with a FIR filter. A FIR filter removes background scans making anomalies more symmetrical. Again, identified anomalies were highlighted showing three large reflective areas and three smaller associated anomalies (Figure 94). The utility line directly parallel to the farmhouse is again evident in the data. Small anomalies are thought to represent stone except one adjacent to the dining room. This is possibly related to debris from the handicapped access previously located here (Figures 40 and 41) (Bailey 1991:191, appendix V). Larger anomalies are again believed to be rubble scatters from historic debris possibly associated with structures. To the north, a distinct anomaly scatter is believed to be associated with the construction of the Joinery/Loomery. Just west of the farmhouse kitchen is a large anomaly that represents structural debris possibly associated with the previously-standing structure excavated by Boyd (1989; Boyd and Riggs 1986, 1990). Another large scatter of material is located to the south of the grid possibly related to the Law Office and use of the front drive.

Finally, a three-dimensional transparency image was exported at five nanoseconds to highlight distinct reflective anomalies (Figure 95). Debris scatters are again evident as well as previously identified disturbances. These are thought to represent construction debris, either stone or brick, from associated standing and non-standing structures. Probing confirmed the presence of a large amount of stone, and/or brick, in these areas.

To display identified anomalies in the data, profiles were also exported. Figure 96 shows the location of two profiles labeled A and B pulled for analysis of the debris scatter located just

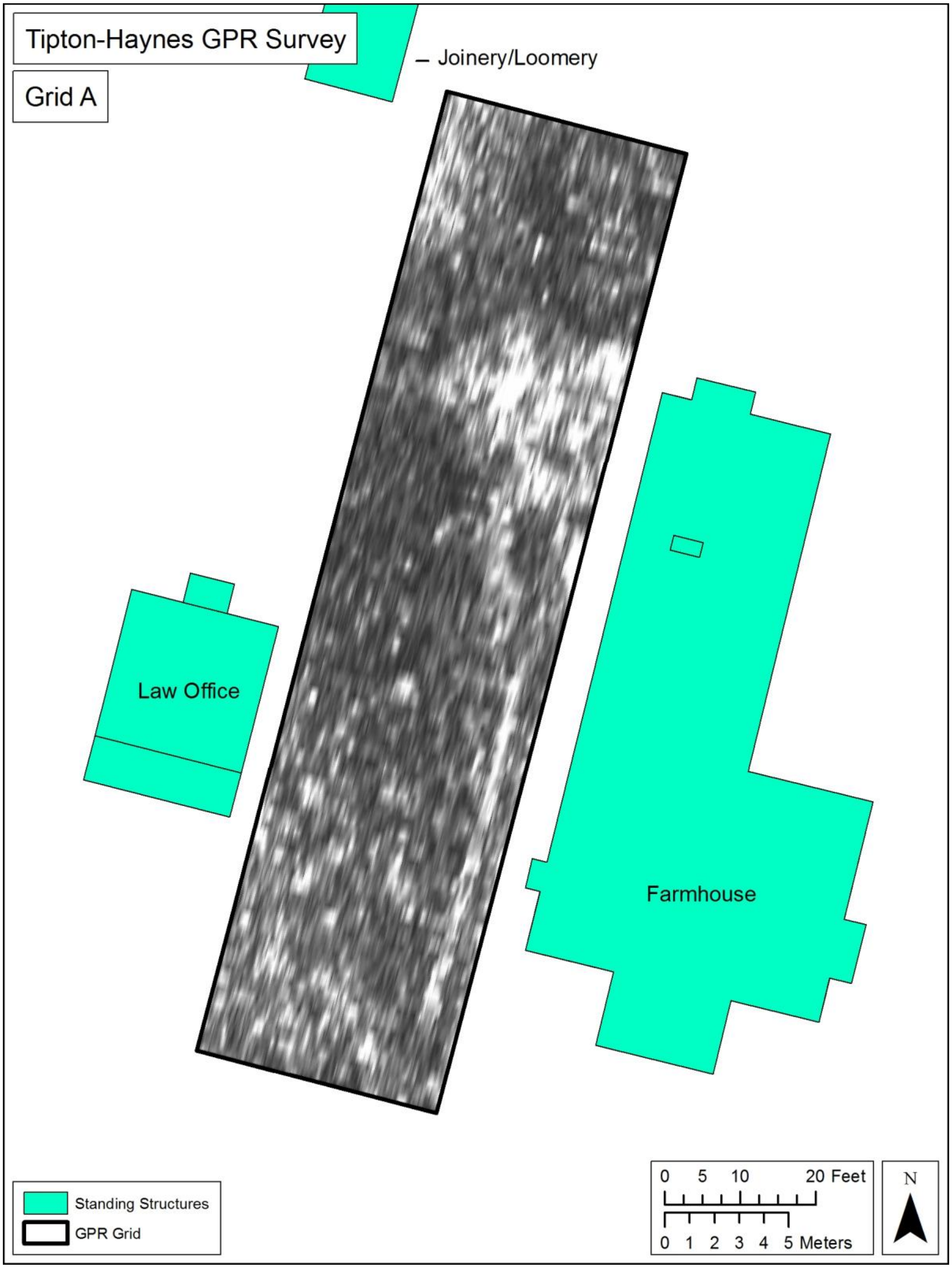

Figure 93. Grid A with applied FIR filter (10 Ns).

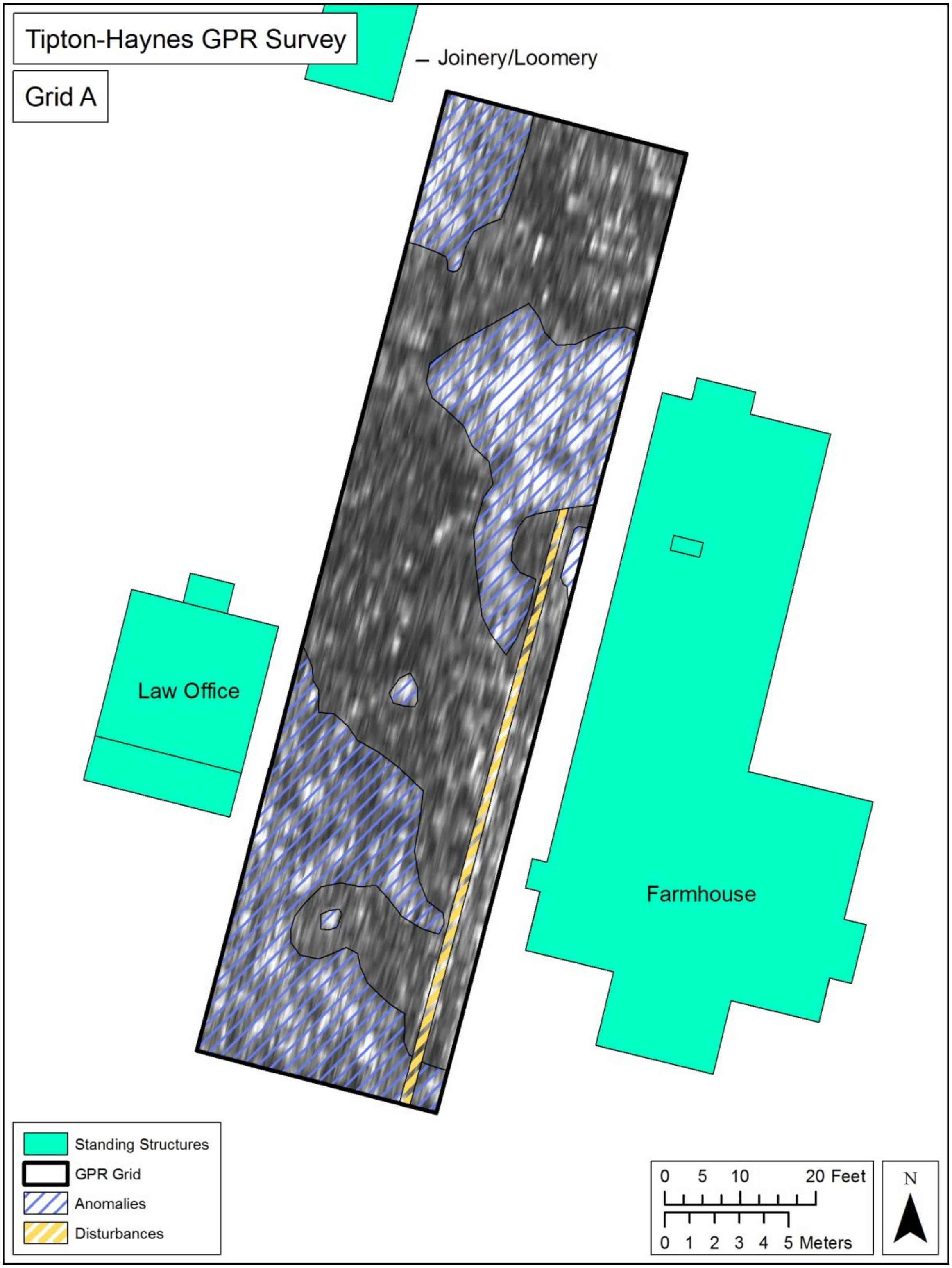

Figure 94. Grid A with applied FIR filter (10 Ns) highlighting identified anomalies.

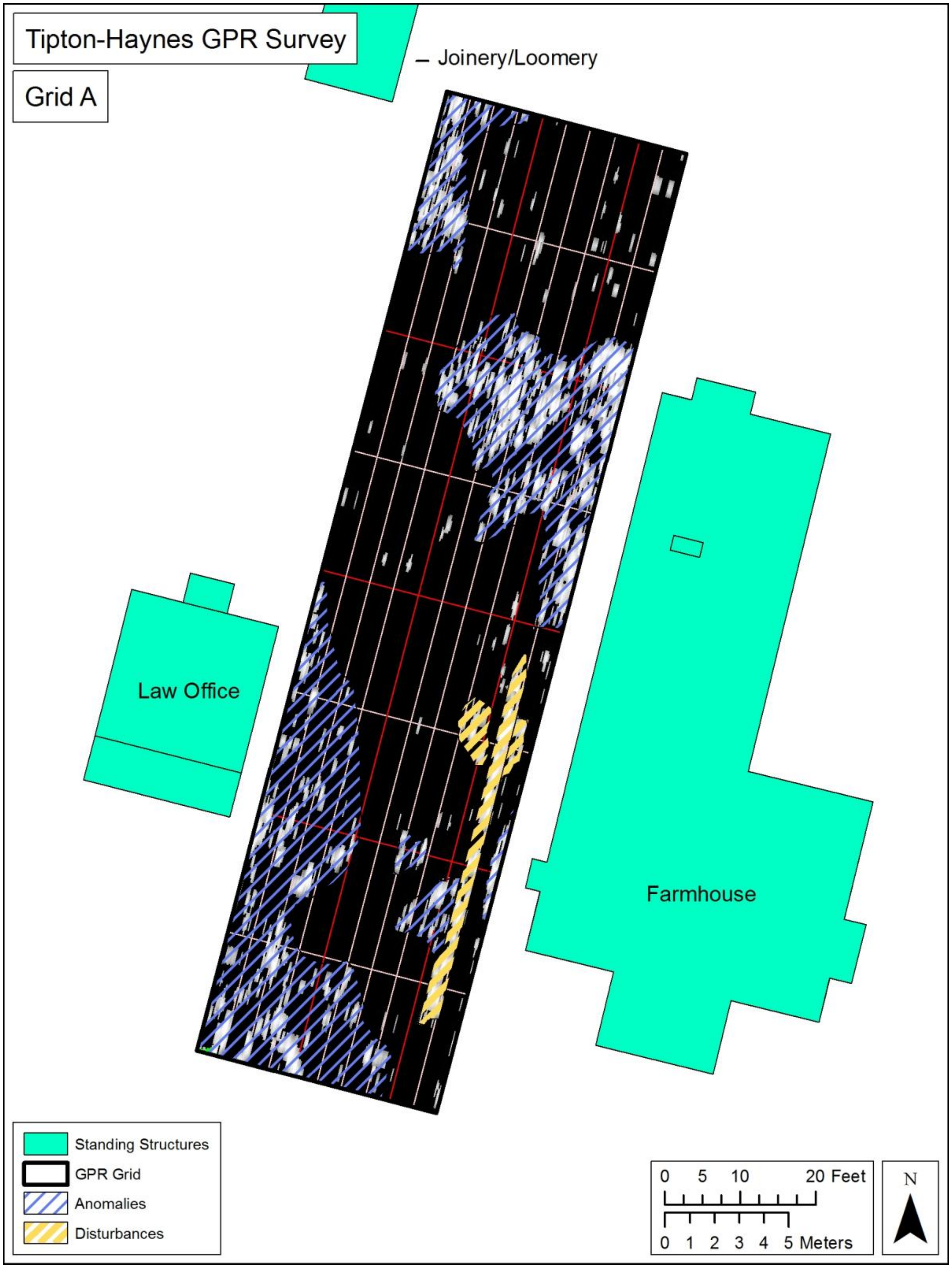

Figure 95. Grid A 3D transparency (Range 0.38 m/Position 0.25 m) highlighting identified anomalies.

west of the farmhouse ell. Within the profile, anomalies represent distinct reflective layers or what are known as "point features." Reflective layers or strata produce somewhat level surfaces while point features tend to produce reflection hyperbolas. As noted previously, these point source hyperbolas are created due to the GPR antennas generating a conical radar wave which spreads out with depth reflecting buried objects that are not directly below the antenna (Conyers 2006:136-137).

Profile A exhibits stone, or possibly brick, anomalies with a possible surface located between them (Figures 97 and 98). This could represent a foundation or piers with the interior surface of a possible structure identified previously. The utility line seen earlier also intrudes into this feature.

Profile B shows a large point feature at five meters which is interpreted as a stone, or possibly brick at surface (Figures 99 and 100). A large reflective surface with large point features located towards the east is interpreted as a portion of the debris scatter identified earlier. Again, the utility line is seen as a large point feature at about nine meters.

Anomalies identified in the GPR survey were then integrated with the other geophysical datasets for comparison. Overlain with the gradiometer survey, GPR anomalies generally configure to the magnetic data (Figure 101). Utilities can be seen in both datasets and general areas of debris scatters conform to significant anomalies highlighted in the gradiometer data. When combined with the resistance data, no definitive conclusions can be made (Figure 102). It does appear that the anomalies surrounding the debris scatter near the farmhouse ell align, but again interference from utilities seen in both the gradiometer and GPR surveys makes identification of significant anomalies difficult.

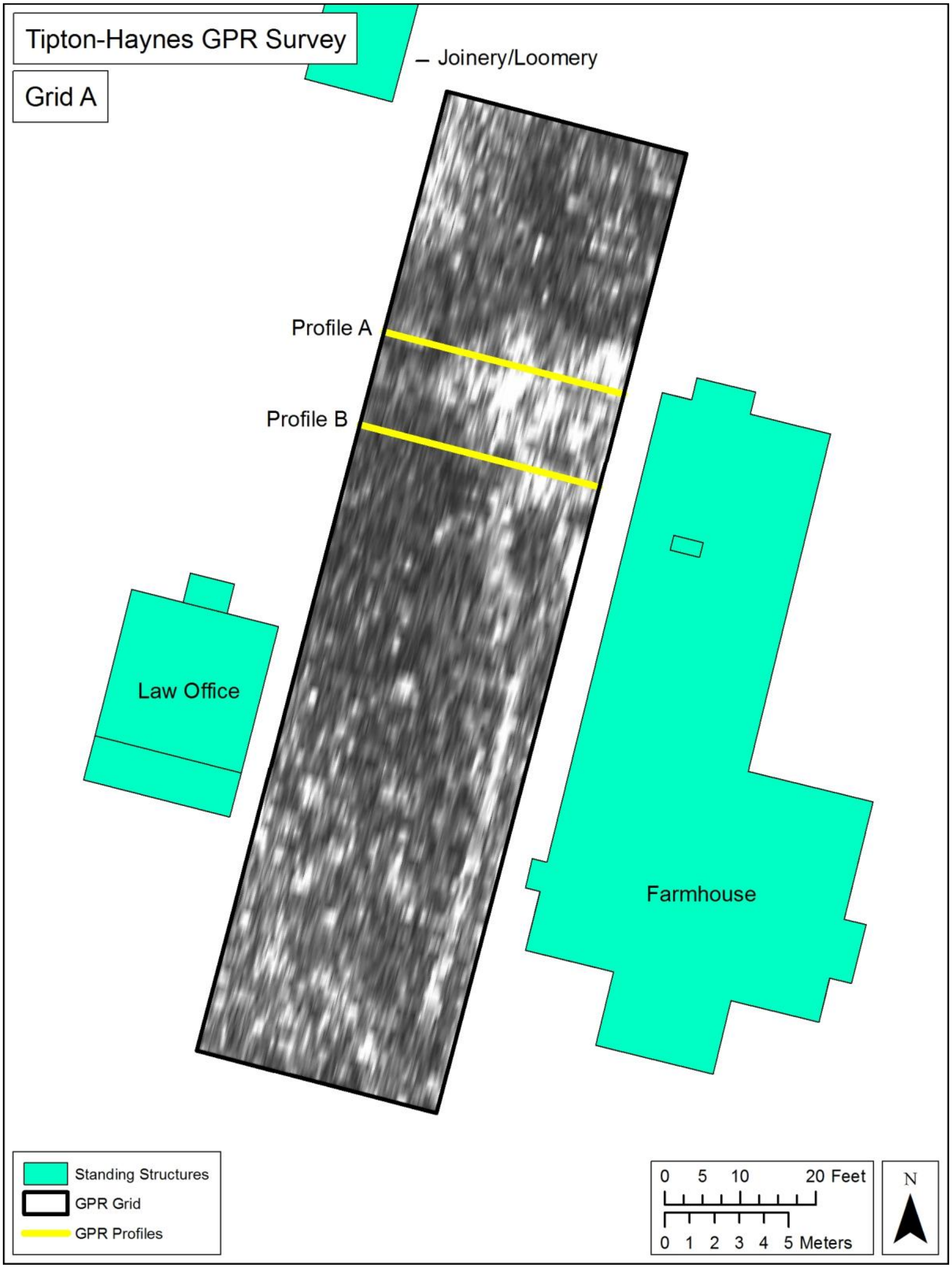

Figure 96. Grid A showing GPR profile locations.

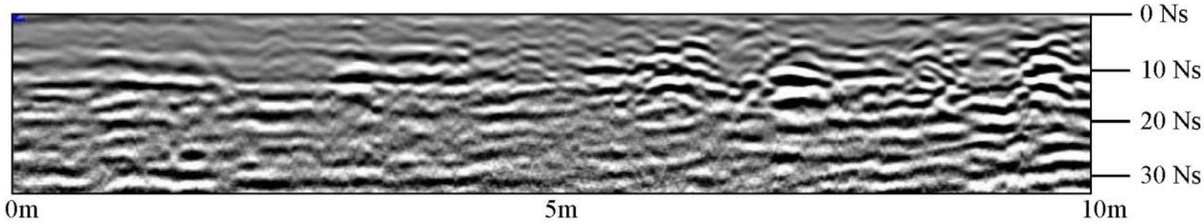

Figure 97. Profile A W/E at 30 m.

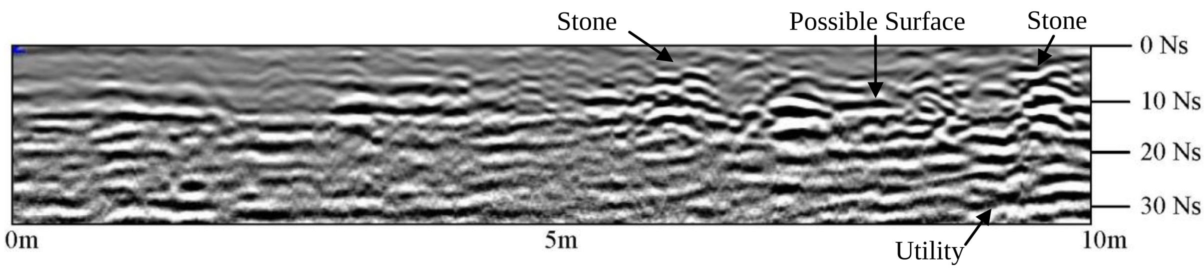

Figure 98. Profile A W/E at 30 m with identified anomalies.

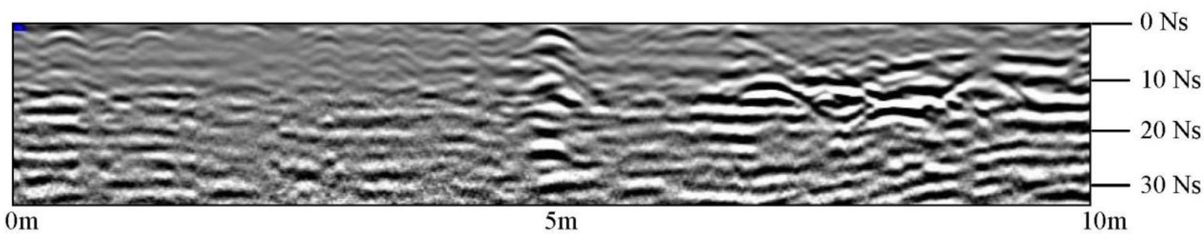

Figure 99. Profile B W/E at 26 m.

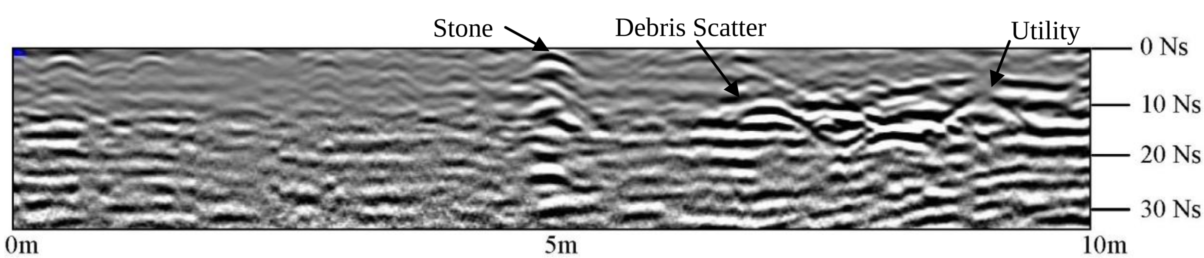

Figure 100. Profile B W/E at 26 m with identified anomalies.

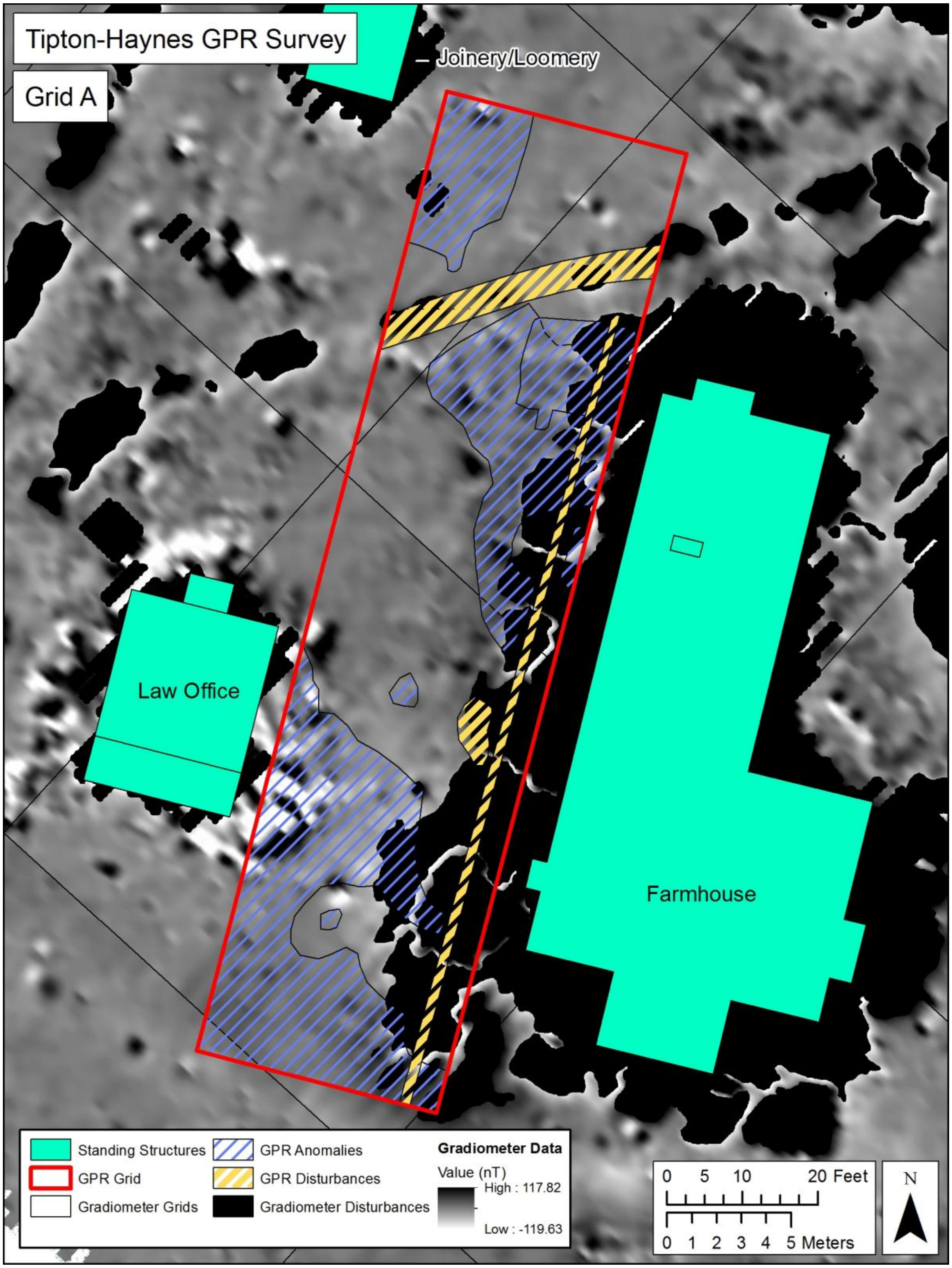

Figure 101. GPR Grid A with highlighted anomalies overlain with gradiometer survey data.

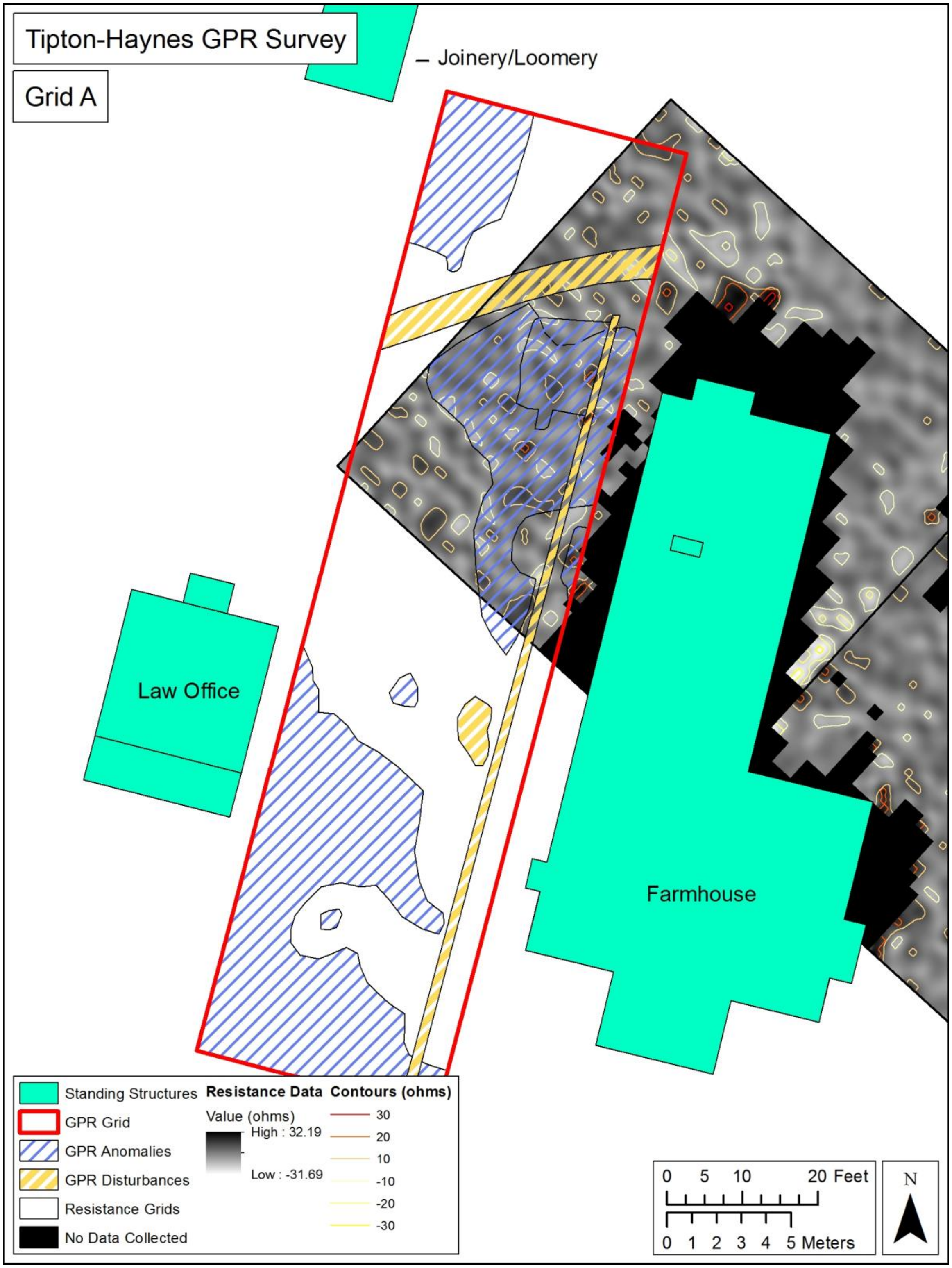

Figure 102. GPR Grid A with highlighted anomalies overlain
with resistance survey data and contours.

Grid B

Grid B was located south of the relocated cabin interpreted as the George Haynes Cabin where previously-standing structures are known to have existed. Again, timeslices at different depths were exported (Figure 103). Estimated depths were calculated resulting in four nanoseconds equaling 0.18 meters and 10 nanoseconds equaling a half meter. Anomalies were identified based on their relative dielectric contrast highlighting any known disturbances (Figure 104).

At four nanoseconds, the data displays a few reflective anomalies including known disturbances close to the surface. Disturbances include a utility line seen in the gradiometer and a standing tree in the southwest corner. A walkway is also evident aligning with the current break in the fenceline. Though known to be modern, it is not known if this path was used historically. Other anomalies are also evident to the south and are possibly associated with one of the formerly standing structures. These include two reflective anomalies thought to be stones near surface and two non-reflective anomalies thought to be small depressions.

At 10 nanoseconds, the data again displays known disturbances. The walkway, though faint, is still evident in the data at this depth. One strong, high amplitude anomaly is noted in the southeast corner of the grid and could possibly represent a large footer stone or refuse-filled pit.

Using a FIR filter and three-dimensional transparencies to resolve the data, images were exported at 10 nanosecond timeslices to identify anomalies (Figures 105-107). Anomalies included disturbances, the walkway, as well as a number of anomalies to the south. Two of these located near the utility line could be related to overburden created from utility installation or tree root disturbances. Other anomalies are believed to represent features associated with the previous standing structure in that location.

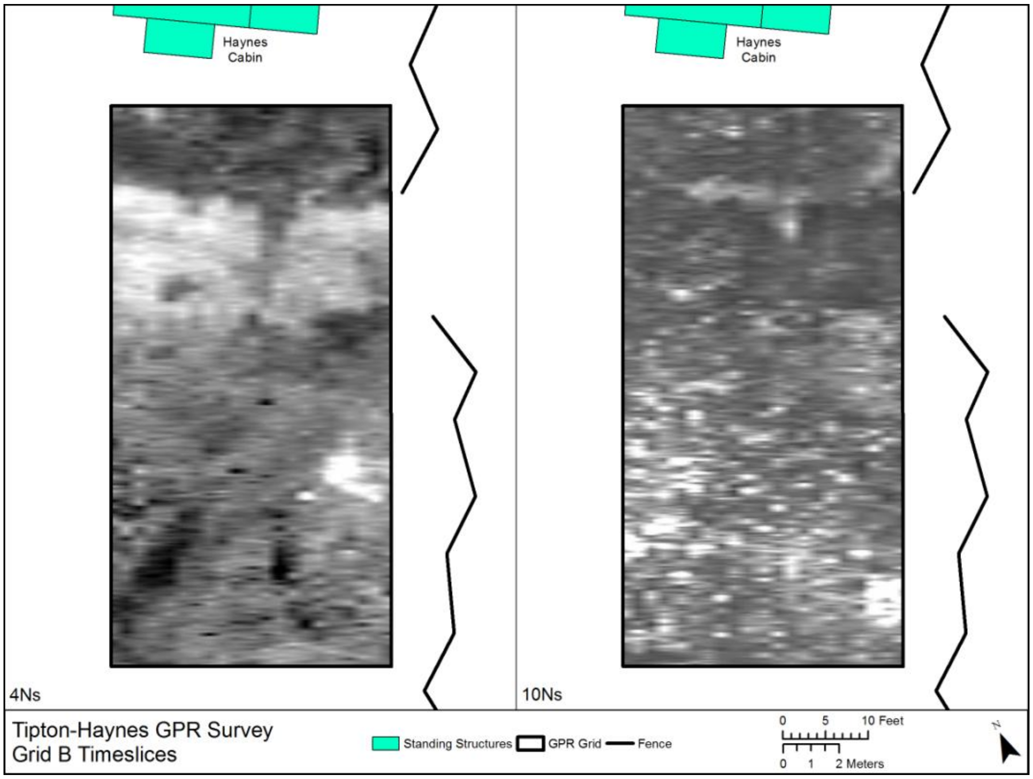

Figure 103. Grid B amplitude timeslices at varied depths.

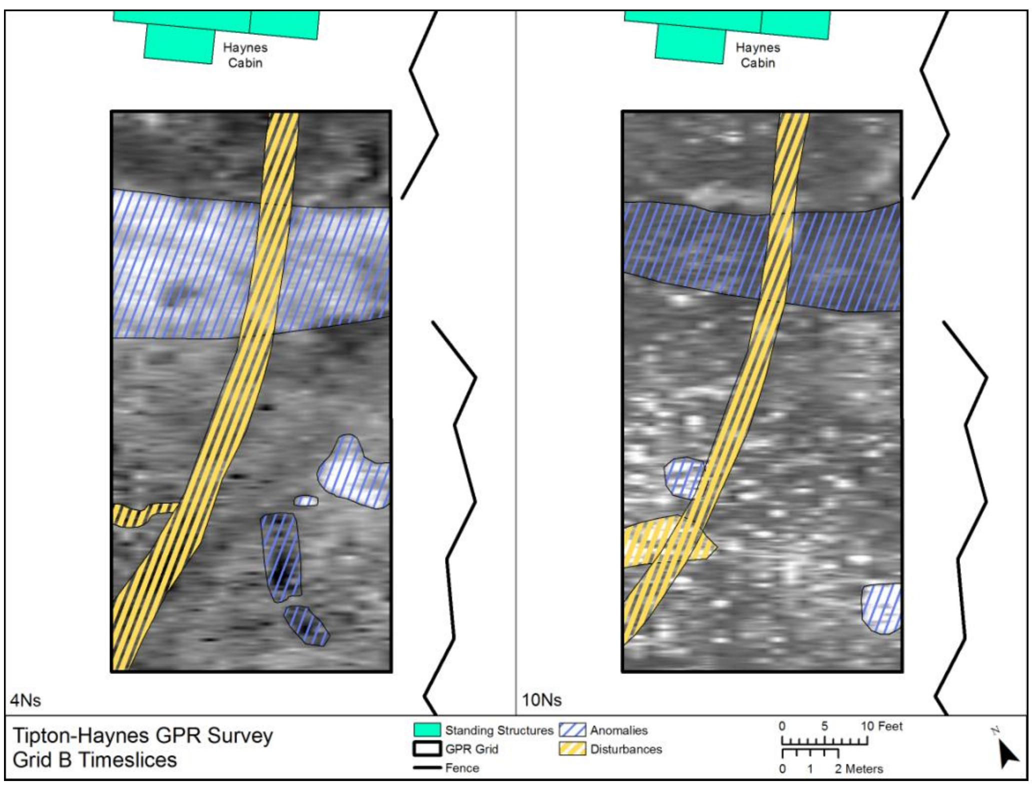

Figure 104. Grid B amplitude timeslices at varied depths highlighting identified anomalies.

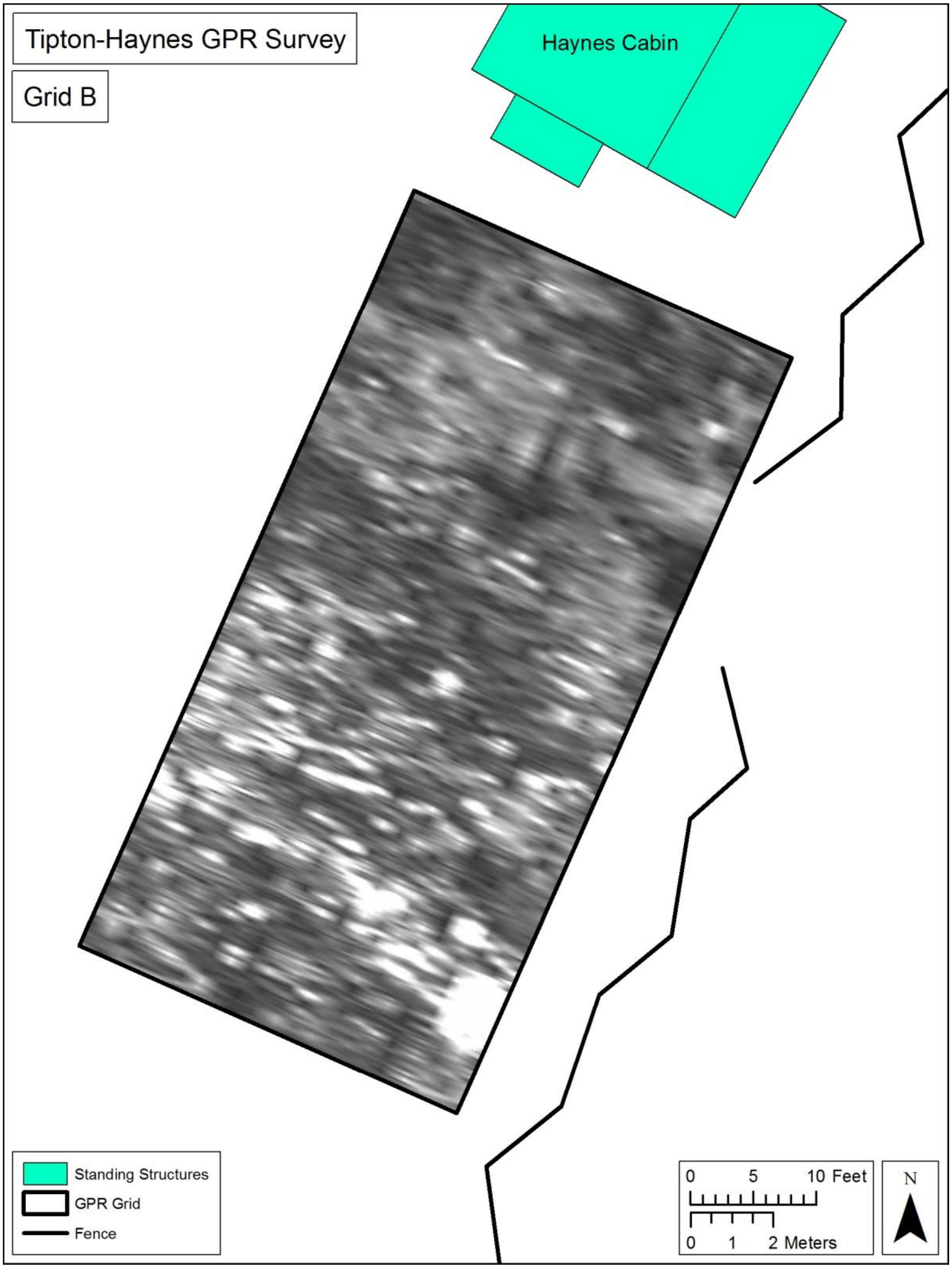

Figure 105. Grid B with applied FIR filter (4 Ns).

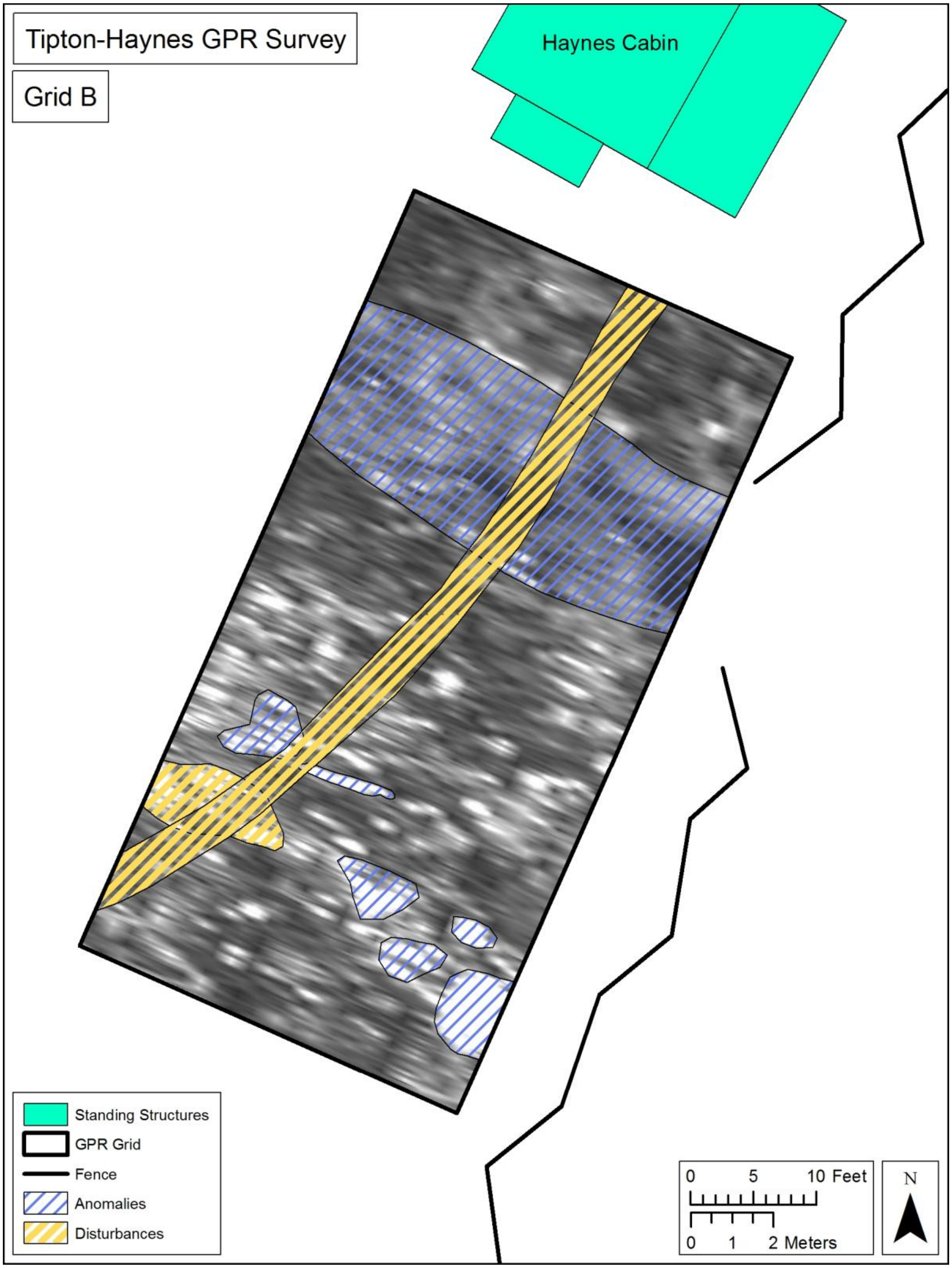

Figure 106. Grid B with applied FIR filter (4 Ns) highlighting identified anomalies.

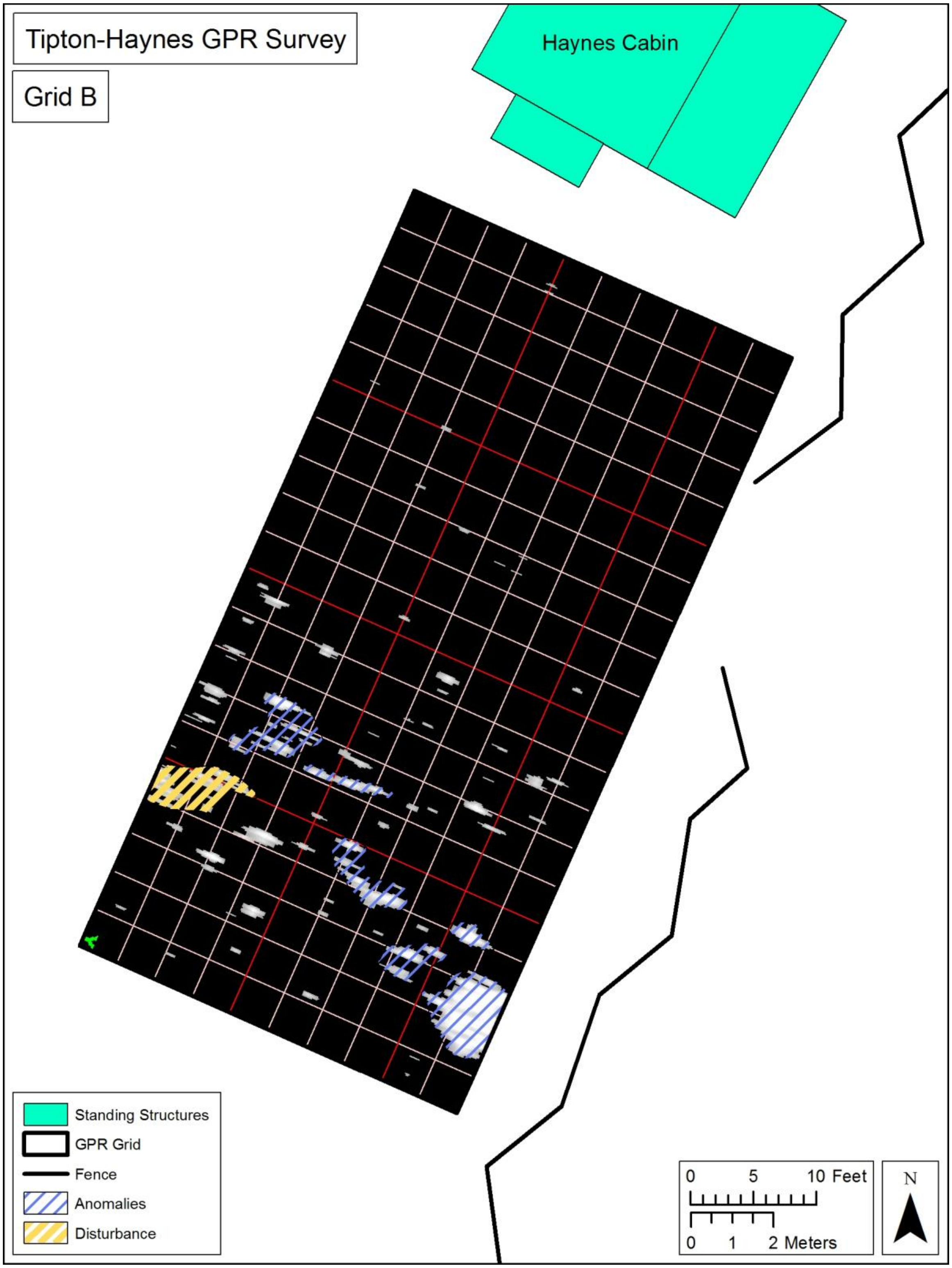

Figure 107. Grid B 3D transparency (Range 0.28 m/Position 0.35 m) highlighting identified anomalies.

To display the most significant anomaly represented in the dataset, a single profile image was exported. Figure 108 shows the location of the profile traversing the identified high amplitude anomaly. Figures 109 and 110 show a strong stacked reflective anomaly thought to be a possible footer stone or refuse-filled pit.

The GPR output was again overlaid with the gradiometer survey to correlate possible anomalies. Figure 111 shows an image with highlighted GPR anomalies compared to magnetic anomalies. Anomalies again generally conform to both datasets. A majority of the identified anomalies are concentrated in the southern portion of the grid. These are all believed to be associated with either disturbances, such as trees or utilities, or the previously-standing structure seen in the 1960s aerial photograph.

GPR is an ideal tool for locating foundations and when depth information is desired (Gaffney and Gater 2003:48). A major benefit of GPR includes the ability to collect three-dimensional data. It is particularly effective for identifying cultural soils by their stratigraphic complexity and is an excellent tool for locating structural debris (Bevan 2006:35). Based on the results of the GPR survey, the location of a probable structure located west of the kitchen was identified as well as other interpreted cultural features. These results attest to the benefits of using GPR.

Conclusions

A geophysical survey was conducted at the Tipton-Haynes site to learn more about the past landscape through the interpretation of identifiable cultural anomalies. Specifically, the survey's intent was to locate features associated with standing or previously-standing structures for archaeological testing and to delineate any possible historic landscape features. This was accomplished through the use of magnetometer, resistance, and GPR surveys. By using more

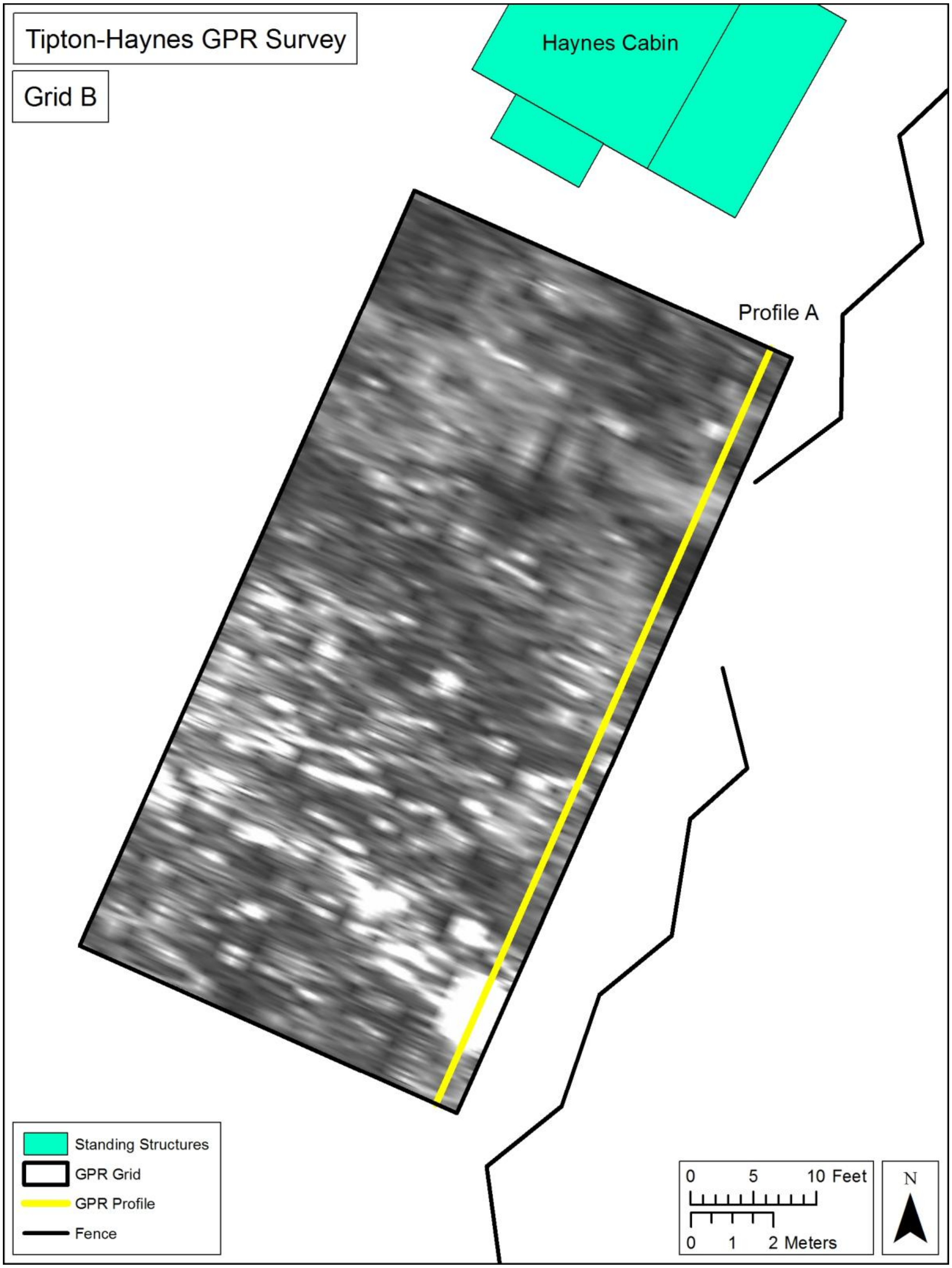

Figure 108. Grid B showing GPR profile location.

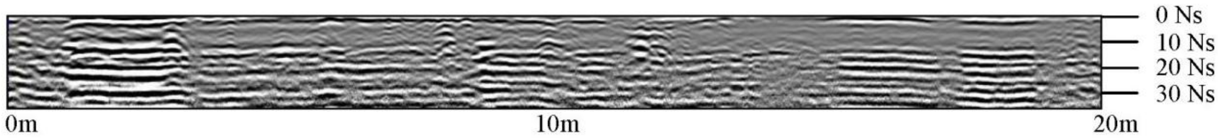

Figure 109. Profile A S/N at 9.5 m.

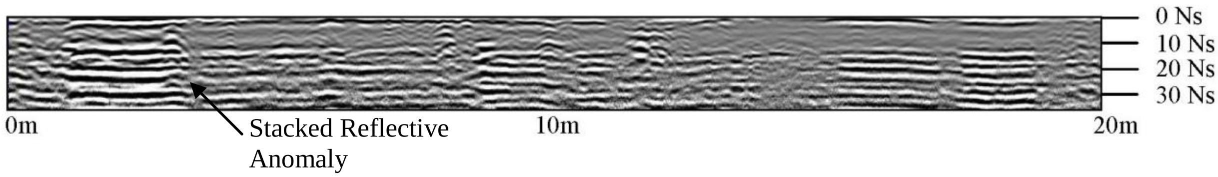

Figure 110. Profile A S/N at 9.5 m with identified anomalies.

than one survey instrument, additional insight can be gained by revealing anomalies not seen by other instruments due to their recording of differing geophysical properties. When combined, these datasets help to correlate anomalies and aid in their interpretation.

Though the resistance survey proved to be unproductive due to interference, other survey methods were more successful. A number of anomalies were identified by the gradiometer and GPR including the location of a possible structure. However, in order to confirm interpretation of identified cultural anomalies, they must be ground-truthed. Based on data provided by the geophysical survey, the archaeological excavation strategy was planned.

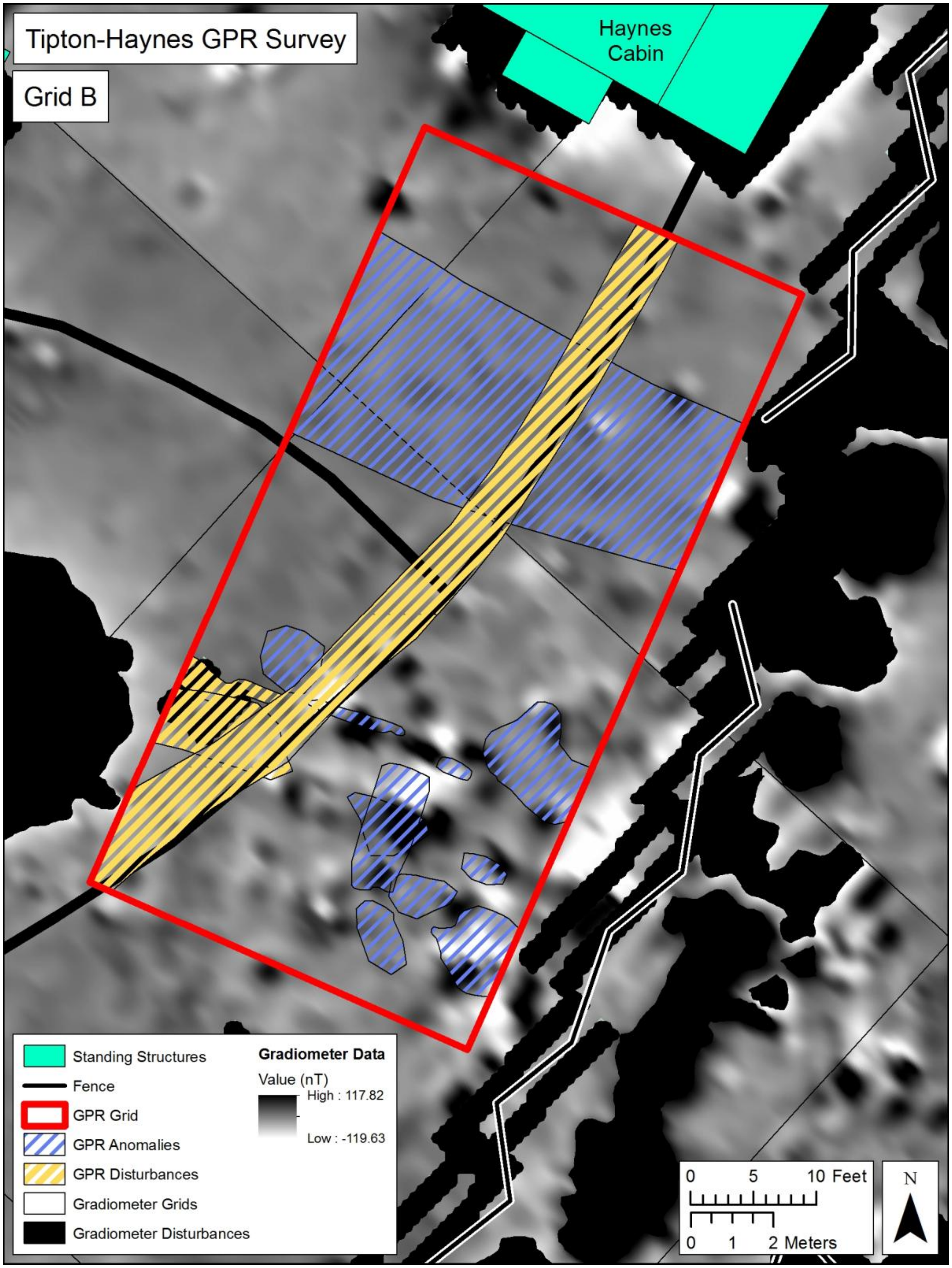

Figure 111. GPR Grid B with highlighted anomalies overlain with gradiometer survey data.

CHAPTER VI

ARCHAEOLOGY

Archaeology was conducted at the Tipton-Haynes site as part of THLAP in the summer of 2008 and spring of 2009. Specifically, historical archaeology was conducted at the Tipton-Haynes site in order to contextualize changes that occurred on the landscape and provide meaning for the processes that created these transformations. Primarily, the archaeological project focused on locating previously-standing structures for interpretation, field testing possible features found in the geophysical data, and mitigating areas around the farmhouse in order to analyze the historic landscape.

Previous Archaeology

Prior to excavations in 2008, several other archaeological projects have taken place at the Tipton-Haynes site. These consisted of a series of field schools that were part of Governor's Schools hosted by the Center for Appalachian Studies at East Tennessee State University. Most of these excavations focused on testing the prehistoric component of the site located near Catbird Creek. Testing of the historic component took place during excavations by Boyd (1989; Boyd and Riggs 1986, 1990) in 1985 and by Coxe (1993a, 1993b) in 1992. Other historic archaeological investigations took place at the Tipton-Simerly Cemetery (Young 1993). Early undocumented projects occurred in the 1960s to identify previously-standing structures and some small mitigation projects took place over the years (Baratte 1970:127-128; Bailey 1989:2, 1991:51, 72, 86; Benthall 1985, 1999).

THLAP Archaeological Survey

In the summer of 2008, the author, along with Dustin Lawson, Angela Milhorn, Jessie Duncan, and numerous volunteers excavated a series of 5 x 5 ft and 2 x 2 ft test units in the primary 17-acre tract (Figure 112). Excavation of a few 2 x 2 ft units continued into the fall and following spring, but primary excavation was completed during the 2008 season. Excavation focused on investigating a possible structure between the farmhouse and law office, testing areas immediately around the farmhouse in order to mitigate the installation of new drainage lines, and testing probable features found in the geophysical data that would yield information about standing structures or possible landscape features (Figure 113). Four main areas were investigated at the site including the causeway between the farmhouse and law office, immediately around the farmhouse due to installation of drainage lines, the barnyard, and the east field. The following analysis of the archaeological testing is organized by these areas of investigation.

Methodology

Using the previous datum (N5000, E5000) established during the geophysical survey, an archaeological grid based on engineering feet was established to remain consistent with other historical archaeological projects at state-owned historic sites (Figure 76). Mapping of grid locations and elevations was accomplished through the use of a Topcon GTS 226 electronic total station. All test units were titled consecutively (TU 1-24) and labeled by their southwest grid coordinate (Table 51). Test units were hand-excavated with a trowel or shovel and dry screened through quarter-inch mesh. Test units were excavated in natural levels using any identifiable stratigraphic change to denote levels halting excavation at sterile subsoil. A total of

Figure 112. THLAP archaeological test unit locations.

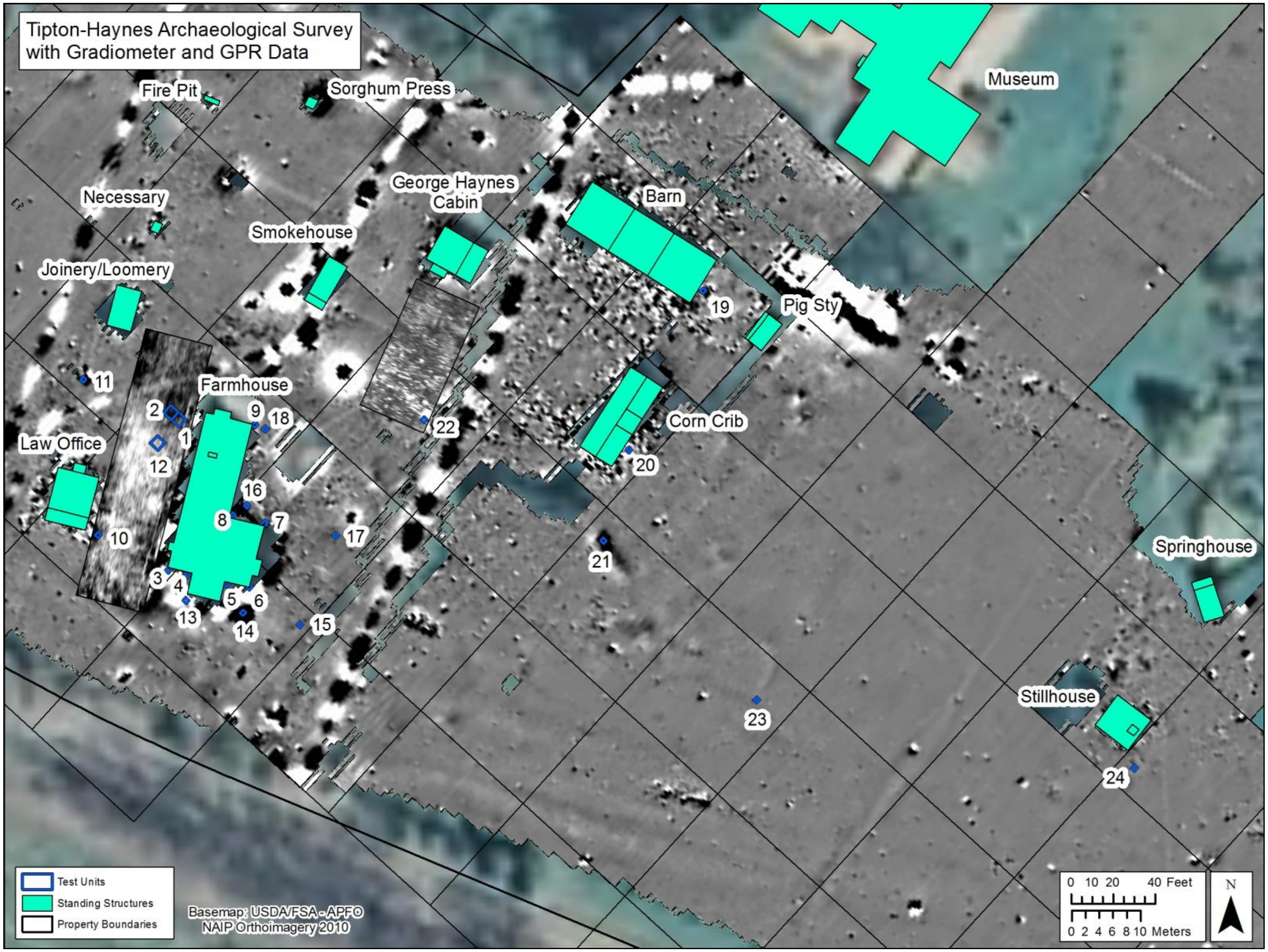

Figure 113. THLAP archaeological test unit locations overlain with geophysical survey data.

12 features labeled 100-111 were identified within test units and excavated separately from levels (Figure 114; Table 52). Excavated stone or brick was quantified, weighed, and discarded. All other artifacts were processed at the University of Tennessee's Charles H. Faulkner Archaeology Laboratory in Knoxville and curated at the Tipton-Haynes State Historic Site in trust of the state. All artifacts were cataloged using ReDiscovery database software. Specific items pulled for interpretive purposes were also sent for conservation to Lisa Young, President of Alexandria Conservation Services, LTD.

Table 51. Test unit locations and dimensions.

Test Unit	SW Coordinate (Ft.)		Size (Ft.)	General Location
	Northing	Easting		
01	N4760	4950	5 x 5	Causeway
02	N4760	E4945	5 x 5	Causeway
03	N4705	E4996	4 x 2	Farmhouse Mitigation
04	N4710	E5004	4 x 2	Farmhouse Mitigation
05	N4719	E5021	4 x 2	Farmhouse Mitigation
06	N4725	E5032	2 x 2	Farmhouse Mitigation
07	N4751	E5015	4 x 2	Farmhouse Mitigation
08	N4745	E5001	2 x 2	Farmhouse Mitigation
09	N4784	E4980	2 x 2	Farmhouse Mitigation
10	N4695	E4960	2 x 2	Causeway
11	N4745	E4905	2 x 2	Causeway
12	N4745	E4950	5 x 5	Causeway
13	N4700	E5012	2 x 2	Farmhouse Mitigation
14	N4714	E5036	2 x 2	Farmhouse Mitigation
15	N4728	E5060	2 x 2	Farmhouse Mitigation
16	N4753	E5003	2 x 2	Farmhouse Mitigation
17	N4771	E5044	2 x 2	Farmhouse Mitigation
18	N4786	E4985	2 x 2	Farmhouse Mitigation
19	N4975	E5095	2 x 2	Barn Yard
20	N4895	E5120	2 x 2	Barn Yard
21	N4855	E5140	2 x 2	East Field
22	N4840	E5038	2 x 2	Barn Yard
23	N4848	E5245	2 x 2	East Field
24	N4945	E5400	2 x 2	East Field

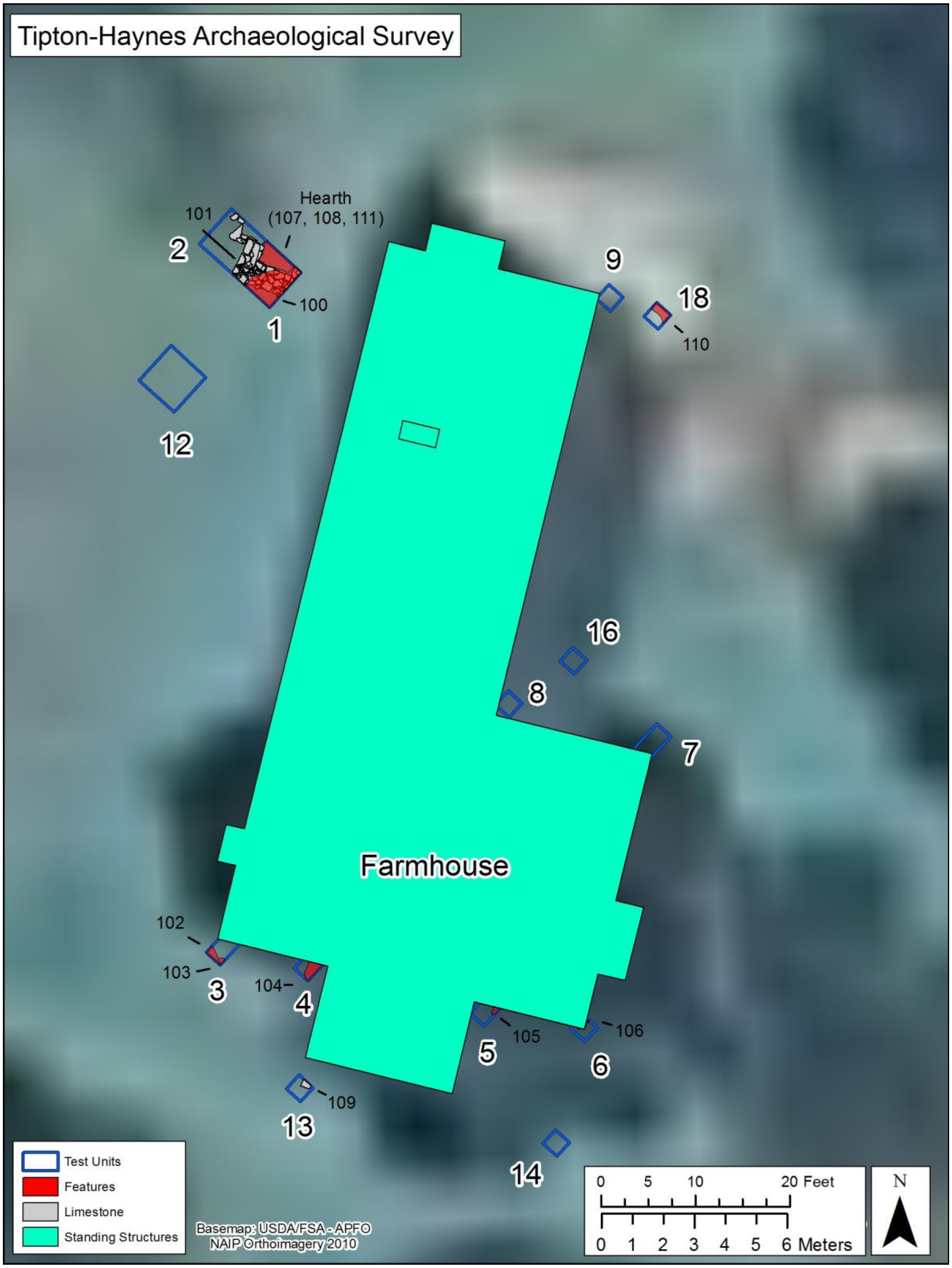

Figure 114. THLAP archaeological test units with identified features.

Table 52. Feature list.

Feature	TU	Munsell	Description	Interpretation
100	1	5YR5/8 mottled with 7.5YR4/6	Clay/Clay Loam	Modern Disturbance
101	1, 2	-	Limestone	Limestone Foundation
102	3	10YR5/6 mottled with 10YR4/6	Loamy Clay/Clay Loam	Modern French Drain
103	3	10YR4/3	Clay Loam	Modern Planting Bed
104	4	10YR3/3	Sandy Clay Loam	Modern Planting Bed
105	5	10YR3/3	Sandy Clay Loam	Modern Planting Bed
106	6	-	Limestone	Limestone Footing
107	1	10YR3/3	Clay Loam	Depression intruding into Feature 108
108	1	5YR4/6	Clay	Brick Lining for Hearth
109	13	-	Limestone	Cut Limestone Footing
110	18	10YR3/3 mottled with 7.5YR4/4	Clay Loam/Clay	Modern Depression Fill
111	1	10YR3/3	Clay Loam	Base of Hearth

Causeway Excavations

The causeway is the open area located between the farmhouse and law office and was created when Landon Haynes constructed the rear ell addition and adjacent outbuildings to the west of the house. Five test units were excavated within the causeway over identified geophysical anomalies (Figure 115). Three 5 x 5 ft test units labeled TU 1, 2, and 12 were excavated in order to locate the historic midden and previously-standing structure first identified by Boyd (1989; Boyd and Riggs 1986, 1990) and supported by the geophysical data. Archaeological testing of this structure was conducted to achieve a better understanding of its location, age, type of construction, dimensions, and function of the structure as well as obtain information about the inhabitants of the previously-extant building. Two other 2 x 2 ft test units were also excavated over anomalies seen in the geophysical data near the law office and a previously-standing shed.

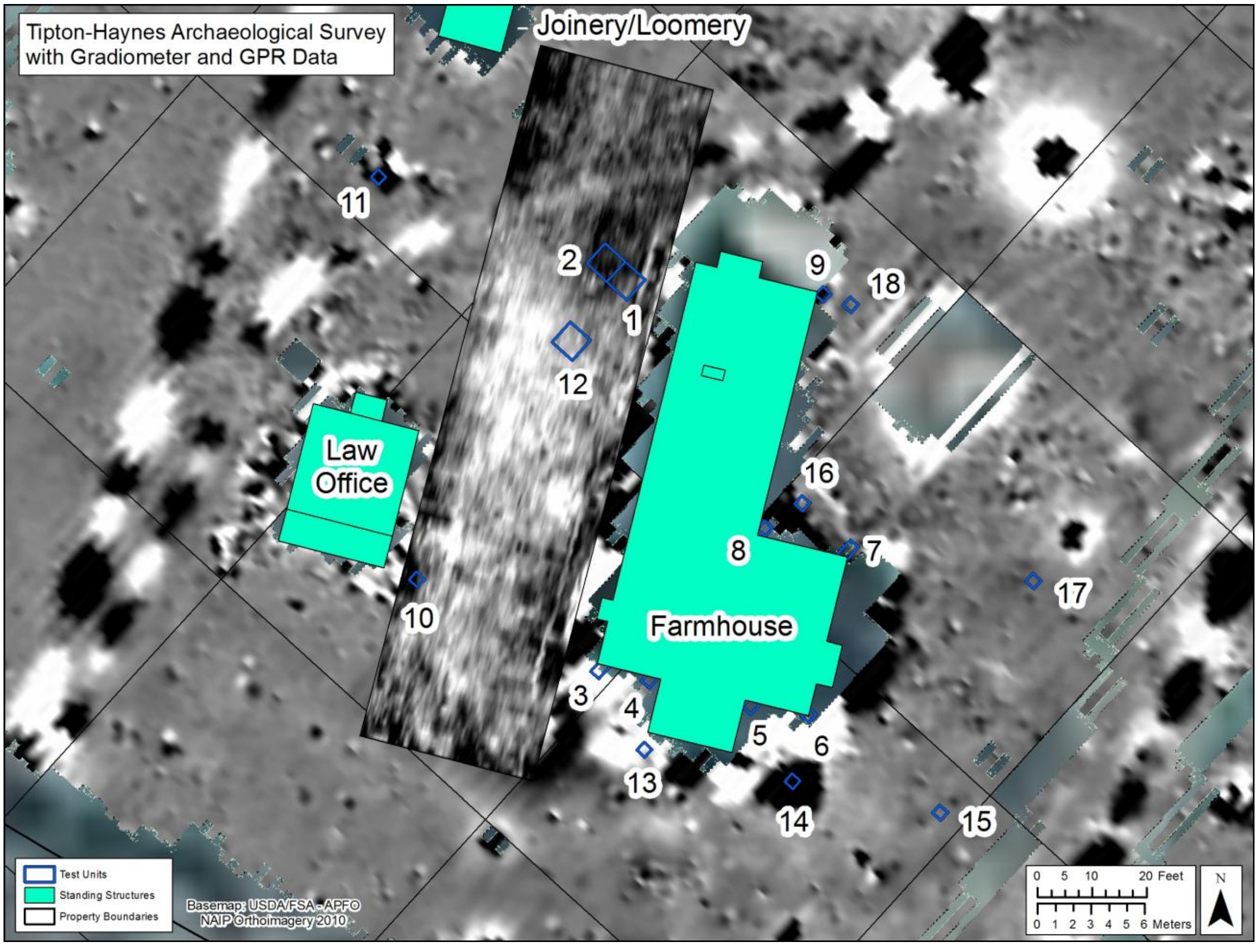

Figure 115. Causeway and mitigation test units near Farmhouse overlain with geophysical survey data.

<u>Structure 1 Excavation Results</u>

The results of the excavation revealed an undocumented historic structure with a limestone foundation and a large 4 x 8 ft chimney henceforth referred to as Structure 1 for analysis purposes (Figures 116-118). The structure's estimated size based on probing and the geophysical data is 12 x 12 ft (Figures 119 and 120). Due to the chimney's large size, the structure is interpreted as having been a kitchen. These dimensions are similar to those of the current kitchen constructed by Landon Haynes. The proportions also match the chimney on the east side of the farmhouse, but its size is due to the need to support a tall chimney. Because of

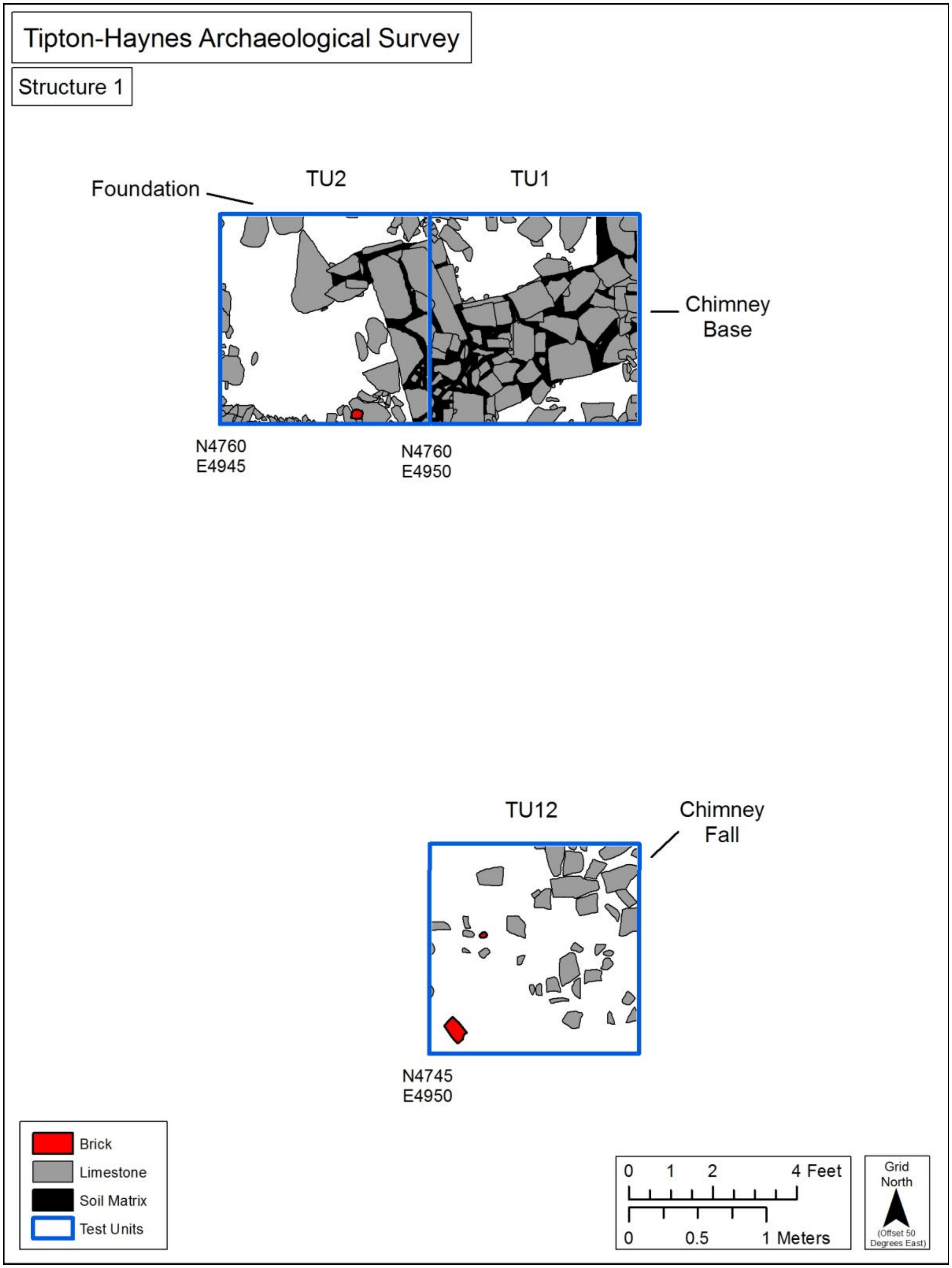

Figure 116. Structure 1 within Test Units 1, 2, and 12.

Figure 117. Test Unit 1 base of Level 5 facing grid north.

Figure 118. Test Unit 12 mid-excavation of Level 3 facing grid north.

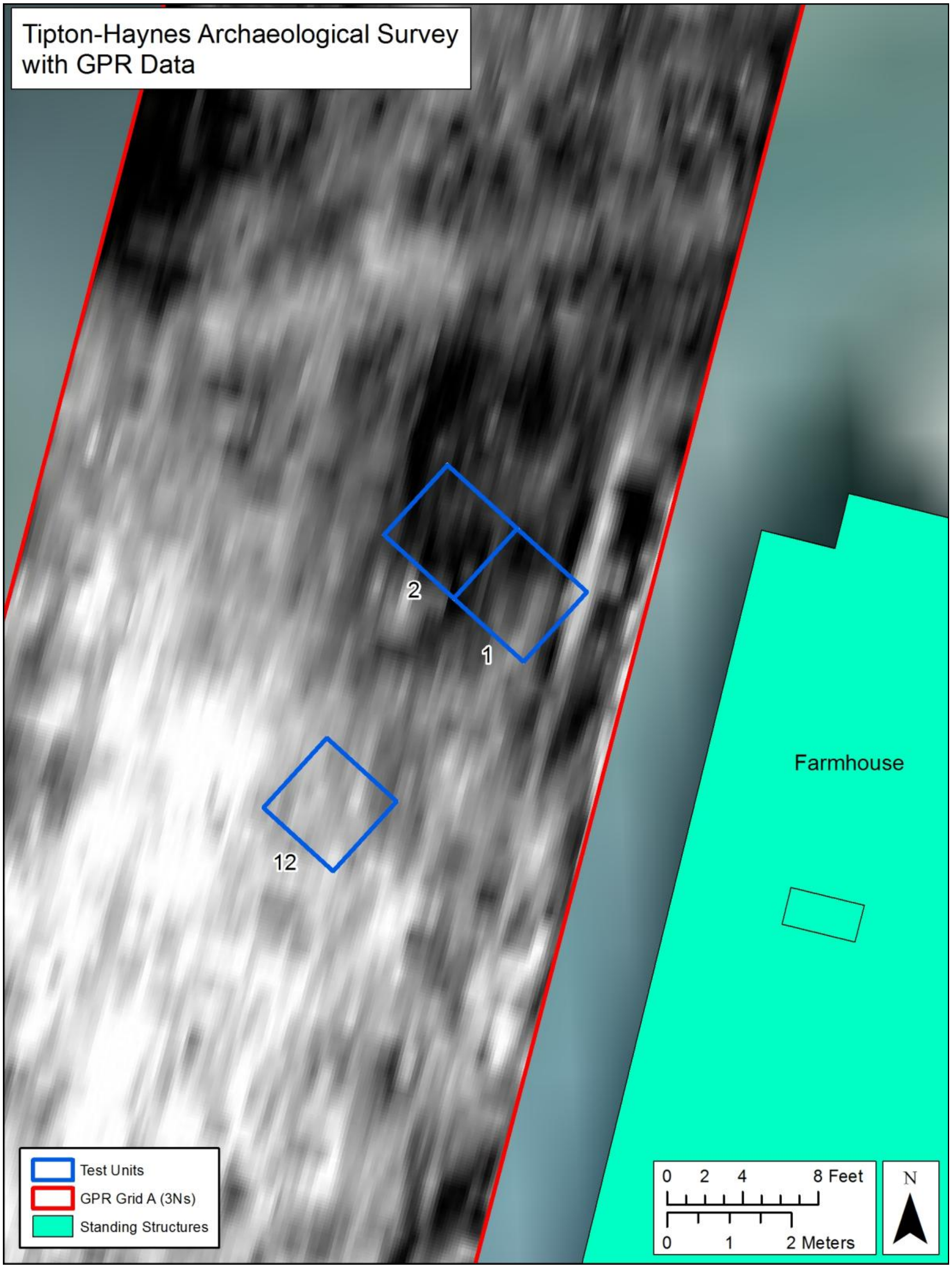

Figure 119. Test Units 1, 2, and 12 with Structure 1 foundation evident in GPR data.

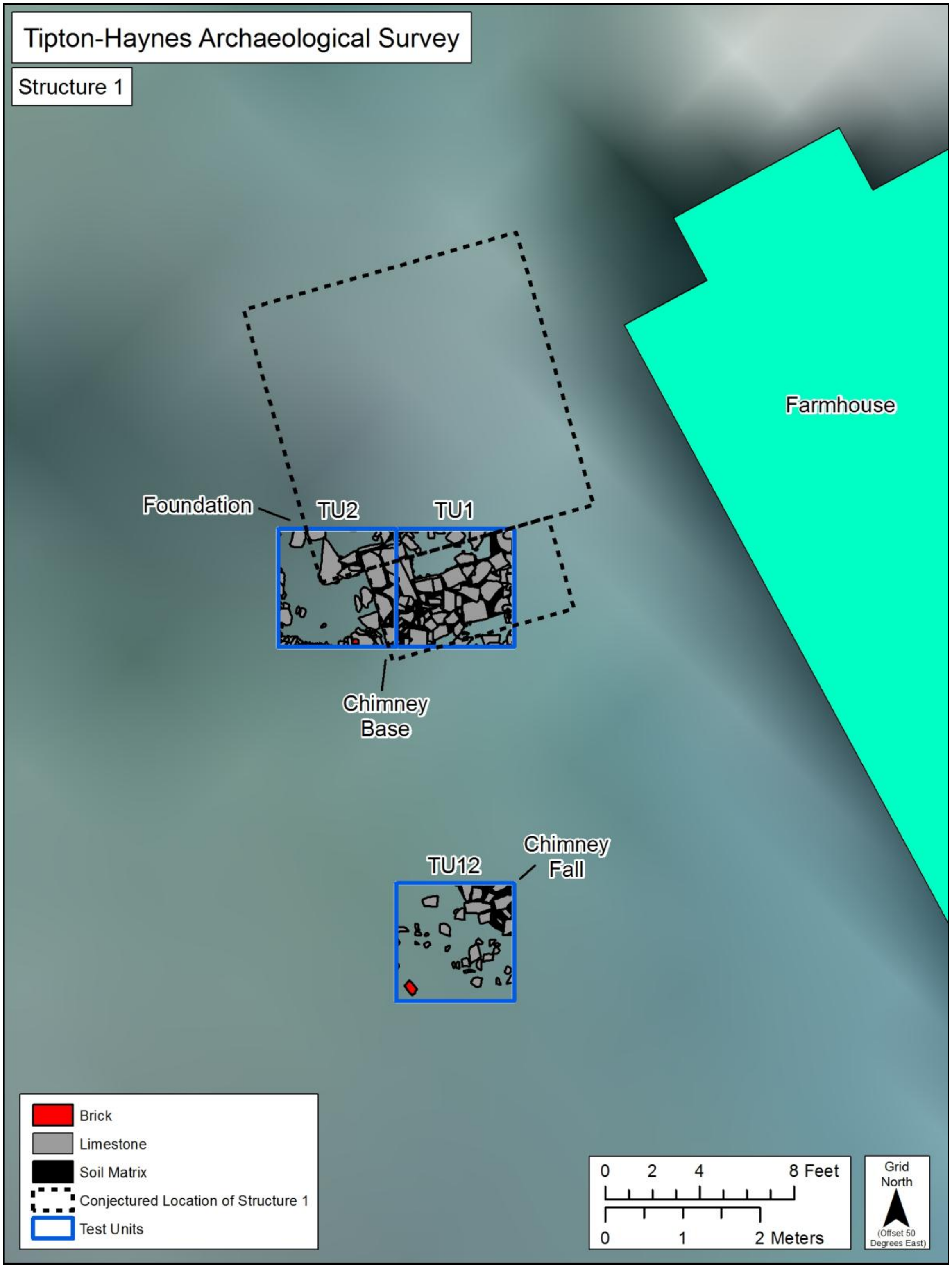

Figure 120. Plan view of Test Units 1, 2, and 12 with conjectured location of Structure 1.

the structure’s small size, it is interpreted as a single-story structure.

The building was demolished after its occupation and a portion of the chimney was robbed for other construction purposes. Below the robbed portion of the chimney base, a builder’s trench was encountered consisting of materials deposited during construction (Figure 117). Outside of the structure, the remains of the chimney fall were also discovered (Figure 118). A dense occupational midden was encountered as well as a dark artifact-rich midden deposited post-occupation. Both were also noted during the geophysical survey (Figures 91-95).

Artifact Analysis

A total of 7,684 artifacts were recovered from TU’s 1, 2, and 12 (Table 53). Artifacts were separated into three distinct time periods including prehistoric (~ca. 1500 AD), historic (ca. 1750-1950), and modern (post-1950) periods. Prehistoric material consisted of flint debitage, a flint cobble, and a celt fragment. Modern artifacts included modern synthetic items such as plastic and Styrofoam. The following analysis focuses on historic artifacts recovered from Structure 1. Historic artifacts were arranged by classes of artifacts defined by material type. Classes included faunal, botanical, ceramics (including brick), glass, metal, mortar, concrete, and stone.

To examine Structure 1, artifacts from TU’s 1, 2, and 12 were combined into phases based upon level or feature provenience (Figures 121 and 122; Table 54). Phases include a construction phase, an occupation phase (inside and outside Structure 1), a destruction phase, a post-occupation phase, and a modern occupation phase. Artifacts were then arranged by phase giving totals for each class and phase with a majority of the artifacts coming from the occupation and post-occupation of Structure 1 (Table 55).

Table 53. Test Units 1, 2, and 12 artifact totals.

Time Period	Class	TU1	TU2	TU12	Total
Prehistoric	Stone	15	8	23	46
Historic	Faunal	179 (87.8 g)	142 (134.6 g)	1445 (403.4 g)	1766 (625.8 g)
	Botanical	665 (37.0 g)	590 (38.7 g)	927 (46.0 g)	2182 (121.7 g)
	Ceramic	58	350	329	737
	-Brick	94 (1196.6 g)	154 (277.2 g)	211 (620.6 g)	459 (2,094.4 g)
	Glass	47	129	154	330
	Metal	205	354	376	935
	Mortar	225 (142.4 g)	122 (129.1 g)	65 (314.5 g)	412 (586.0 g)
	Concrete	-	3 (6.4 g)	17 (116.9 g)	20 (123.3 g)
	Stone	377 (57,133.1 g)	273 (59,530.1 g)	122 (25,024.6 g)	772 (141,687.8 g)
Modern	Modern	13	8	4	25
Total		1878	2133	3673	7684

Table 54. Structure 1 phases based on provenience.

Phases	TU1*	TU2**	TU12***
Construction Phase	Level 5, Fea. 111	-	-
Occupation Phase (Exterior Structure 1)	-	Level 4 Zone A, Level 4 Zone C	Level 3
Occupation Phase (Interior Structure 1)	Level 3, Level 4N, Fea. 107, Fea. 108	Level 4 Zone B	-
Destruction Phase	Level 4	Level 3	-
Post-Occupation Phase	Level 2	Level 2	Level 2
Modern Occupation Phase	Level 1, Fea. 100	Level 1	Level 1

***TU1**
Level 1- Modern humic level.
Level 2- Area primarily within hearth with large amount of limestone chippage debris deposited after deconstruction of structure.
Level 3- Area primarily within hearth with large amounts of ash and charcoal deposited above hearth.
Level 4- Area outside of hearth with lots of ash, mortar, and charcoal. Area probably robbed during destruction phase.
Level 4N- Area within hearth surrounding Feature 108.
Level 5- Builder's trench surrounding chimney base.

Feature 100- Modern disturbance.
Feature 107- Intrusion into Feature 108. Sterile.
Feature 108- Hearth consisting of disintegrated brick.
Feature 111- Base of hearth.

****TU2**
Level 1- Modern humic level.
Level 2- Post-occupation midden deposit above foundation.
Level 3- Midden deposit outside of structure beside foundation.
Level 4 Zone A- Outside structure.
Level 4 Zone B- Inside structure.
Level 4 Zone C- Outside structure.

*****TU12**
Level 1- Modern humic level.
Level 2- Midden deposit outside structure above chimney fall.
Level 3- Midden deposit outside structure below chimney fall.

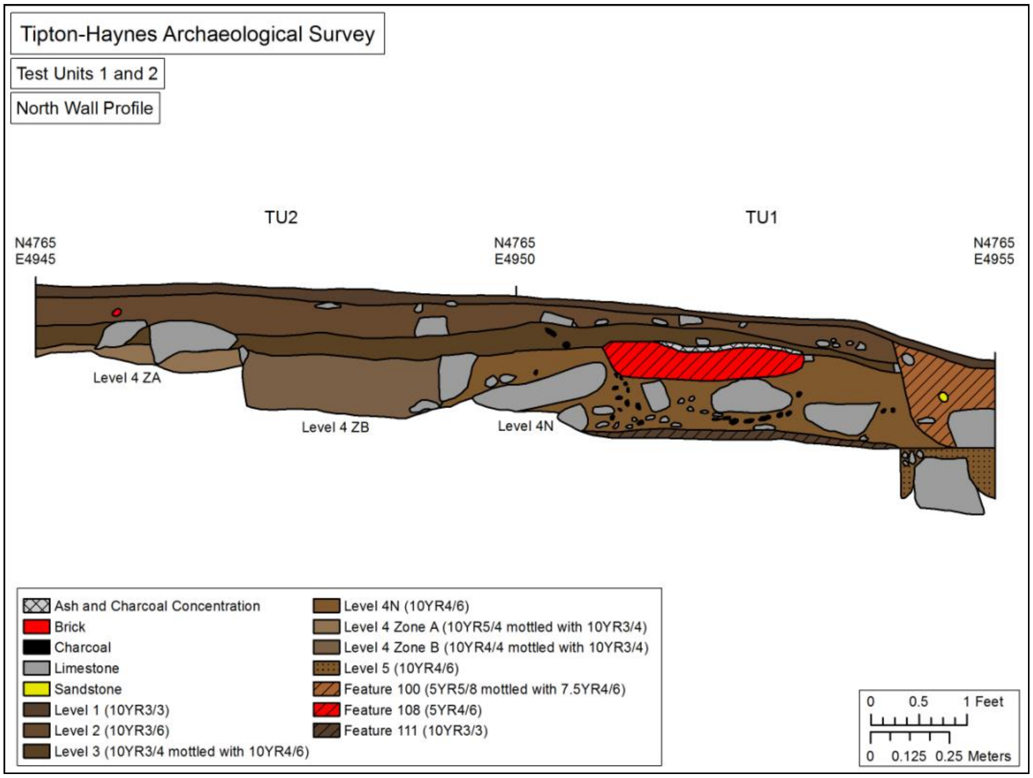

Figure 121. Test Units 1 and 2 north wall profile showing level provenience.

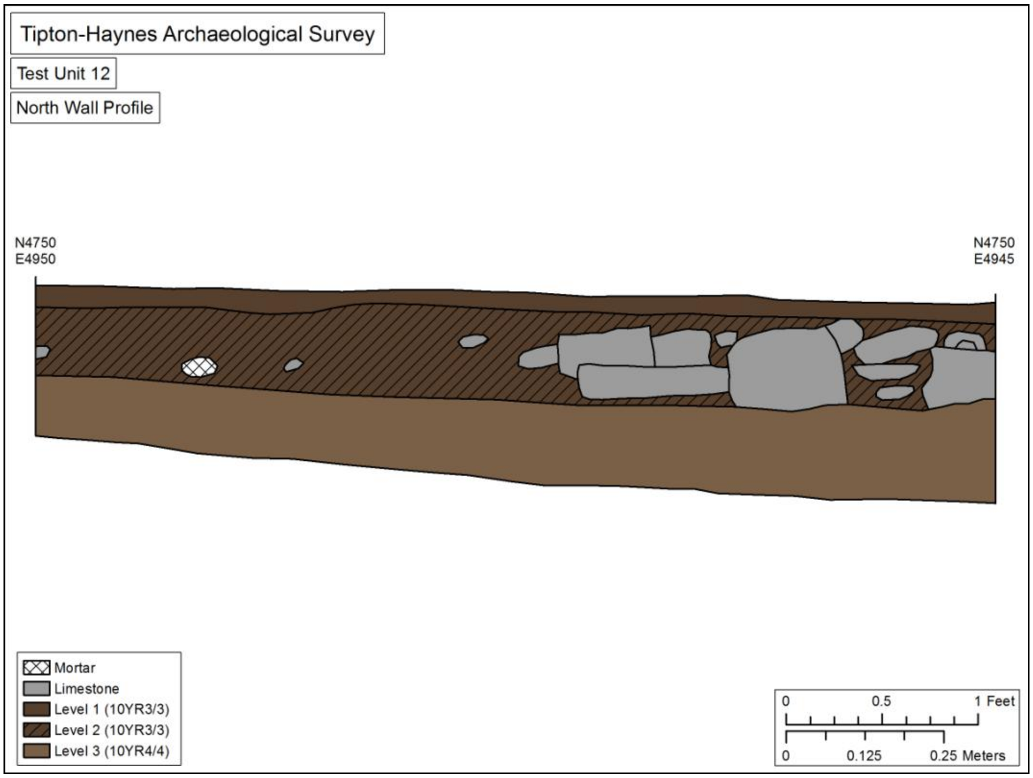

Figure 122. Test Unit 12 north wall profile showing level provenience.

Table 55. Structure 1 artifact totals arranged by phase.

Time Period	Class	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total	Percent
Prehistoric	Stone	1	16	4	20	1	17	7	46	0.6%
Historic	Faunal	17 (7.3 g)	1399 (362.7 g)	26 (10.1 g)	1425 (372.8 g)	125 (76.0 g)	164 (150.9 g)	35 (18.8 g)	1766 (625.8 g)	23.0%
	Botanical	60 (1.7 g)	724 (42.0 g)	396 (18.3 g)	1120 (60.3 g)	487 (30.9 g)	469 (25.2 g)	46 (3.6 g)	2182 (121.7 g)	28.4%
	Ceramic	2	203	8	211	66	431	27	737	9.6%
	-Brick	5 (2.6 g)	84 (276.2 g)	41 (486.78 g)	125 (762.98 g)	90 (185.8 g)	231 (620.0 g)	8 (523.0 g)	459 (2,094.4 g)	6.0%
	Glass	3	73	6	79	23	217	8	330	4.3%
	Metal	9	165	28	193	120	565	48	935	12.2%
	Mortar	13 (2.9 g)	76 (176.1 g)	121 (102.1 g)	197 (278.2g)	90 (45.4 g)	100 (255.5 g)	12 (4.0 g)	412 (586.0 g)	5.4%
	Concrete	-	-	-	-	-	17 (117.4 g)	3 (5.9)	20 (123.3 g)	0.3%
	Stone	2 (5.9 g)	141 (56,516.7 g)	139 (23.060 g)	280 (79,576.7 g)	201 (34,040.3 g)	286 (28,052.5 g)	3 (12.4 g)	772 (141,687.8 g)	10.0%
Modern	Modern	-	-	-	-	-	-	25	25	0.3%
Total		112	2881	774	3650	1203	2497	222	7684	100%
Percent		1.5%	37.5%	10.0%	47.5%	15.7%	32.5%	2.9%	100%	-

Faunal

Faunal items include organic material such as animal bone, shell, eggshell, and fish scales (Table 56). Excavated bone items included general refuse from food consumption as well as buttons and scale handles. Bone is the most frequent faunal type and was primarily recovered from the exterior occupation of Structure 1 as well as the post-occupational phase. No specialized faunal analysis was completed; however, a majority of the bone recovered was pig including a large mandible recovered from the exterior occupational phase in TU 12 Level 3 (Figure 118).

Other bone artifacts included clothing items in the form of buttons listed in Table 57. A total of five lathed-turned bone buttons were collected from Structure 1. These include one-hole, four-hole, and five-hole varieties. Buttons were primarily worn by men during the seventeenth and eighteenth centuries with women beginning to wear buttons more frequently during the nineteenth century (White 2005:57). Buttons were popular embellishments worn on coats, waistcoats, breeches, stocks, cloaks, sleeves, and handkerchiefs (White 2005:57). Bone buttons with one to five holes are common in early clothing assemblages, the most distinctive late eighteenth-century button type having a single hole (Faulkner 2008:78). Two single-holed bone buttons were recovered from Structure 1; one engraved type was also recovered from the construction phase.

Other faunal material included eggshell, shell, and fish scales. A total of 788 pieces of eggshell were also excavated from Structure 1. The high concentration of eggshell which primarily came from TU 12 leads to the interpretation that poultry was likely raised in the yard during the occupation of Structure 1. A single shell artifact was recovered consisting of a single four-hole shell button (Table 57). Three fish scales were recovered from outside Structure 1

Table 56. Faunal material from Structure 1.

Material	Form	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Bone	Faunal	13 (7.1 g)	595 (343.2 g)	21 (9.8 g)	616 (353.0 g)	112 (75.5 g)	162 (150.3 g)	34 (13.8 g)	937 (599.7 g)
Bone	Button	1 (0.1 g)	4 (0.4 g)	-	4 (0.4 g)	-	-	-	5 (0.5 g)
Bone	Scale Handle	-	-	-	-	-	1 (0.5 g)	1 (5.0 g)	2 (5.5 g)
Bone	Sickle Handle	-	30 (1.8 g)	-	30 (1.8 g)	-	-	-	30 (1.8 g)
Shell	Button	-	-	-	-	1 (0.1 g)	-	-	1 (0.1 g)
Eggshell		3 (0.1 g)	767 (17.2 g)	5 (0.3 g)	772 (17.5 g)	12 (0.4 g)	1 (0.1 g)	-	788 (18.1 g)
Fish Scale		-	3 (0.1 g)	-	3 (0.1 g)	-	-	-	3 (0.1 g)
Total		17 (7.3 g)	1399 (362.7 g)	26 (10.1 g)	1425 (372.8 g)	125 (76.0 g)	164 (150.9 g)	35 (18.8 g)	1766 (625.8 g)

Table 57. Bone and shell buttons from Structure 1.

Material	Form	Manufacturing Tech	Description	Measurement	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Bone	Button	Lathe turned	One hole.	dia 17.16mm	1	-	-	-	-	-	-	1
Bone	Button	Lathe turned	Four hole.	dia 9.09mm	-	1	-	1	-	-	-	1
Bone	Button	Lathe turned	One hole, engraved design.	dia 12.7mm	-	1	-	1	-	-	-	1
Bone	Button	Lathe turned	Five hole.	dia 16.27mm, 17.55mm	-	2	-	2	-	-	-	2
Shell	Button	Lathe turned	Four hole.	dia 9.85mm	-	-	-	-	1	-	-	1
Total					1	4	-	4	1	-	-	6

during its occupation.

Botanical

Botanical items include any floral material collected such as wood charcoal, nutshells, and seeds (Table 58). Numerous fragments of charcoal were excavated from Structure 1 totaling 2,178 pieces weighting 120.6 grams. A majority of these were found within the occupation phase of Structure 1 including the hearth which contained ashy deposits mixed with charcoal. Other botanical items from the occupation phase included walnut shells, a peach pit, and an unidentifiable charred seed.

Ceramics

Seven hundred and thirty seven ceramic fragments were recovered from Structure 1 (Table 59). Ceramics were comprised of food preparation and storage vessels, teawares, tablewares, chamber pot fragments, and a few ceramic pipe fragments. Ware types included coarse earthenwares, stoneware, creamware, pearlware, whiteware, yellowware, porcelain, gizzard stones, and a few unidentified pieces (Table 60). Brick, though technically a ceramic, was kept separate from the following analysis and will be discussed below.

Coarse earthenware is a term used to describe ceramics that typically have a red to brown, soft, porous body typically used unglazed as flowerpots, or glazed as jars, jugs, and other kitchenware containers (Granger and Ball 1982:VI-15). Coarse earthenware has been produced for centuries in North America and continues to the present day. A large number of coarse earthenwares were recovered from Structure 1 comprising 42 percent of the total ceramic

Table 58. Botanical material from Structure 1.

Material	Form	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Nutshell	Walnut shell	-	1 (0.3 g)	1 (0.2 g)	2 (0.5 g)	-	-	-	2 (0.5 g)
Seed	Charred Peach Pit	-	1 (0.5 g)	-	1 (0.5 g)	-	-	-	1 (0.5 g)
Seed	Charred Seed	-	-	1 (0.1 g)	1 (0.1 g)	-	-	-	1 (0.1 g)
Charcoal		60 (1.7 g)	722 (41.2 g)	394 (18.0 g)	1116 (59.2 g)	487(30.9 g)	469 (25.2 g)	46 (3.6 g)	2178 (120.6 g)
Total		60 (1.7 g)	724 (42.0 g)	396 (18.3 g)	1120 (60.3 g)	487(30.9 g)	469 (25.2 g)	46 (3.6 g)	2182 (121.7 g)

Table 59. Ceramic vessel and pipe sherd counts from Structure 1.

Ware	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Coarse Earthenware	1 (50%)	73 (35.9%)	-	73 (34.5%)	28 (42.4%)	200 (46.4%)	5 (18.5%)	307 (41.7%)
Stoneware	-	2 (0.9%)	-	2 (0.9%)	-	5 (1.1%)	1 (3.7%)	8 (1.1%)
Creamware	-	1 (0.4%)	-	1 (0.4%)	1 (1.5%)	-	-	2 (0.3%)
Pearlware	1 (50%)	90 (44.3%)	8 (100%)	98 (46.4%)	22 (33.3%)	111 (25.7%)	8 (26.6%)	240 (32.6%)
Whiteware	-	19 (9.6%)	-	19 (9.0%)	5 (7.5%)	56 (13.0%)	9 (33.3%)	89 (12.1%)
Yellowware	-	-	-	-	-	1 (0.2%)	-	1 (0.1%)
Porcelain	-	4 (1.9%)	-	4 (1.8%)	4 (6.0%)	26 (6.0%)	3 (11.1%)	37 (5.0%)
Unidentified	-	13 (6.4%)	-	13 (6.1%)	6 (9.0%)	31 (7.1%)	1 (3.7%)	51 (6.9%)
Coarse Earthenware (Pipes)	-	1 (0.4%)	-	1 (0.4%)	-	-	-	1 (0.1%)
Ball Clay (Pipes)	-	1 (0.4%)	-	1 (0.4%)	-	1 (0.2%)	-	2 (0.3%)
Total	2 (0.3 %)	203 (27.5%)	8 (1.1%)	211 (28.6%)	66 (9.0%)	431 (58.5%)	27 (3.7%)	737 (100%)

Table 60. Ceramic vessel totals from Structure 1 by type.

Ware	Decoration	Decoration Notes	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Coarse Earthenware	Undecorated	Orange Body	-	1	-	1	-	33	-	34
Coarse Earthenware	Undecorated	Tan Body	-	12	-	12	-	-	-	12
Coarse Earthenware	Lead Glazed	Orange Body	1	4	-	4	4	113	3	125
Coarse Earthenware	Lead Glazed	Tan Body	-	49	-	49	17	47	2	115
Coarse Earthenware	Lead Glazed	Brown Body	-	-	-	-	-	1	-	1

Table 60. Ceramic vessel totals from Structure 1 by type (Continued).

Ware	Decoration	Decoration Notes	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Coarse Earthenware	Lead Glazed	Red Body	-	5	-	5	5	1	-	11
Coarse Earthenware	Lead Glazed	Grey Body with Burned Glaze	-	-	-	-	2	-	-	2
Coarse Earthenware	Unidentified		-	1	-	1	-	5	-	6
Stoneware	Undecorated	Grey Neck Fragment	-	-	-	-	-	2	-	2
Stoneware	Salt Glazed	Grey	-	-	-	-	-	3	-	3
Stoneware	Salt Glazed	Grey with Underglazed Blue Floral Pattern	-	2	-	2	-	-	-	2
Stoneware	Albany Slip		-	-	-	-	-	-	1	1
Creamware	Undecorated		-	1	-	1	1	-	-	2
Pearlware	Undecorated		-	34	2	36	10	53	2	101
Pearlware	Hand Painted	Blue	-	1	2	3	1	17	-	21
Pearlware	Hand Painted	Green	-	1	-	1	1	1	-	3
Pearlware	Hand Painted	Polychrome	-	2	-	2	2	7	-	11
Pearlware	Edge Decorated	Blue	-	5	-	5	3	9	-	17
Pearlware	Edge Decorated	Green	1	2	1	3	1	1	-	6
Pearlware	Edge Decorated	Embossed	-	-	-	-	-	-	3	3
Pearlware	Transfer Printed	Blue	-	13	2	15	3	12	2	32
Pearlware	Transfer Printed	Green	-	-	-	-	-	1	-	1
Pearlware	Transfer Printed	Red	-	2	-	2	-	1	-	3
Pearlware	Transfer Printed	Black	-	2	-	2	-	2	-	4
Pearlware	Industrial Slipware, Banded	Blue	-	14	1	15	1	3	-	19
Pearlware	Industrial Slipware, Banded	Green	-	1	-	1	-	1	-	2
Pearlware	Industrial Slipware, Banded	Brown	-	2	-	2	-	-	-	2
Pearlware	Industrial Slipware, Banded	Polychrome	-	8	-	8	-	3	1	12
Pearlware	Industrial Slipware, Mocha	Polychrome	-	2	-	2	-	-	-	2
Pearlware	Lusterware	Polychrome	-	1	-	1	-	-	-	1
Whiteware	Undecorated		-	12	-	12	2	33	6	53
Whiteware	Hand Painted	Blue	-	-	-	-	-	-	1	1
Whiteware	Edge Decorated	Green	-	-	-	-	1	6	1	8
Whiteware	Transfer Printed	Blue	-	2	-	2	1	9	1	13
Whiteware	Transfer Printed	Green	-	-	-	-	-	1	-	1
Whiteware	Transfer Printed	Red	-	2	-	2	-	5	-	7
Whiteware	Transfer Printed	Brown	-	3	-	3	-	-	-	3
Whiteware	Transfer Printed	Black	-	-	-	-	1	1	-	2
Whiteware	Transfer Printed	Faded Overglazed Design	-	-	-	-	-	1	-	1

Table 60. Ceramic vessel totals from Structure 1 by type (Continued).

Yellowware	Undecorated		-	-	-	-	-	1	-	1
Porcelain	Undecorated		-	3	-	3	2	10	-	15
Porcelain	Gilded		-	-	-	-	-	7	-	7
Porcelain	Transfer Printed	Underglazed/Burned	-	-	-	-	-	-	3	3
Porcelain	Industrial Slipware, Banded		-	1	-	1	2	1	-	4
Porcelain	Embossed		-	-	-	-	-	2	-	2
Porcelain	Unidentified	Burned	-	-	-	-	-	6	-	6
Refined Earthenware	Unidentified		-	9	-	9	6	31	1	47
Refined Earthenware	Gizzard Stones		-	4	-	4	-	-	-	4
<u>Total</u>			2	201	8	209	66	430	27	734

assemblage. Deposition of coarse earthenware storage vessels also doubled during the post-occupational phase. The large amount of coarsewares is not surprising due to local manufacturing with adjacent Greene County being the largest producer of coarsewares in Tennessee during the nineteenth century (Smith and Rogers 1979:15-16). Types included undecorated and lead glazed with a variety of colors for the body.

Stoneware is a thick, durable, high-fired ware (Smith and Nance 2000:161). Stoneware was being produced in Eastern North America in limited quantities at the beginning of the eighteenth century and is still in limited production today (Greer 1981). A total of eight stoneware sherds were recovered including an undecorated neck fragment, grey salt-glazed fragments, and a single fragment with Albany slip. One salt-glazed variety also has an underglazed cobalt floral pattern (Figure 118).

Refined earthenware refers to refinement of the clay prior to production for superior quality ceramics. Refined ware types from Structure 1 included creamware, pearlware, whiteware, and yellowware. This type of ceramic was typically produced for dining and beverage consumption with yellowwares typically being used for food preparation and sanitary wares. High-fired, vitreous ceramics included porcelain.

Creamware is a yellow-tinted, lead-glazed earthenware with a cream-colored body (Noël Hume 1973:218). The cream-colored body with a yellow lead glaze was developed around 1762 by English potters, including the famous Josiah Wedgwood who by 1767 was producing a form called “Queen’s ware” (Noël Hume 1973:219; South 1977:212). Popularity of this ware lasted until about 1820 when production dwindled due to better quality wares (South 1977:212). Two undecorated creamware sherds were recovered from Structure 1 (Table 60).

Pearlware is a white-bodied earthenware with a clear lead glaze tinted with cobalt which was developed as an improvement over creamware (Smith and Nance 2000:150). In 1779, Josiah Wedgwood described this type as "pearl white" (Noël Hume 1973:232). The whiter appearance comes from the addition of flint to the body. The addition of cobalt to the glaze produces a bluish tint which is noticeable in areas where the glaze has pooled. Pearlware was created as a replacement for creamware creating a whiter ware similar to porcelain. Popularity of this type waned with the introduction of whiteware in the 1820s though some researchers have suggested it was still in production until the mid-nineteenth century (Lamb 2003; Price 1979). A large amount of pearlware was recovered from Structure 1 comprising 32.5 percent of the total ceramic assemblage for all phases (Table 59). Types of pearlware included undecorated, hand painted, edge decorated, transfer printed, industrial slipware (banded and mocha), and lusterware. One piece in particular included an overglazed transfer-printed children's cup (Figure 123). The text is taken from a series entitled "Flowers that Never Fade" meant to teach children about kindness and reads:

> "Oh look! brother look! at my dear little Neddy
> How good humour'd he seems, so quiet and steady!
> Ill-natur'd and spiteful how many you see
> To donkeys which always astonishes me." (Riley 1991:254).

A similar cup is also seen with a print taken from *Peter Parley's Annual* published in 1862 (Martin 1862:189; Riley 1991:254-255). The cup recovered from Structure 1 is believed to predate this reference.

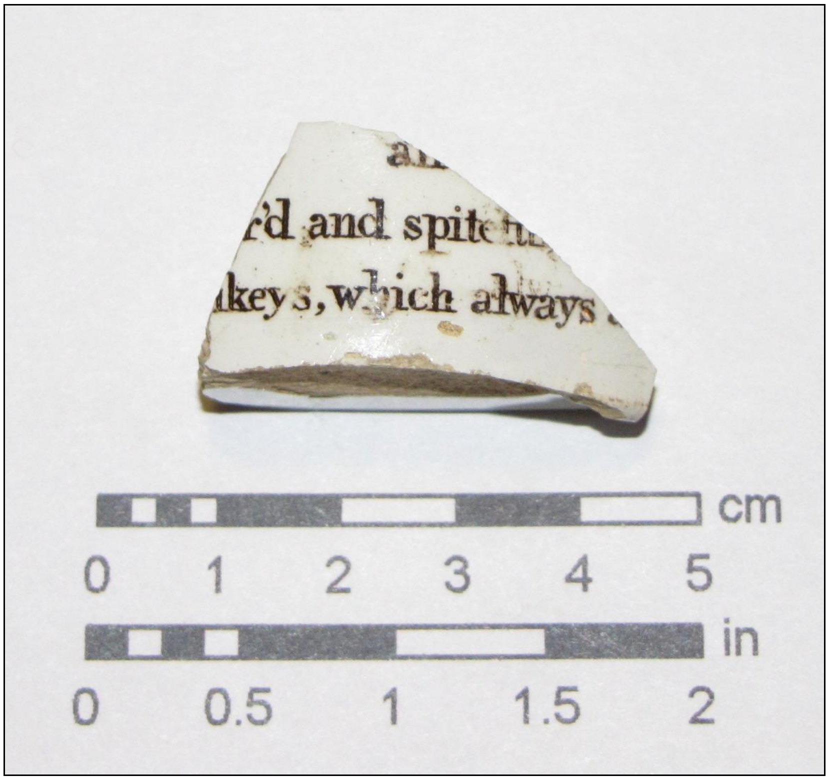

Figure 123. Overglazed transfer printed pearlware with text.

Whiteware is a white-bodied earthenware covered in a clear lead glaze. Developed as an improvement over pearlware, whiteware is harder and whiter than pearlware. Whiteware was developed in England about 1805 but did not become popular on American sites until the 1820s. By the 1830s it had become the most popular ware in North America (Miller et al. 2000:13). Some early whitewares are difficult to distinguish from pearlware due to the continued use of cobalt in the glaze resulting in bluish tinting possibly affecting the proportion of whitewares versus pearlwares recovered from Structure 1 (Cupka 2010:82). Popularity of whiteware continued throughout the nineteenth century. Types of whiteware included undecorated, hand painted, edge decorated, and transfer printed.

Yellowware is a yellow-bodied earthenware with a clear glaze. Production of this ware began around 1830 and was a popular type through the beginning of the twentieth century (Smith

1983). Production of this ware began in America around 1830 and lasted until the 1930s. A single undecorated sherd of yellowware was recovered (Table 60).

Porcelain is made of highly refined, residual clays that vitrify when fired at temperatures of 1250 degrees or above. Porcelain recovered from Structure 1 primarily consists of soft-paste English porcelain, also known as bone china, developed around 1800 as a replacement for earlier more expensive Chinese porcelains (Miller 1980:17). No hard-paste Chinese porcelain was found. Five types of porcelain were recovered from Structure 1 including undecorated, gilded, transfer printed, banded, embossed, and some unidentifiable fragments. A majority of these come from the post-occupational period of Structure 1.

Using South's (1977) mean ceramic dating formula with date adjustments for certain ceramic types, mean ceramic dates were calculated for refined earthenwares. Using known ceramic manufacturing dates, a mean date of occupation can be obtained. South's (1977) formula can be simply described as:

Mean Ceramic Date = (Median Manufacturing Date of Type x
Frequency of Artifacts of Type)/Total Number of Artifacts.

Table 61 lists the calculated mean dates for Structure 1 by phase. Dates for the occupational phase of Structure 1 averaged 1819 with the post-occupational date averaging 1824. With a difference of roughly five years, it is possible that the dates differ only slightly due to a continued use of pearlwares into the middle of the nineteenth century. It is also possible that the dates are close due to misidentification of early whitewares which look similar to pearlwares of the time (Cupka 2010:82). The overall mean ceramic date for Structure 1 equaled 1822.

Table 61. Refined ceramics from Structure 1 with corresponding mean ceramic dates.

Ware	Decoration	Decoration Notes	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total	Date Range	Date	Source
Creamware	Undecorated		-	1	-	1	1	-	-	2	1762-1820	1791	South 1977
Pearlware	Undecorated		-	34	2	36	10	53	2	101	1780-1830	1805	South 1977
Pearlware	Hand Painted	Blue	-	1	2	3	1	17	-	21	1780-1830	1805	South 1977
Pearlware	Hand Painted	Green	-	1	-	1	1	1	-	3	1780-1830	1805	South 1977
Pearlware	Hand Painted	Polychrome	-	2	-	2	2	7	-	11	1795-1830	1813	Miller et al. 2000
Pearlware	Edge Decorated	Blue	-	5	-	5	3	9	-	17	1800-1835	1818	Miller et al. 2000
Pearlware	Edge Decorated	Green	1	2	1	3	1	1	-	6	1820-1835	1818	Miller et al. 2000
Pearlware	Edge Decorated	Embossed	-	-	-	-	-	-	3	3	1820-1835	1828	Miller et al. 2000
Pearlware	Transfer Printed	Blue	-	13	2	15	3	12	2	32	1784-1840	1812	Samford 1997
Pearlware	Transfer Printed	Green	-	-	-	-	-	1	-	1	1818-1840	1829	Samford 1997
Pearlware	Transfer Printed	Red	-	2	-	2	-	1	-	3	1818-1840	1829	Samford 1997
Pearlware	Transfer Printed	Black	-	2	-	2	-	2	-	4	1785-1840	1813	Samford 1997
Pearlware	Industrial Slipware, Banded	Blue	-	14	1	15	1	3	-	19	1810-1833	1822	Miller et al. 2000
Pearlware	Industrial Slipware, Banded	Green	-	1	-	1	-	1	-	2	1790-1830	1810	Smith 1983
Pearlware	Industrial Slipware, Banded	Brown	-	2	-	2	-	-	-	2	1810-1833	1822	Miller et al. 2000
Pearlware	Industrial Slipware, Banded	Polychrome	-	8	-	8	-	3	1	12	1790-1830	1810	Smith 1983
Pearlware	Industrial Slipware, Mocha	Polychrome	-	2	-	2	-	-	-	2	1795-1840	1818	Miller et al. 2000
Pearlware	Lusterware	Polychrome	-	1	-	1	-	-	-	1	1790-1840	1815	South 1977
Whiteware	Undecorated		-	12	-	12	2	33	6	53	1820-1900	1860	Miller et al. 2000; South 1977
Whiteware	Hand Painted	Blue	-	-	-	-	-	-	1	1	1820-1870	1845	Garrow 1983; Miller et al. 2000; Price 1979; Smith 1983
Whiteware	Edge Decorated	Green	-	-	-	-	1	6	1	8	1820-1860	1840	Garrow 1983; Miller et al. 2000; Price 1979; Smith 1983
Whiteware	Transfer Printed	Blue	-	2	-	2	1	9	1	13	1820-1859	1840	Samford 1997; Miller et al. 2000;
Whiteware	Transfer Printed	Green	-	-	-	-	-	1	-	1	1820-1859	1840	Samford 1997; Miller et al. 2000;
Whiteware	Transfer Printed	Red	-	2	-	2	-	5	-	7	1820-1880	1850	Samford 1997; Miller et al. 2000;
Whiteware	Transfer Printed	Brown	-	3	-	3	-	-	-	3	1828-1890	1859	Miller et al. 2000; South 1977
Whiteware	Transfer Printed	Black	-	-	-	-	1	1	-	2	1820-1864	1842	Samford 1997; Miller et al. 2000;
Whiteware	Transfer Printed	Faded Overglazed Design	-	-	-	-	-	1	-	1	1820-1860	1840	Garrow 1983; Miller et al. 2000; Price 1979; Smith 1983
Yellowware	Undecorated		-	-	-	-	-	1	-	1	1830-1930	1880	Ketchum 1971; Garrow 1983; Smith 1983
Total			1	110	8	118	28	168	17	332			
Dates			-	1819.3	-	1818.7	1816.0	1823.7	-	1821.9			

A total of six sherds were recovered with ceramic marks on their base (Table 62). Two of these sherds found outside of Structure 1 during the occupational phase have estimated mean dates of production at 1835 and 1846 being produced until at least 1859 (Snyder 1997:32; Williams 1978:214-215; Williams and Weber 1986:70).

A total of three ceramic pipe fragments were recovered from Structure 1 (Table 63). These include one coarse earthenware bowl fragment and two ball clay pipe fragments. Two of these had molded decorative flutes.

Brick

Brick, though a ceramic, was kept as a separate class for analysis purposes. Brick included hand-made and machine-made brick as well as a few pieces of daub (Table 64). A few large intact bricks were kept as a sample; all others were counted, weighted, and discarded in the field. A total of 459 fragments of brick were recovered weighting 2,094.4 grams. An estimated 33,000 grams of disintegrated brick was also excavated from the hearth (Feature 108) and not included in the final count. The large amount of brick could indicate the presence of a partial stone/brick chimney attached to Structure 1 similar to the current kitchen chimney. It is also possible that brick recovered during the occupation phase could be associated with Tipton, Jr.'s brick chimney added during his renovation of the farmhouse. Brick was not known to have been used in construction on the property until this time. Structure 1 is assumed to have been constructed of log, possibly with a clapboard exterior, consistent with other outbuildings constructed on the property before the 1850s.

Table 62. Ceramic marks from Structure 1 ceramics.

Ware	Decoration	Decoration Notes	TU	Level	Phase	Mark	Dates	Source	Total
Pearlware	Undecorated		12	3	Occupation Phase (Exterior)	" ...fordshir...", which stands for Staffordshire.	-	-	1
Pearlware	Transfer Printed	Black	12	2	Post-Occupational Phase	"MADE...W..."	-	-	1
Whiteware	Transfer Printed	Red	12	3	Occupation Phase (Exterior)	"Scott's Illustrations Legend of Montros[e]"	c.1846	(Williams and Weber 1986:70)	1
Whiteware	Transfer Printed	Brown	12	3	Occupation Phase (Exterior)	"…VA" with Canova Design.	c.1835	(Snyder 1997:32; Williams 1978:214-215)	3
Total									6

Table 63. Ceramic pipes from Structure 1.

Material	Ware	Decoration	Description	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Ceramic	Coarse Earthenware	Mold Decorated	Fluted	-	1	-	1	-	-	-	1
Ceramic	Ball Clay	_	_	-	1	-	1	-	-	-	1
Ceramic	Ball Clay	Mold Decorated	Fluted	-	-	-	-	-	1	-	1
Total				-	2	-	2	-	1	-	3

Table 64. Brick from Structure 1.

Material	Description	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Brick	Hand Made	5 (2.6 g)	84 (276.2 g)	41 (486.8 g)	125 (763.0 g)	88 (184.5 g)	231 (620.0 g)	3 (500.5 g)	452 (2070.6 g)
Brick	Machine Made	-	-	-	-	-	-	5 (22.5 g)	5 (22.5 g)
Fired Clay	Daub	-	-	-	-	2 (1.3 g)	-	-	2 (1.3 g)
Total		5 (2.6 g)	84 (276.2 g)	41 (486.8 g)	125 (763.0 g)	90 (185.8 g)	231 (620.0 g)	8 (523.0 g)	459 (2094.4 g)

Glass

A total of 330 fragments of glass were recovered from Structure 1 (Table 65). Glass artifacts primarily consisted of container glass and glass tablewares. Other glass items included architectural items in the form of window glass and personal items in the form of a fragmented blue bead and a single mirror glass fragment. A few fragments of medicine bottles were also recovered. A majority of the glass from Structure 1 was discovered in the post-occupational phase.

Container glass recovered included a variety of general bottle types often recovered from nineteenth-century sites, as well as miscellaneous small pieces of glass of uncertain type. These types were subdivided by color and decoration which included amber, aqua, green, dark green, light blue, and colorless or clear glass. Panel bottles were also recovered during excavation, some which included embossed lettering. Panel bottles typically with embossing become available after 1867 with the introduction of the plate mold (Miller et al. 2000:8).

Glass tableware artifacts included tumblers, a decanter stopper, a wine glass base, and decorative glass vessels or glassware. Tumblers are drinking glasses without a foot or stem and included clear and frosted fragments some of which included paneling or fluting. Pressed paneled tumblers became available in the mid- to late 1830s while frosted glass begins to be massproduced in the 1840s (Jones 2000:179, 225).

Decorative glasswares included blown-in-mold, contact molded, and press molded designs such as cross-hatched, molded chevrons, floral patterns, scalloped edges, and a free-blown bowl with side engraving and a folded rim. Blown glass is common throughout the eighteenth and nineteenth centuries while pressed glass tableware was introduced around 1825 (Miller et al. 2000:7). The pressed glass cup plate with classical motif seen in Figure 124 was

Table 65. Glass from Structure 1.

Category	Form	Color	Decoration	Notes	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Clothing	Bead	Light Blue		Light Blue Fragmented Bead	-	2	-	2	-	-	-	2
Container	Bottle	Clear			-	17	3	20	6	51	1	78
Container	Bottle	Clear	Molded	Ribbed design.	-	-	-	-	-	1	-	1
Container	Bottle	Clear	Embossed		-	-	-	-	-	3	-	3
Container	Bottle	Clear	Embossed	"..T…"	-	1	-	1	-	-	-	1
Container	Bottle	Amber			-	-	1	1	-	4	-	5
Container	Bottle	Green			-	3	-	3	-	1	-	4
Container	Bottle	Dark Green			2	-	1	1	1	14	3	21
Container	Bottle	Aqua			1	2	-	2	3	21	-	27
Container	Bottle	Light Blue			-	-	-	-	-	1	-	1
Container	Panel Bottle	Clear			-	-	-	-	-	2	-	2
Container	Panel Bottle	Aqua	Embossed	"...R_O...L_T…"	-	-	-	-	-	2	-	2
Container	Panel Bottle	Aqua	Embossed	"...GIS…"	-	-	-	-	-	1	-	1
Pharmaceutical	Medicine Bottle	Clear			-	-	-	-	1	10	-	11
Pharmaceutical	Medicine Bottle	Aqua			-	1	-	1	-	1	-	2
Tableware	Tumbler	Clear			-	2	-	2	1	2	-	5
Tableware	Tumbler	Clear	Molded		-	-	-	-	-	2	-	2
Tableware	Tumbler	Clear	Fluted		-	-	-	-	-	3	-	3
Tableware	Tumbler	Frosted			-	-	-	-	-	5	-	5
Tableware	Tumbler	Frosted	Fluted		-	2	-	2	-	-	-	2
Tableware	Decanter	Clear		Decanter Stopper.	-	1	-	1	-	-	-	1
Tableware	Stemware	Clear		Wine glass base.	-	1	-	1	-	-	-	1
Tableware	Glassware	Clear	Free Blown	Folded rim with air design and etching along the body.	-	-	-	-	-	1	-	1
Tableware	Glassware	Clear	Molded	Handle Fragment.	-	-	-	-	-	1	-	1
Tableware	Glassware	Clear	Molded	Cross-hatched design.	-	-	-	-	-	1	-	1

Table 65. Glass from Structure 1 (Continued).

Category	Form	Color	Decoration	Notes	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Tableware	Glassware	Clear	Molded	Cross-hatch design forming interlinking chevrons.	-	-	-	-	-	12	-	12
Tableware	Glassware	Clear	Molded	Molded chevrons in base.	-	-	-	-	1	-	-	1
Tableware	Glassware	Clear	Press Molded		-	-	-	-	1	-	-	1
Tableware	Glassware	Clear	Press Molded	Cross-hatched design.	-	-	-	-	-	1	-	1
Tableware	Glassware	Clear	Press Molded	Tea plate with floral pattern and scalloped edge.	-	-	-	-	-	1	-	1
Tableware	Glassware	Clear	Press Molded	Scalloped Edge.	-	1	-	1	-	-	-	1
Flat glass	Window Glass				-	35	1	36	8	74	4	122
Flat glass	Mirror Glass				-	-	-	-	-	1	-	1
Unidentified	Burned				-	5	-	5	1	1	-	7
Total					3	73	6	79	23	217	8	330

Figure 124. Pressed glassware cup plate.

common between the late 1820s and about 1860 while “cross-hatched” or “waffle-square” patterns roughly date between 1827 and 1835 (Jones 2000:141, 162). Again an increase in glassware is seen in the post-occupational phase.

A total of 123 fragments of flat glass were recovered from Structure 1. One of these fragments is interpreted as mirror glass due to the presence of silvering for reflective purposes. All other fragments were interpreted as window glass.

Flat glass increased in thickness over time due to changes in technology and manufacturing. Due to the increasing thickness, it is possible to relatively date construction or renovation episodes of structures which had windows. Using Moir’s (1987) formula for window glass dating, glass dates were calculated for each phase (Table 66). Moir’s (1987) formula can be expressed as:

Window Glass Date = (84.22 x average thickness in mm) +1712.7

Moir's formula was found to be accurate to +/- seven years for sites in the far western portion of the southeast (Moir 1987:78). Due to the variability in thickness, it is also only considered fully applicable between 1830 and 1910. Within Tennessee, Moir's formula has been found to be accurate to within 15 years (Meyers 2001:69).

Calculated dates for each phase show a gradual increase in average thickness over time. Counts below about 30 fragments are statistically invalid for accurate dating (Moir 1987). Due to small sample size, only the occupation and post-occupation phases provided statistically relevant dates. Window glass deposited during occupation of Structure 1 totaled 1808.71 placing the construction to within 15 years of this date. Post-occupational accumulations of window glass totaled 1825.55. It is possible that the post-occupation phase window glass was deposited from Tipton, Jr.'s Federal farmhouse during Haynes' later Greek-Revival renovation which would explain a mid-1820s date. Dates for window glass collected from Structure 1 combine for a total date of 1820.5 (Table 66).

Table 66. Flat glass dates from Structure 1.

Flat Glass	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Count	-	35	1	36	8	74	4	122
Average Thickness (mm)	-	1.14	-	1.14	-	1.34	-	1.28
Date	-	1808.71	-	1808.71	-	1825.55	-	1820.50

Metal

Metal artifacts excavated from Structure 1 totaled 935 objects (Table 67). These consisted of a number of different forms including clothing items, kitchen items, architectural

Table 67. Metal artifacts from Structure 1.

Form	Description	Type	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Button	Iron		-	1	-	1	-	-	-	1
Button	Copper Alloy		-	-	-	-	-	1	-	1
Button	Brass		-	5	-	5	-	1	-	6
Button	Brass	Molded with wash or coating	-	-	-	-	-	1	-	1
Straight Pin	Iron	Flat headed	-	2	-	2	-	2	-	4
Straight Pin	Copper Alloy	Wire wound	-	1	-	1	2	-	-	3
Pendant	Iron		-	-	-	-	-	2	-	2
Jaw Harp	Iron	Wrought	-	-	-	-	-	1	-	1
Umbrella Parts	Stretcher		-	-	-	-	-	1	-	1
Handle	Drawer Handle		-	1	-	1	-	-	-	1
Knife	Iron	Blade fragment	-	1	-	1	-	1	-	2
Cleaver	Iron		-	1	-	1	-	-	-	1
Cutlery Handle	Pewter		-	1	-	1	-	-	-	1
Tinware	Fragments		-	8	-	8	-	12	1	21
Tinware	Container	Can fragments	-	-	-	-	-	16	-	16
Nail	Wrought		-	25	9	34	11	28	1	74
Nail	Wrought	Roseheaded	-	2	1	3	7	7	1	18
Nail	Wrought	L-headed	-	4	1	5	1	8	-	14
Nail	Wrought	T-headed	-	-	1	1	3	3	-	7
Nail	Wrought	Horseshoe	-	1	1	2	-	3	-	5
Nail	Early Machine Cut		-	-	1	1	7	63	1	72
Nail	Late Machine Cut		3	30	-	30	37	110	18	198
Nail	Wire		-	-	-	-	-	26	10	36
Nail	Machine Cut	L-headed	-	-	-	-	1	4	-	5
Nail	Unidentified		5	60	9	69	38	247	11	370
Tack	Iron	Handwrought	-	-	-	-	-	3	-	3
Tack	Iron		1	1	-	1	3	4	1	10
Tack	Brass		-	-	-	-	-	1	-	1
Screw	Iron		-	1	-	1	-	-	-	1

Table 67. Metal artifacts from Structure 1 (Continued).

Form	Description	Type	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Spike	Railroad Screw Spike		-	-	1	1	-	-	-	1
Wire	Iron	Thin gauge	-	6	-	6	1	6	1	14
Wire	Iron	Thick gauge	-	-	-	-	1	4	1	6
Wire	Iron	Loop	-	1	-	1	-	-	-	1
Wire	Brass		-	-	-	-	-	-	1	1
Hook	Hook with Shank for Attachment		-	-	-	-	-	1	-	1
Hook	Large Hook.		-	-	-	-	1	-	-	1
Hinge	Strap Hinge		-	2	-	2	-	-	-	2
Tool	Sickle with Bone Handle		-	1	-	1	-	-	-	1
Chain	Link.		-	1	-	1	-	-	-	1
Chain	Link with Handle.			1		1				1
Buckle	Large Strap Buckle		-	1	-	1	-	-	-	1
Bit	Snaffle Bit		-	1	-	1	-	-	-	1
Saddle Brace	Iron		-	-	-	-	1	-	-	1
Horseshoe	Iron		-	1	-	1	-	-	-	1
Band	Iron Strip		-	1	-	1	1	3	-	5
Band	Iron Band		-	1	-	1	-	-	-	1
Band	Large Iron Reinforcement Band		-	1	-	1	-	-	-	1
Slag	Lead Slag		-	-	-	-	-	-	1	1
Slag	Lead Casting Sprue		-	-	-	-	-	1	-	1
Unidentified	Iron Fragment		-	-	-	-	1	1	-	2
Unidentified	Sheet Metal Fragment		-	-	-	-	-	1	-	1
Unidentified	Iron Oxide Fragments		-	2	4	6	4	3	-	13
Total			9	165	28	193	120	565	48	935

materials, farm equipment, and other miscellaneous items. Again the post-occupational midden overlaying Structure 1 contained the highest volume of metal artifacts.

Metal clothing materials consisted of buttons, straight pins, and pendants (Table 68). Metal buttons are commonly recovered from late eighteenth- and nineteenth-century contexts. Nine metal buttons were found during the excavation of Structure 1. Types of metal buttons included iron, copper alloy including brass, and brass with a wash or coating.

A single iron button was found outside of Structure 1 during the occupation phase. This was comprised of an iron button back with cloth impression. Cloth buttons with metal shanks were common after 1810 (Marcel 1994: 4, 13).

Copper-alloy buttons included and a small dome-shaped Navy sleeve button with a molded eagle over anchor design (Figure 125). Navy buttons of this type (left-facing eagle with spread wings perched on fouled anchor) are believed to date to the early nineteenth century (ca. 1830-1850) (Albert 1969:87). It is unclear why a Navy button was recovered at Tipton-Haynes as none of its inhabitants are known to have served in the Navy. It is possible that this type of artifact is associated with hand-me-downs or used items given to enslaved laborers (Galle 2004:54, 59; Kelso 1997:90; Thomas and Thomas 2004:107; Young 2004:145).

Seven brass buttons were excavated from Structure 1. Types included brass and brass with a wash or coating. Brass buttons were popular from the late eighteenth century until around 1820 when they were replaced by gilded, or gold-plated brass buttons (Marcel 1994:4). Gilded buttons were popular from the late eighteenth century until about 1850 when milk glass buttons grew in popularity (Marcel 1994:4; White 2005:64-65). Quality marks were typically placed on buttons between 1800 and 1850 to identify the quality of the piece for the promotion of sales (Luscomb 1967:163). Quality marks include “Orange Colour” and “Gilt” backmarks. Two

Table 68. Metal clothing artifacts from Structure 1.

Form	Material	Manufacturing Tech	Description	Measurement	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Button	Iron		Button back with cloth impression.		-	1	-	1	-	-	-	1
Button	Copper Alloy		Small dome-shaped Navy button with molded eagle over anchor design.	dia 12.89mm	-	-	-	-	-	1	-	1
Button	Brass		Slightly convex face with soldered wire eye.	dia 21.11mm	-	3	-	3	-	-	-	3
Button	Brass		Flat face with backstamp "ORANGE… COLOUR".	dia 19.84mm	-	-	-	-	-	1	-	1
Button	Brass		Flat face with soldered eye and "GILT" backstamp.	dia 21.76mm	-	1	-	1	-	-	-	1
Button	Brass	With pewter wash or coating.	Flat face with soldered eye and "JACKSON… VICTORY… AMERICAN STANDARD" backstamp.	dia 21.10mm	-	1	-	1	-	-	-	1
Button	Brass	Molded with wash or coating	Two-piece convex button with basket weave pattern.	dia 23.19mm	-	-	-	-	-	1	-	1
Straight Pin	Iron	Flat headed			-	1	-	1	-	-	-	1
Straight Pin	Iron	Flat headed	Slightly bent.		-	1	-	1	-	-	-	1
Straight Pin	Iron	Flat headed	Bent into U-shape.		-	-	-	-	-	2	-	2
Straight Pin	Copper Alloy	Wire wound			-	1	-	1	-	-	-	1
Straight Pin	Copper Alloy	Wire wound	Slightly bent.		-	-	-	-	2	-	-	2
Pendant	Iron		Pumpkin Shaped		-	-	-	-	-	1	-	1
Pendant	Iron		Fragment		-	-	-	-	-	1	-	1
Total					-	9	-	9	2	7	-	18

Figure 125. Copper-alloy Navy button with left-facing eagle with spread wings perched on fouled anchor.

brass buttons had a wash or coating. One of these was a political campaign button with a backmark excavated from the occupational phase. The backmark reads, “Jackson Victory American Standard” and dates to the presidential campaign of 1828 (Figure 126) (Albert 1969:407-409). The other was a two-piece convex faced button with basket-weave pattern.

Other clothing artifacts included straight pins. A total of seven straight pins were cataloged including three wire-wound and four flat-headed pins. Wire-wound straight pins date to before 1824, while flat-headed pins replaced wire-wound pins between 1824 and 1830 (Beaudry 2006:21; Noël Hume 1969:254). Straight pins were commonly used for sewing and on clothing. Generally women’s clothing did not employ buttons but was instead fastened with lacings, pins, or hook-and-eye fasteners (Beaudry 2006:14-15; White 2005:57). Five of the pins

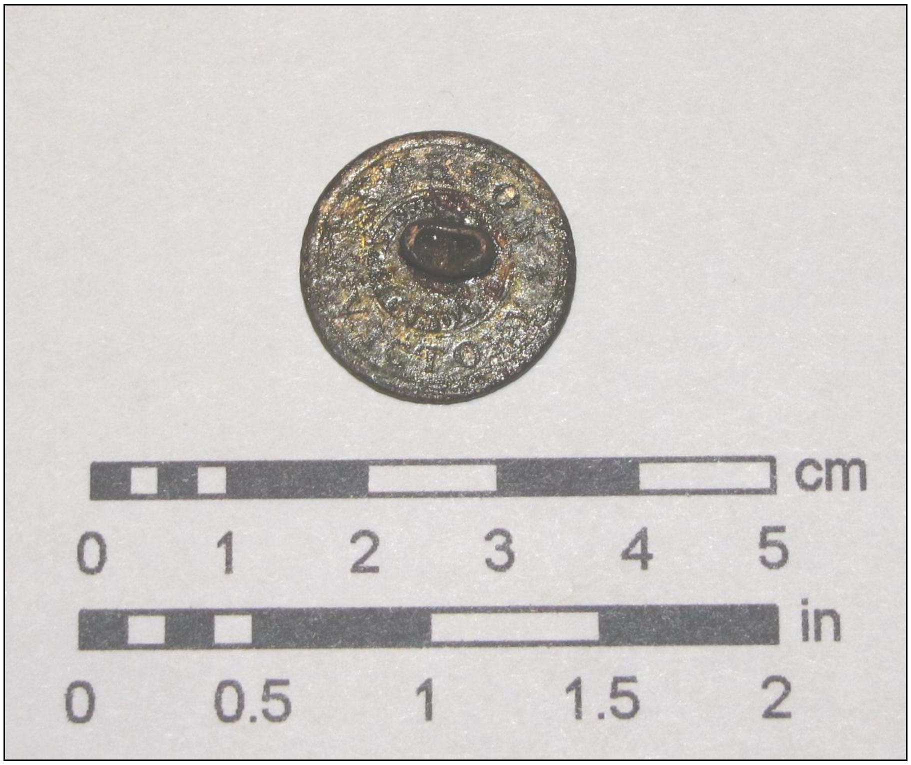

Figure 126. Brass button with "Jackson Victory" backstamp.

recovered were bent most likely for affixing clothing (Figure 127).

Two pendants were also found during excavation. These included an iron pendant fragment and what can be best described as a "pumpkin-shaped" pendant. Both of these were deposited during the post-occupational phase of Structure 1.

Kitchen-related items recovered from Structure 1 include cutlery and tinware. Cutlery artifacts were comprised of two partial knife blades, a cleaver, and the handle of a dining utensil. One of the knives had a bone scale handle with a "BACKWOOD" mark on the blade while the other had an illegible mark "…LL…" (Figure 128). A large cleaver for the butchering of meat was also found. A white metal utensil handle, believed to be pewter, with an "M-shaped" molding on the front and a "V" or "W-shaped" etching or engraving on the back was excavated from the occupation phase (Figure 129). The molded front is thought to be a manufacturer's

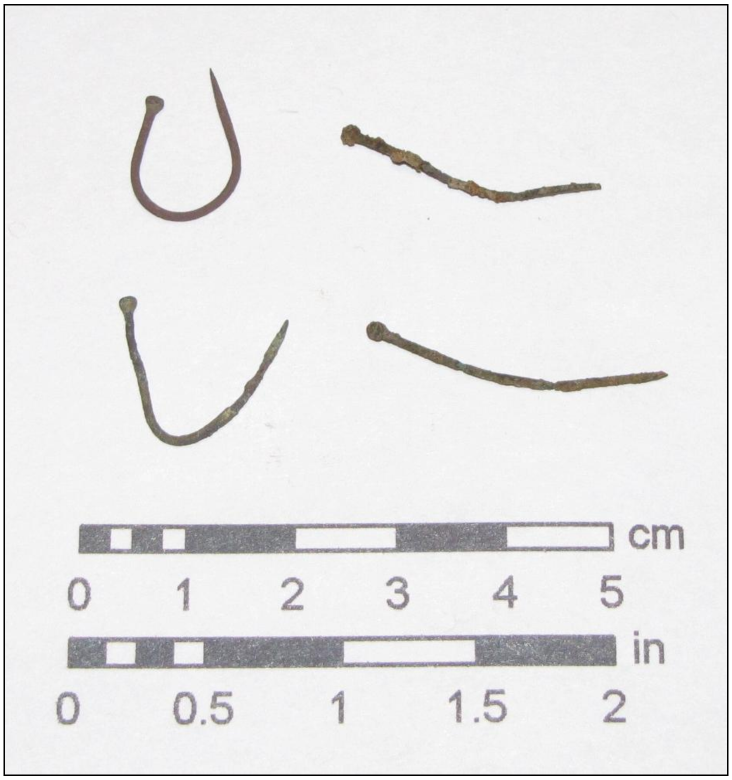

Figure 127. Bent flat-headed straight pins (*left*) and wire-wound straight pins (*right*).

Figure 128. Knife blade with bone scale handle and “BACKWOOD” stamp on the blade.

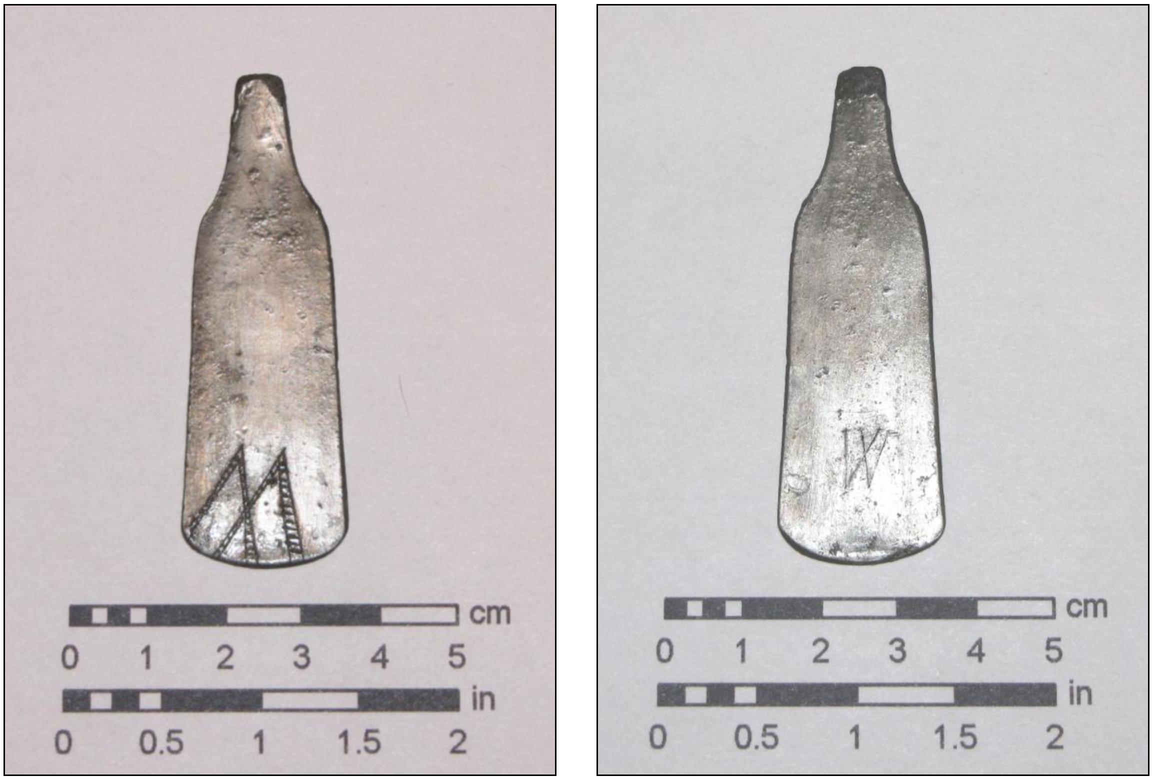

Figure 129. Pewter handle with molded "M-shaped" design on front (*left*)
and "W-shaped" etching on back (*right*).

mark though no maker could be identified. The rear etching, however, was applied post production. An identical inscription was found at a late eighteenth-century slave quarter at Rich Neck in Virginia (Franklin 2004:125-126). The piece was a silver clothing stud with an etched "W" described as an owner's mark (Figure 130). It is thought that this is the common style of writing "W" at this time.

The pewter utensil handle is thought to be from a spoon and is interpreted as a slave-related artifact. Pewter was a relic during nineteenth-century dining. Pewter tableware was passed down for kitchen usage in the home and eventually made its way down the household passing it to slaves (Martin 2000:267-268). The lack of the distal portion of the utensil and the etching on the back, however, point to something more than just a utilitarian tool. The meaning

Figure 130. Silver clothing stud from Rich Neck slave quarters (Franklin 2004:126, figure 5.19).

of objects can change depending on the context of use (Deetz 1977). Other handles have been found in slave contexts which have been interpreted as charms or spiritual items related to ancestor veneration (Franklin 1997:240-241, 2004:120, 215; Klingelhofer 1987:114; Samford 2004:163, 165; 2007:169-171; Young 1996:144). At Kingsmill Quarter Plantation in Virginia, deliberately broken pewter spoon handles were recovered primarily from mid- to late eighteenth-century sub-floor pits (Samford 2004:165). A majority of the decorated spoons had linear zig-zag engravings (Samford 2004:165). The decorative motifs were attributed to Igbo cultural beliefs which includes the use of running lines with "V-shaped" decorative elements (Samford 2004:165). The spoons were probably used as divination tools by men. It is possible the inscribed pewter handle served the same purpose to its owner.

Other kitchen-related artifacts included tinware fragments. Tinware is comprised of pieces of metal containers or other devices assumed to have been used for food preparation or storage. Tinware was a tin-coated sheet iron commonly used for making various types of kitchenwares during the eighteenth and nineteenth centuries as well as many other items such as lamps, buckets, or candle molds (Smith and Nance 2000:178). A total of 37 fragments were recovered with 16 of those being identified as a tin can from the post-occupational phase.

Patents for canning food in tin containers began in 1810 with commercial production becoming popular in 1837 (Miller et al. 2000:24; Nance and Smith 2005:75).

Metal artifacts associated with construction or architectural materials included nails, tacks, screws, spikes, wire, hooks, and two partial strap hinges. A total of 799 nails were cataloged from the Structure 1 test units made up of hand wrought, machine cut, and wire nails (Table 67). Of these, a majority (n=499) were found in the post-occupational phase.

Hand wrought iron nails were used in America from the beginning of European settlement well into the nineteenth century (Smith and Nance 2000:187). Hand wrought nails were common until the 1850s because they were not as brittle as early machine cut nails and could be clinched without breaking (Nance and Smith 2005:79; Noël Hume 1969:254). Hand wrought nails totaled 118 and included rose headed, L-headed, T-headed, and horseshoe nails.

Machine cut nails were first introduced in about 1790 (Adams 2002:67-68; Noël Hume 1969: 253; Wells 1998:83). The first type of cut nails produced were formed with machine-made shafts with hammered heads (Noël Hume 1969: 253). These were produced roughly between the 1790s and 1820s (Adams 2002:68; Nelson 1968:8; Noël Hume 1969:253). Early machine cut, machine headed nails were developed by the late eighteenth century but are generally given a post-1815 date after production increased and the process was refined (Adams 2002:66-68; Noël Hume 1969:253).

Late machine cut nails, or modern machine cut nails, were developed during the early to mid-1820s (Edward and Wells 1993:16-17). By about 1830, machine cut nails with machined heads were perfected (Adams 2002:68; Nelson 1968:7; Noël Hume 1969:253). A total of 198 late machine cut nails were identified from Structure 1 with a majority coming from the post-occupational phase. Three late machine cut nails were also found within the construction phase

placing the construction date to sometime after the early 1820s. Other machine cut nails included L-headed nails which were manufactured after 1810 (Nance and Smith 2005:84).

Other machine cut nails included L-headed nails which were manufactured after 1810 (Nance and Smith 2005:84). These were cut from a sheet of iron and were used as with other L-headed nails for flooring, trim, and finishing work (Nelson 1968; Noël Hume 1969:252). A total of five machine cut L-headed nails were excavated from the destruction and post-occupation phases of Structure 1 (Table 67).

The final type of nail recovered was the wire nail. Wire nails date from around 1819 onward, but are usually ascribed an early 1850s production date when patents began to be registered in Britain (Adams 2002:66; Nelson 1968:9-10; Noël Hume 1969:254). However, no significant quantities of wire nails were produced in the United States until the 1880s (Adams 2002:66; Noël Hume 1969:254).

Due to the uniformity of cut nails, their lengths can be used to determine a possible function (Nelson 1968; Amrine 2010:22). Using data available from Amrine (2010), Table 69 shows nail lengths in pennyweights and their intended function. Small construction nails between 2d and 5d are considered finishing nails used in the final stages of carpentry while 6d (2.0”) through 10d (3.0”) nails are common nails used for many purposes including for flooring and boarding. Larger nails ranging from 12d (3.25”) to 20d (4.0”) were typically used for heavy framing.

Whole identifiable nails excavated from the Structure 1 were measured in pennyweights, or inches, to discover any possible patterns (Table 70). Totals from the excavation place most nails between sizes 3d (1.25“) and 9d (2.75“). These were used mainly for flooring, boarding, shingles, trim, and siding. Based on the available data, Structure 1 is interpreted as a log cabin,

Table 69. Nail size and function (Adapted from Amrine 2010:24; Lees 1986).

Pennyweight (d)	Size (Inches)	Intended Function
2d	1.0"	wall and ceiling lath, fastening wooden shingles to roof sheathing
3d	1.25"	wall and ceiling lath, shingling, thin tongue-and-groove paneling
4d	1.50"	shingling, slating, cabinet work, moulding, interior finish, clapboard siding
5d	1.75"	moulding, finish work, ornamentation, light framing of 1-1.75" boards
6d	2.0"	clapboarding, light framing, bevel siding, wood grounds, shingling, exterior trim, flooring, finish
7d	2.25"	**no available data*
8d	2.50"	finish, flooring, furring strips, wood grounds, interior fittings, sheathing, boarding, exterior trim
9d	2.75"	flooring, boarding
10d	3.0"	boarding, furring strips, flooring, interior fittings, pillars, roof of veranda, sheathing, door and window framing, window trim, weatherboarding, wainscotting, stairs, washboards
12d	3.25"	wooden studding
16d	3.50"	wooden studding, rafters, heavy framing
20d	4.0"	very heavy framing, framing of joists and roofs, sheathing, planking walks, heavy flooring

Table 70. Nail sizes from Structure 1.

Pennyweight (d)	Size (inches)	Total	Percent
2d	1.0"	3	1.9%
3d	1.25"	13	8.1%
4d	1.50"	41	25.5%
5d	1.75"	15	9.3%
6d	2.0"	24	14.9%
7d	2.25"	16	9.9%
8d	2.50"	19	11.8%
9d	2.75"	18	11.2%
10d	3.0"	4	2.5%
12d	3.25"	6	3.7%
16d	3.50"	2	1.2%
20d	4.0"	-	-
Total		161	100%

similar to other contemporaneous outbuildings constructed on site, with wood flooring and trim, a shingled roof, and possibly a clapboard exterior. A high percentage of 4d (1.5") and 6d (2.0") nails were recovered indicating that Structure 1 possibly had clapboard siding. It is also possible these nails were deposited from the restoration or upkeep of the farmhouse's clapboard siding.

Tacks are small nails typically used in construction though they can serve other functions as well. A total of 14 tacks were found at Structure 1 made of hand wrought or machine-made iron and brass. The brass tack found in the destruction phase could be related to furniture or equine hardware.

Aside from nails, a single screw was cataloged from the occupation phase with a blunt end. Screws were typically made by hand until the end of the eighteenth century when machine-made screws came into production (Smith and Nance 2000:256). The process of manufacturing machine-made screws produced blunt ends until about 1846 when a machine that produced points on the screws was developed (Smith and Nance 2000:256).

Another item considered to be construction related is a railroad screw spike excavated from the occupational phase of Structure 1. Machine-made railroad spikes came into production by 1839 (Miller et al. 2000:14). The unearthing of a railroad spike is unusual in this context since no railroad was constructed near the immediate property until around 1890 (Cox 2008:54). The railroad did however arrive in Johnson City by 1857, the same year Haynes is thought to have renovated the farmhouse (Fink 1989:63; Stahl 1986:33). One other railroad spike was also found at the site in Boyd's 1985 Test Unit 8 located in the rear yard (Boyd and Riggs 1990:99).

Other metal architectural artifacts include wire, hooks, and strap hinges. A total of 22 fragments of thin and heavy gauge iron wire were found. One piece formed a loop for an unknown function. Two hooks were cataloged from Structure 1. One hook had a shank for attachment, probably for affixing to a wall, found in the post-occupation phase. The other was a large hook probably for use with a pulley. Due to its provenience within the destruction phase, it is possible this hook was used to dismantle the chimney. Two portions of strap hinges were also found. A strap hinge is comprised of a metal strap which extends horizontally across a door and

is anchored to the frame by a pintle (Priess 2000:51). These were both recovered outside of Structure 1 during the occupation phase.

Farm-related metal artifacts include tools, hardware, and other general farm equipment. Tools included an intact sickle with bone scale handle. Other hardware items are primarily related to equine hardware and included chain links; one has a link handle possibly for use with a harness. A large strap buckle, a snaffle bit, a saddle brace, and a horse or oxen shoe were also cataloged from the occupation and destruction phases of Structure 1 (Figures 131-133) (Noël Hume 1969:238-241).

Other miscellaneous items include personal items as well as furniture hardware and other unidentifiable metal fragments. Personal objects are comprised of a jaw harp and an umbrella stretcher both of which were found during the post-occupation phase. Jaw harps are instruments played by vibrating a metal tongue commonly found on eighteenth- and nineteenth-century sites (Smith 1993:346; Stone 1974:144). An umbrella stretcher springs out to open and support an umbrella's covering and is also commonly recovered from other eighteenth- and nineteenth-century sites (Smith and Nance 2000:250). One object of furniture hardware in the form of a drawer handle was recovered from the occupation phase. The drawer handle is believed to be in the eighteenth-century Chippendale style (Noël Hume 1969:228-230). Unidentified metal consisted of iron fragments, sheet metal fragments, and iron oxide fragments whose form could not be discerned.

Mortar

Mortar totaled 412 fragments weighting 586 grams (Table 71). The mortar class includes mortar fragments as well as plaster. Plaster was defined by the presence of a smoothed flat

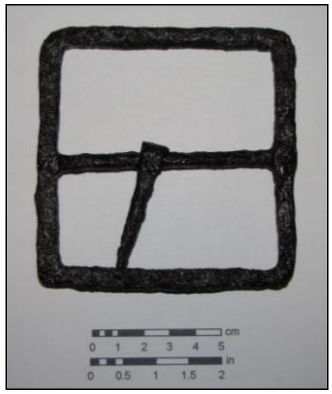

Figure 131. Large strap buckle.

Figure 132. Snaffle bit.

Figure 133. Horse or ox shoe from Structure 1.

Table 71. Mortar from Structure 1.

Material	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Mortar	13 (2.9 g)	66 (159.0 g)	121 (102.1 g)	187 (261.1 g)	89 (45.3 g)	83 (199.1 g)	12 (4.0 g)	384 (512.4 g)
Plaster	-	10 (17.1 g)	-	10 (17.1 g)	1 (0.1 g)	17 (56.4 g)	-	28 (73.6 g)
Total	13 (2.9 g)	76 (176.1 g)	121 (102.1 g)	197 (278.2g)	90 (45.4 g)	100 (255.5 g)	12 (4.0 g)	412 (586.0 g)

surface on the exterior. Mortar primarily occurred within TU's 1 and 2 surrounding the chimney base with most fragments being deposited during the occupation of the structure.

Concrete

Concrete was considered a separate material class. Small fragments of concrete were recovered from the post-occupation and modern phases of Structure 1 (Table 55). Most of the concrete recovered is assumed to be related to modern construction activities.

Stone

Stone recovered from Structure 1 includes limestone, coal, cinders, a marble, and a steatite pencil (Table 72). Limestone totaled 758 fragments weighting 141,679.4 grams. Limestone is primarily constituted of chimney, foundation, and chinking stones from Structure 1. Limestone was also counted, weighted, and discarded in the field. Several fragments of coal were also recovered from the post-occupational phase. One unidentified cinder fragment was also found outside of Structure 1. A single stone marble and a steatite pencil fragment were also recovered from Structure 1. Stone marbles are considered an early type since their importation reached a peak in the mid-eighteenth century (Faulkner 2008:79). These were later replaced by inexpensive clay marbles (Faulkner 2008:102).

Table 72. Stone from Structure 1.

Material	Construction Phase	Occupation Phase (Exterior)	Occupation Phase (Interior)	Occupation Phase (Total)	Destruction Phase	Post-Occupation Phase	Modern Occupation Phase	Total
Limestone	2 (5.9 g)	138 (56,515.2 g)	139 (23.060 g)	277 (79,575.2 g)	201 (34,040.3 g)	275 (28,045.6 g)	3 (12.4 g)	758 (141,679.4 g)
Coal	-	-	-	-	-	11 (6.9 g)	-	11 (6.9 g)
Unidentified Cinder	-	1 (1.5 g)	-	1 (1.5 g)	-	-	-	1 (1.5 g)
Stone: Marble	-	1	-	1	-	-	-	1
Stone: Steatite Pencil	-	1	-	1	-	-	-	1
Total	2 (5.9 g)	141 (56,516.7 g)	139 (23.060 g)	280 (79,576.7 g)	201 (34,040.3 g)	286 (28,052.5 g)	3 (12.4 g)	772 (141,687.8 g)

Artifact Results

Phases of Occupation

Construction Phase

The construction phase was comprised of artifacts recovered from the builder's trench and below the brick hearth. The construction phase could also be combined with the occupation of the cabin due to association but was kept separate for analysis purposes. Very few artifacts were excavated (n=112) totaling only 1.5 percent of the artifacts recovered (Table 55). The assemblage was primarily comprised of bone and charcoal. Other artifacts included a one-hole bone button, a fragment of coarse earthenware and pearlware, as well as aqua and dark green bottle glass. Three late machine-cut nails, unidentifiable nails, and iron tacks were also recovered. Other small amounts of construction materials including brick, mortar, and limestone were also found. A *terminus post quem* (TPQ) date or "date after which" the level or feature was deposited would place Structure 1's construction after 1820 with the presence of late machine cut nails.

Occupation Phase

The occupation phase of Structure 1 included deposits from inside and outside of Structure 1. Only a small portion of the interior was excavated leading to a smaller sample size (n=774) accounting for only 10 percent of the total assemblage (Table 55). Artifacts related to the exterior midden adjacent to the cabin significantly increase. When combined, artifacts total 3,650 amounting to 47.5 percent of the total assemblage from Structure 1. Based on the deficiency of interior artifacts, occupation totals were combined for analysis.

Artifacts included faunal, botanical, ceramic, glass, metal, mortar, and stone material classes. Faunal material consisted of a large amount of bone and eggshell as well as a few fish scales. Due to the high count of eggshell outside of Structure 1 it is believed that eggs were a component of the inhabitants diet and that poultry were raised in this area during its occupation. Four bone buttons were also found outside of Structure 1 including a one-hole, a four-hole, and two five-hole buttons. The remains of a bone sickle handle found in situ were also added to the faunal category. Botanical remains included a large amount of charcoal, walnut shells, as well as a charred peach pit and unidentifiable seed.

Ceramics totaled 211 fragments of coarse earthenwares, a few sherds of stoneware, a single sherd of creamware, pearlware, whiteware, porcelain, some unidentifiable fragments, and gizzard stones. Two of these fragments included ball clay and coarseware pipe fragments. Coarse earthenwares included unglazed and lead glazed variety with a variety of colors for the body. Two fragments of grey salt-glazed stoneware were recovered with a blue underglazed floral pattern. A large number of pearlware sherds (n=98) were found associated with the occupation of Structure 1. Pearlware sherds included undecorated, hand painted, edge decorated, transfer printed, banded and mocha industrial slipware, and lusterware. Hand painted wares included blue, green, and polychrome colors typically depicting floral patterns. Edge decorations included blue and green feather-edged wares and a mold decorated embossed rim. Transfer prints were of varying color such as blue, red, and black. Other types included industrial slipware such as banded and mocha designs as well as a fragment of lusterware. Whitewares included undecorated and transfer printed varieties. Transfer prints were blue, red, and brown in color and included classical and romantic views which were popular between 1827 and 1851 (Samford 1997:6). Porcelain fragments were also found including undecorated and

banded types. Mean ceramic dates for the occupation of Structure 1 equaled 1819. A few ceramics also contained ceramic marks on their base with estimated mean dates of production at circa 1835 and 1846 being produced until at least 1859 (Snyder 1997:32; Williams 1978:214-215; Williams and Weber 1986:70).

Glass recovered from the occupation phase (n=79) was made up of a light blue fragmented bead, bottle glass, an aqua medicine bottle fragment, tablewares, and window glass. Bottle glass included clear, amber, green, dark green, and aqua colors with a single embossed piece. Tablewares included tumbler fragments, a decanter stopper, stemware, and a piece of press-molded, scalloped-edged glassware. Frosted tumblers with fluting came into production by the 1840s (Jones 2000:179). Window glass totaled 36 fragments suggesting a date of 1808.71 +/- 15 years.

Metal recovered from the occupation phase totaled 193 artifacts including clothing items, kitchen items, architectural materials, farm equipment, and other miscellaneous items (Table 67). Clothing objects included six buttons and three straight pins. Buttons were composed of iron and brass, one of which was an 1828 presidential campaign button. Flat-headed and wire-wound straight pins were also recovered.

Kitchen items include a knife blade fragment, a cleaver, a pewter utensil handle, and tinware. The knife blade contained a “BACKWOOD” stamp while the pewter handle was molded with a “W”-shaped” etching on the back (Figures 128 and 129). The pewter utensil handle is thought to be from a spoon and is similar to other objects recovered from slave-related contexts. Eight tinware fragments were also found outside of Structure 1.

Metal artifacts associated with construction or architectural materials included nails, a tack, a screw, a spike, wire, and two partial strap hinges. A total of 145 nails were found

consisting primarily of wrought and late machine cut nails as well as two horseshoe nails. A screw with a blunt end was found which was produced from the end of the eighteenth century until about 1846 (Smith and Nance 2000:256). A railroad screw spike was also recovered which came into production by 1839 (Miller et al. 2000:14). Other metal architectural artifacts included wire and two strap hinges found outside of Structure 1.

Farm-related metal artifacts included tools, hardware, and other general farm equipment. An iron sickle was recovered outside of Structure 1 as well a number of equine-related artifacts. Equine hardware included chain links, one with a harness, a large strap buckle, a snaffle bit, and an horse or oxen shoe. A few small iron band fragments were also found relating to general farm equipment. Other miscellaneous items included furniture hardware in the form of a drawer pull and other unidentifiable metal fragments.

The remaining artifacts were construction-related materials including brick, mortar, and stone. Numerous brick, mortar, and limestone fragments related to building materials for Structure 1 were recovered (Tables 64, 71-72). A few pieces of plaster were also found as well as an unidentified cinder. Other stone artifacts included a steatite pencil and a marble.

Based on the artifact data, the occupation of Structure 1 ranges from the 1820s to 1840s. A window glass date of 1808.71, accurate to within 15 years, places the construction at the later range of this spectrum up to 1824. A mean ceramic date of 1819 was calculated for the occupation phase and included marks dating to circa 1835 and 1846 with an end date of 1859. Other artifacts such as the 1828 presidential campaign button, a machine made railroad spike produced post-1839, frosted tumbler fragments, as well as the presence of late machine cut nails support an 1820s to 1840s date range.

Destruction Phase

The destruction phase of Structure 1 was related to deposits associated with the robbing of the chimney foundation. The deposit was located below the modern disturbance labeled Feature 100. The artifacts could also be classified as relating to the occupation of Structure 1 but were kept separate due to the historic disturbance. Artifacts totaled 1,203 making up 32.5 percent of the total assemblage which was comprised of faunal, botanical, ceramics, glass, metal, mortar, and stone material classes (Table 55).

Faunal material included bone, a shell button, and some eggshell fragments. Botanical remains consisted entirely of charcoal. Ceramics included fragments of coarse earthenwares, a sherd of creamware, pearlware, whiteware, porcelain, and a few unidentifiable pieces. Mean ceramic dates calculated for the destruction phase equaled 1816 (Table 61). Glass artifacts included clear, dark green, and aqua bottle glass, a clear medicine bottle fragment, a tumbler fragment, glasswares, and window glass. One hundred and twenty metal artifacts were found in the destruction levels including wire-wound straight pins, wrought and cut nails, an iron tack, wire, a saddle brace, and an iron band fragment. A large hook recovered from next to the foundation could also likely be associated with a pulley system used to dismantle the chimney when the structure was demolished. Other construction materials included hand-made bricks, a couple of pieces of daub, and a large amount of mortar and limestone rubble. Based on the available information the destruction of Structure 1 appears to have occurred after 1839.

Post-Occupation Phase

The post-occupation phase is related to deposits associated with the dark organic-rich midden overlying the remains of Structure 1. Artifacts are believed to be associated with the

destruction of Structure 1 and materials deposited after its demolition. Artifacts totaled 2,497 objects amounting to 32.5 percent of the total assemblage. Higher counts of ceramic, brick, glass, and metal were recovered from the post-occupation phase midden.

Artifacts were recovered from all historic material classes (Table 55). Faunal material consisted of a large amount of bone a fragment of eggshell as well as a bone scale handle. Botanical remains consisted entirely of charcoal.

Ceramics equaled 431 fragments, twice as many as those recovered during the occupation of Structure 1, mostly made up of coarse earthenwares. One of these fragments included a fluted ball clay pipe bowl. Other ceramic types included sherds of stoneware, pearlware, whiteware, yellowware, porcelain, some unidentifiable fragments. Coarse earthenwares included unglazed and lead glazed variety with a variety of colors for the body. Five pieces of grey stoneware were recovered including salt-glazed fragments and unglazed neck sherds from the same vessel. A large number of pearlware sherds (n=111) were found associated with the post-occupation of Structure 1. Pearlware sherds included undecorated, hand painted, edge decorated, transfer printed, and banded industrial slipware. Hand-painted wares included blue, green, and polychrome colors. Edge decorations included blue and green-edged wares. Transfer prints of varying color such as blue, red, and black were also found. Other types included banded industrial slipware. Whitewares during the post-occupation phase increase in percentage and included undecorated, edge decorated, and transfer printed types (Table 59). Transfer prints were blue, green, red, and black in color typically common between 1830 and the 1860s. Porcelain fragments were also found including undecorated, gilded, embossed, and banded types. Mean ceramic dates for the post-occupation of Structure 1 totaled 1824.

Glass recovered from the post-occupation phase (n=217) included container glass, medicine bottles, tablewares, window glass, and an unidentifiable fragment. Container glass included bottle fragments of clear, amber, green, dark green, aqua, and light blue colors. Panel bottle shards were also found including some with embossing dating after 1867 (Miller et al. 2000:8). A large number of curved thin glass fragments were identified as medicine bottle fragments which increase in count during the post-occupation phase. Tablewares also increase in count and include tumbler fragments and glassware. Tumblers were both clear and frosted with some including decoration such as fluting being produced after the 1830s and 1840s (Jones 2000:141, 162). Decorative glass vessels or glasswares were comprised of blown, contact molded, and press molded designs such as cross-hatched, floral patterns with scalloped edges, and a free-blown bowl with side etching and a folded rim. Pressed glass motifs were common between the late 1820s and about 1860 (Jones 2000:141, 162). Other glass fragments included flat glass identified as window glass and a shard of mirror glass. Window glass recovered totaled 74 fragments equaling a date of 1825.55.

Metal recovered from the occupation phase totaled 595 artifacts with a majority of those being unidentified nails (n=247). Construction materials related to the post-occupation deposits, including nails, are believed to be related to the destruction of Structure 1 or the construction of the farmhouse ell. Metal objects can be broken down into clothing items, kitchen items, architectural materials, farm equipment, and miscellaneous items (Table 67).

Clothing objects included three copper-alloy or brass buttons, two flat-headed straight pins, and two iron pendants. One button was identified as a Navy sleeve button possibly related to hand-me-downs given to enslaved occupants of Structure 1. Others included a brass button with an “Orange Colour” quality mark and a two-piece convex faced button with basket-weave

pattern. The flat-headed straight pins were bent possibly for affixing clothing (Beaudry 2006:14-15; White 2005:57). Pendants were also found during excavation including an iron pendant fragment and a "pumpkin-shaped" pendant.

Kitchen items included a knife blade fragment and tinware. A total of 28 fragments of tinware were recovered with 16 of those identified as coming from a flattened tin can. The tin can become popular in 1837 (Miller et al. 2000:24; Nance and Smith 2005:75).

Metal artifacts associated with construction or architectural materials included nails, tacks, wire, and a hook. A total of 499 nails were found consisting primarily of wrought, machine cut, and wire nails. Wrought nails types included roseheaded, L-headed, T-headed, and horseshoe nails. Hand-wrought nails were common until the 1850s (Nance and Smith 2005:79; Noël Hume 1969:254). Early and late machine cut nails as well as machine cut L-headed nails were also cataloged from the post-occupational phase. Twenty-six wire nails were also recovered dating to post-1850 (Adams 2002:66; Nelson 1968:9-10; Noël Hume 1969:254). Other metal architectural artifacts included wire and a hook with a shank for attachment possibly for attaching to a wall.

Farm-related metal artifacts included general farm equipment such as iron strips and slag. Iron strips totaled three fragments and were not as thick as iron bands. These had many uses including architectural bracing and storage container reinforcement (Smith and Nance 2000:266). One piece of a lead casting sprue, left-over lead from the production of shot, was found in the post-occupation phase.

Other miscellaneous items included personal items and other unidentifiable metal fragments. Personal objects are comprised of a jaw harp and an umbrella stretcher. Unidentified

metal consists of iron fragments, sheet metal fragments, and iron oxide fragments which could not be discerned.

Construction-related materials such as brick, mortar, and stone comprised the remaining artifacts assigned to the post-occupational phase. A large amount of brick rubble, mortar, and limestone fragments related to building materials were recovered associated with the demolition of Structure 1 or the construction of the ell (Tables 64, 71-72). A few pieces of plaster were also found as well as coal fragments used for fuel in the later part of nineteenth century.

Based on the artifacts recovered from the post-occupation phase, the midden is believed to have been deposited between the 1820s and 1840s with deposition continuing into the 1880s. A mean ceramic date of 1824 was calculated for the post-occupation phase. Other artifacts as well as the presence of wire nails and panel bottles support an 1820s through late nineteenth-century date range. A window glass date of 1825.55, accurate to within 15 years, places the production of window glass to between 1810 and 1840. Window glass from the post-occupational phase is believed to be related to the demolished cabin, or Tipton, Jr.'s farmhouse deposited during Haynes' renovations.

The results of the mean ceramic date for the post-occupation phase present a lag when compared with other relative dates for artifacts. An increase in whiteware is noticed, however, other late ceramic types such as ironstone or sponge-decorated wares are lacking. There are several possible reasons for the date lag seen in ceramics from the post-occupation phase.

One possibility is that some of the refined ceramics recovered from Structure 1 were misidentified. During the interpreted period of occupation in the 1820s, pearlwares and whitewares are difficult to distinguish due to the continued use of cobalt in the glaze (Cupka

2010:82). This could possibly affect the proportion of whitewares versus pearlwares recovered from Structure 1.

It is also believed that the mean ceramic date reflects ceramics that were deposited shortly after demolition of Structure 1 and are related to the occupation phase. It is probable that Haynes didn't use the cabin for a long period of time during his early years at the site. It is also possible that the cabin was dismantled prior to or upon his arrival at the property providing an early mean ceramic date for the post-occupation phase.

Ceramics could also be reflecting the use of hand-me-downs by slaves. Other items found in the post-occupation phase such as the brass Navy button point to this conclusion. This could explain the use of pearlwares into the mid-nineteenth century.

The lack of definitive mid-nineteenth-century ceramics could also point to the causeway area being kept clean during Haynes' occupancy. Another test unit located by the law office (TU 10) also found a lack of historic material pointing to the area being kept clean during its use as an office. This is in line with progressive farming ideals which promoted modern sanitation practices to provide a healthier environment. It also provides the ideological impression of cleanliness and order.

Modern Phase

The modern phase of occupation is derived from artifacts deposited during the last half of the twentieth century to the present. This includes Level 1 artifacts and artifacts collected within Feature 100, a modern disturbance. Historic artifacts placed into the modern phase could more appropriately be combined with the post-occupation of Structure 1 but were kept separate due to modern intrusion. Artifacts included bone, charcoal, ceramics, glass, and metal for a total of 222

artifacts comprising 2.9 percent of the total assemblage. A single bone scale handle was found as well as a few fragments of clear and dark green bottle glass. Ceramics included coarse earthenwares, a fragment of stoneware with an Albany slip, pearlware, whiteware, and fragments of porcelain. Metal artifacts consisted of all types of nails, an iron tack, wire, a fragment of tinware, and a piece of lead slag. Construction materials included hand-made and machine-made bricks, mortar, and limestone.

Test Units

To further refine dates for the phases of occupation, TPQ dates were calculated for each test unit (Tables 73-75). Based on the results, dates range from the late eighteenth to late nineteenth centuries. Level dates adhere to the law of superposition with deeper levels containing older artifacts and shallow levels containing younger material. Level TPQ's again show occupation ranging from the 1820s through 1840s with the post-occupation dating to after the 1880s with the presence of wire nails.

The post-occupation phase was comprised of the second level of excavation from each

Table 73. Test Unit 1 relative dates with TPQs.

Level/Feature	MCD	Count	Flat Glass	Count	Artifacts	TPQ Date	Assigned Phase
Level 1	-	4	-	-	Modern Materials	20th Century	Modern Occupation Phase
Level 2	-	1	-	7	Wire Nails	ca. 1880	Post-Occupation Phase
Level 3	-	6	-	1	RR Screw Spike	1839	Occupation Phase (Interior)
Level 4	-	9	-	3	Press Molded Glassware	ca. 1825	Destruction Phase
Level 4N	-	-	-	-	Wrought Nails	-	Occupation Phase (Interior)
Level 5	-	1	-	-	Late Machine Cut Nails	ca. 1825	Construction Phase
Fea 100	-	12	-	4	Modern Materials	20th Century	Modern Occupation Phase
Fea 107	-	-	-	-	-	-	Occupation Phase (Interior)
Fea 108	-	-	-	-	-	-	Occupation Phase (Interior)
Fea 111	-	-	-	-	-	-	Construction Phase
Total	1825.78	33	-	15			

Table 74. Test Unit 2 relative dates with TPQs.

Level/Feature	MCD	Count	Flat Glass	Count	Artifacts	TPQ Date	Assigned Phase
Level 1	-	1	-	-	Modern Materials	20th Century	Modern Occupation Phase
Level 2	1830.07	102	1831.45	33	Wire Nails	ca. 1880	Post-Occupation Phase
Level 3	-	19	-	5	Late Machine Cut Nails	ca. 1825	Destruction Phase
Level 4ZA	-	1	-	3	Industrial Slipware, Banded Polychrome Pearlware	ca. 1790	Occupation Phase (Exterior)
Level 4ZB	-	2	-	-	Early Machine Cut Nails	ca. 1815	Occupation Phase (Interior)
Level 4ZC	-	3	-	-	Undecorated and Hand Painted Blue Pearlware	ca. 1780	Occupation Phase (Exterior)
Total	1826.64	128	1828.92	41			

Table 75. Test Unit 12 relative dates with TPQs.

Level/Feature	MCD	Count	Flat Glass	Count	Artifacts	TPQ Date	Assigned Phase
Level 1	-	-	-	-	Modern Materials	20th Century	Modern Occupation Phase
Level 2	1814.13	65	1817.97	34	Wire Nails	ca. 1880	Post-Occupation Phase
Level 3	1820.56	105	1808.71	32	Frosted Tumbler	ca. 1840	Occupation Phase (Exterior)
Total	1818.1	170	1812.92	66			

test unit. Test Unit 2, placed over Structure 1, provided a mean ceramic date of 1830 while TU 12, located over the chimney fall, supplied an earlier ceramic date of 1814 (Tables 74 and 75). Only a single ceramic was found within the post-occupation phase in TU 1 (Table 73). The differences seen in the ceramics between test units could indicate that the midden associated with the chimney fall in TU 12 is contemporaneous with the occupation and/or destruction of Structure 1 while ceramics found in TU 2 were deposited after its destruction.

Structure 1

The results of the artifact analysis provided information as to the age, style and type of construction, function of the building, as well as information about the inhabitants. Based upon the acquired mean ceramic dates, flat glass dates, and various materials known manufacturing dates, an estimated range of occupation can be deduced. Mean ceramic dates place the mid-point

of occupation to around 1820 with window glass dates recovered during the destruction of Structure 1 dating the construction to around 1816 +/- 15 years. Other artifacts recovered from the occupation phase date between the 1820s and 1840s. This includes ceramic and button marks, pressed glasswares, as well as the recovery of a railroad spike. Cut nails recovered in the construction phase place the date of construction post-1820. Based on these results, it is believed that Structure 1 was constructed during the late 1820s and demolished during the 1840s (Table 76).

The post-occupational midden overlaying Structure 1 had a mean ceramic date of 1824 and a corresponding window glass date of 1826. Artifacts related to the post-occupation phase are believed to contain materials associated with occupation of Structure 1 and refuse from renovations to the farmhouse. A window glass date of 1826 could in fact be dating renovations to the farmhouse conducted by Tipton, Jr. in the 1820s. A combined date of 1821 was calculated for window glass dating the construction of Structure 1 and the renovation of the farmhouse to that within that timeframe. Looking at these dates, it is apparent that Structure 1 was constructed during Tipton, Jr.'s occupation of the site and was dismantled by Landon C. Haynes.

Structure 1 is believed to have been log structure with a single room, windows, wood

Table 76. Structure 1 relative dates with TPQ's.

Phase of Occupation	MCD	Count	Flat Glass	Count	Artifacts	TPQ Date
Construction Phase	-	1	-	-	Late Machine Cut Nails	ca. 1825
Occupation Phase (Exterior)	1819.3	110	1808.71	35	Frosted Tumbler	ca. 1840
Occupation Phase (Interior)	-	8	-	1	RR Screw Spike	1839
Occupation Phase (Total)	1818.7	118	1808.71	36	Frosted Tumbler	ca. 1840
Destruction Phase	1816	28	-	8	Press Molded Glassware, Late Machine Cut Nails	ca. 1825
Post-Occupation Phase	1823.7	168	1825.55	74	Wire Nails	ca. 1880
Modern Occupation Phase	-	17	-	4	Modern Materials	20th Century
Total	1821.9	332	1820.5	122		

flooring and trim, a shingled roof, and possibly a clapboard exterior. Nails recovered from Structure 1 were mainly used in the construction of flooring, boarding, shingles, trim, and siding. A high percentage of siding nails were recovered indicating that Structure 1 possibly had a clapboard exterior. It is also possible these nails were deposited from the restoration or upkeep of the farmhouse's clapboard siding.

The chimney attached to Structure 1 is also believed to have been constructed partially of brick. The brick could also indicate a partial stone/brick chimney similar to Haynes' kitchen chimney. It is also possible brick recovered during the occupation phase could be associated with Tipton, Jr.'s brick chimney added during his renovation of the farmhouse. Brick was not known to have been used in construction on the property until that time.

Other features associated with Structure 1 include the raising of poultry near the cabin. A total of 788 pieces of eggshell were excavated from Structure 1. A high concentration of eggshell recovered in TU12 leads to the interpretation that poultry were raised near the structure during its occupation and the food remains were deposited here. The recovery of gizzard stones also leads to this conclusion.

Structure 1 is interpreted as having been used for a kitchen during Tipton, Jr.'s and Haynes' occupation of the site. Evidence for the structure's use as a kitchen can be found in the dimensions for the chimney and functional analysis of the artifacts. Based on the chimney's size, it is assumed that this structure functioned as a kitchen. The limestone base was measured at 4 x 8 ft providing a large hearth for cooking. These dimensions are similar to the Haynes' kitchen chimney located at the rear of the ell helping to lead to this conclusion.

To assess the function that Structure 1 served, artifacts were arranged into categories based on material type and function (Table 77). Percentages were then calculated for the

Table 77. Structure 1 artifacts by category.

Categories	Associated Artifacts
Faunal/Botanical Items/Food-Related	Bone, eggshell, fish scales, nutshells, and seeds.
Domestic Items/Kitchen-Related	Bottles, tumblers, glassware, drawer handle, scale handles, knives, cleaver, ceramics, and tinware.
Personal Items	Buttons, straight pins, glass beads, pendants, pewter handle, pipes, mirror glass, umbrellas stretcher, marbles, steatite pencil, jaw harp, and medicine bottles.
Architectural/Construction Items	Window glass, strap hinges, wire, nails, screw, tacks, hooks, railroad spike, mortar, brick, and limestone.
Farm Items/Hardware	Sickle, chains, strap buckle, snaffle bit, saddle brace, horseshoe, horseshoe nails, iron bands, and slag.
Charcoal	Charcoal.
Other	Unidentified glass and metal, coal, concrete, prehistoric and modern items.

occupation and post-occupation phases as well as for the total artifacts from Structure 1 (Table 78).

During the occupation phase a majority of the artifacts were related to food consumption and domestic or kitchen-related items. Kitchen-related domestic artifacts included faunal/botanical materials, bottles, tumblers, glassware, scale handles, knives, a cleaver, ceramics, and tinware. If combined, they account for 45.2 percent of the total artifacts collected from the occupation phase helping to affirm the conclusion that Structure 1 served as a kitchen and residence. The large amount of charcoal associated with the chimney remains and dumping of ash is also consistent with its use as a domestic kitchen.

Table 78. Artifact counts from Structure 1 by category.

Categories	Occupation Phase	Percent	Post-Occupation Phase	Percent	Structure 1 Total	Percent
Faunal/Botanical Items/ Food-Related	1395 (371.7 g)	38.2%	163 (150.4 g)	6.5%	1732 (619.0 g)	22.5%
Domestic Items/Kitchen-Related	255	7.0%	590	23.6%	962	12.5%
Personal Items	21	0.6%	22	0.9%	48	0.6%
Architectural/Construction Items	790	21.6%	1195	47.9%	2587	33.7%
Farm Items/Hardware	41	1.1%	7	0.3%	51	0.7%
Charcoal	1116 (59.2 g)	30.6%	469 (25.2 g)	18.8%	2178 (120.6 g)	28.3%
Other	32	0.9%	51	2%	126	1.6%
Total	3650	100%	2497	100%	7684	100%

A large amount of architectural or construction items associated with Structure 1 are also believed to be related its maintenance and demolition. Other materials include personal items and farm items or hardware providing some information about the inhabitants. A small percentage of personal items point to Structure 1 being not only used for kitchen-related tasks but also as a residence. The presence of farming equipment shows that the inhabitants of Structure 1 were also involved in some farming-related activities.

The post-occupational phase midden overlaying Structure 1 contained a high amount of architectural debris and domestic items respectively. The deposition of architectural debris is thought to have accumulated from the demolition of Structure 1 and possibly the renovation of the farmhouse. Based on the relative dates of artifacts recovered from the post-occupational phase, it is believed these are primarily associated with the occupation of Structure 1.

Some of the artifacts recovered from Structure 1 point to the presence of slaves, suggesting its use as a quartering area. The occurrence of a blue bead retrieved from the occupation of Structure 1 could indicate the presence of slaves; however, it cannot be viewed as a definitive marker. As seen at other sites, blue beads have been interpreted as indicators of slave adornment during the nineteenth century (Russell 2000; Stine et al. 2000). An early nineteenth-century Navy button was also recovered in the post-occupational phase which is interpreted as being associated with hand-me-downs or used items given to slave laborers (Figure 125) (Galle 2004:54, 59; Kelso 1997:90; Thomas and Thomas 2004:107; Young 2004:145).

Another hand-me-down item is believed to be the pewter spoon handle (Figure 129). Pewter was a relic during nineteenth-century dining and was passed down for kitchen usage in the home. The objects then eventually made their way down the household eventually ending up

in the hands of slaves (Martin 2000:267-268). The pewter spoon was also modified by removal of the bowl and addition of "V-shaped" or a "W-shaped" etchings to the back. This is attributed to its possible use as a divination tool. Other such artifacts have been recovered in slave quarters and provide context for use of Structure 1 as a slave quarter (Samford 2004:163, 165; 2007:169-171; Young 1996:144).

Other possible items include mirror glass and a railroad spike. Mirror glass also has a history among slaves and could have played a role in the spiritual world of African Americans (Martin 2008:191). The discovery of a railroad spike could also be attributed to the curation of a collected piece possibly acquired by the slaves who had access to the local railway or given to them by Landon Haynes due to his help in bringing the railroad to Johnson City.

The large amount of eggshell points to the raising of poultry in the yard which can also be attributed to use of the area by slaves. Slaves are known to have kept poultry at their quarters in order to supplement their diet including the consumption of their eggs. Other excavations and accounts have shown that tending poultry was a common slave activity (Heath and Bennett 2000:42; Samford 2004:158).

The artifact analysis also provided information about the inhabitants of the Tipton-Haynes site and Structure 1. The cabin is interpreted as functioning as a kitchen/slave quarter. The duties of the enslaved living in Structure 1 encompassed cooking, possibly sewing, and farming activities. Functional categories of artifacts show a high percentage of domestic or kitchen-related items, indicating that the structure was used a kitchen and hence the inhabitants were responsible for cooking meals. Straight pins, typically used for sewing or as clothing fasteners, were also recovered indicating that sewing was possibly a task assigned to the slaves.

The presence of farming equipment shows that the inhabitants of Structure 1 were also involved in farm-related activities.

The excavation of TU’s 1, 2, and 12 identified the location of a previously undocumented structure, labeled Structure 1. A previously-standing structure was suspected to be located in this area due to previous archaeological excavations (Boyd 1989; Boyd and Riggs 1986, 1990). The location of a structure was also seen in the results of the geophysical survey (Figure 119).

Structure 1 was a log cabin with a half limestone and brick chimney and possibly a clapboard exterior similar to the farmhouse. The cabin was built as a one-room, single-story, slave quarter and kitchen on a 12-foot square. In Tennessee, there are several other cases of kitchen outbuildings that were also used to house slaves (Strutt 2010:227). The 12-foot square slave quarter was also a common dimension in Virginia by the nineteenth century and was a form known to West Africans, whom possibly preferred it (Strutt 2010: 228).

The dates of occupation for Structure 1 are interpreted as ranging from the 1820s through 1840s. This coincides with John Tipton, Jr.’s and Landon C. Haynes occupation of the site. Structure 1 was therefore a slave quarter/kitchen constructed by John Tipton, Jr. when he took up residency between 1819 and 1825 (Bailey 1991:16; Hall and Merritt 1913:2605; Massengill 1942:22; Tomlinson 2008). It is also believed to have been used by Landon C. Haynes for the same purpose during his early occupation at the site.

Haynes later renovated the farmhouse adding a kitchen to the rear end of the ell between 1857 and 1858. The ell is believed to have been constructed in stages and it is possible that Structure 1 was used for materials in its construction (Bailey 1989:2; Baratte 1970:125). After the structure was dismantled, a portion of the chimney on its eastern side was robbed possibly for construction of the ell or another outbuilding. One outbuilding seen in Strother’s (1857)

woodcut could be a detached kitchen that was eventually connected to the end of the ell (Figure 11). Structure 1 is not visible in the woodcut and is thought to have been demolished before 1857. The construction of another possible kitchen and rear slave quarter could explain why Structure 1 was razed.

Around the time that Structure 1 was demolished, Haynes is assumed to have constructed another slave quarter in the rear yard as seen in Strother's (1857) woodcut. Bailey (1991) attributes the construction of the rear slave quarter to Tipton, Jr., but Structure 1 is believed to have served this purpose during his time at Tipton-Haynes. The new quarter constructed by Haynes was slightly larger, more typical of quarters built by the mid-nineteenth century, which was done to improve their quality of life, alleviate crowded conditions, and create a healthier environment for the enslaved (Bailey 1991:86; Strutt 2010:229). After construction of the cabin, the slaves were removed to the back yard though they still remained near the house and their respective positions as cook and farmer. In Tennessee, it is apparent that slaveholders wanted their slaves close-by mainly for efficiency purposes (Strutt 2010:226).

The enslaved households at Tipton-Haynes were comprised of family units. Kin-based slave quarters are common by the nineteenth century (Ellis 2010:147). John Tipton, Jr. was recorded as owning five slaves comprising a family unit in the 1830 census (USBC 1830). The family consisted of James, Polly, and their children Lewis and Martha with two other children, one named Meriah and the other an infant, being sold or given away a few years earlier (Speer 2000:39-40; Tomlinson 2008; WCDB 18:358-359; 19:219-220, 268-269). To settle an outstanding debt, Tipton, Jr. gave the remaining family to the merchants Greenway and Jones from Jonesborough in 1831 (Speer 2000:40; WCDB 19:219-220). James worked as a farmer while Polly would have been responsible for cooking.

When Haynes moved to the property after his marriage in 1839, it is believed that he continued use of the cabin as a kitchen/slave quarter for a short time which provided housing for another enslaved family. Census records indicate two young males living at the quarter in 1840 (USBC 1840). By 1850, more accurate slave schedules record one mulatto 21 years of age and one female at the age of 53 (USBC 1850c). In the 1860 schedule, the slave household was comprised of Charlotte Haynes, her son George, and his daughter Cornelia who are recorded as living in a single slave house (USBC 1860a, 1860b). It is not known why George's wife or Cornelia's mother is not listed in the census. The family unit described in the 1860 census is believed to document the same slaves listed in earlier records excluding a small male child missing in the 1850 census who presumably was George's younger brother.

The excavation of Structure 1 provided information concerning the size, age, type of construction, function, and information about the inhabitants of the site. Boyd's 1985 excavation is believed to have located architectural debris from the dismantling of Structure 1, but the artifacts provide a later occupation date than previously documented (Boyd 1989; Boyd and Riggs 1986, 1990). The artifacts recovered from Structure 1 provided information about the Tipton, Jr. and Haynes households as well as their enslaved workforce. The conclusions reached here help to place a previously undocumented structure and its enslaved inhabitants on the historic landscape.

<u>Other Causeway Test Units</u>

Aside from the Structure 1 test units, two other 2 x 2 ft test units were excavated in and around the causeway (Figure 115). Test units were placed over anomalies seen in the

geophysical data near the law office and a previously-standing storage shed. A short description of each test unit follows.

TU 10 - Law Office Anomaly

Test Unit 10 was placed five feet east of the law office to investigate a large high contrast geophysical anomaly. Test Unit 10 revealed no evidence of features related to the identified geophysical anomaly. It is possible that this feature is a disturbance related to the law office or a previous cedar tree seen in an old photograph (Figure 24). A large number of tree root casts were also evident at the base of the test unit. The high frequency of nails and few pieces of window glass indicates a deposition area related to maintenance of the law office mainly during the Haynes and Simerly period of occupation. The small number of historic artifacts recovered also possibly point to the front yard area being kept clean during the building's use as an office.

TU 11 – Storage Shed Anomaly

Test Unit 11 was placed north of the law office to recover evidence of a previously-standing structure. A small storage shed believed to have been constructed by the Simerly family stood behind the law office until 1970 and can be seen in historic photographs (Figures 14, 18-20) (Bailey 1991:86). Artifacts point to general yard debris deposited from the early to late historic occupation. However, construction materials such as nails, brick, and limestone may be related to the previously-standing shed. A few pieces of Mason jar fragments were recovered which could also be the result of food storage at this location post-1858 (Miller et al. 2000:8). This structure is interpreted as being constructed during the mid- to late nineteenth century for use as a storage shed.

Farmhouse Mitigation

Another focus of the archaeological fieldwork was excavation around the farmhouse for a drainage mitigation project. Installation of drainage lines directly adjacent to the house called for archaeological testing of this area since no previous work had been completed focusing on the home. This also allowed an opportunity to investigate the nature of the deposits directly around the farmhouse to see if any information about its construction or later renovations could be obtained.

Thirteen test units were excavated around the farmhouse (Figures 112, 115). These included 2 x 2 ft and a few partial 4 x 2 ft units which were extended to the edge of the house. Test Units 3 through 9 were excavated directly adjacent to the farmhouse foundation and in general were completely disturbed. During the 1965 restoration, the foundation was entirely removed and rebuilt leading to the almost complete destruction of any deposits directly around the house (Bailey 1991:71). A few of these disturbances were given feature numbers (102-105) and included a French drain and modern flower beds. However, during excavation architectural remains were found intact. Test Unit 6 contained what is believe to be an intact portion of the original pier stone laid down by Col. John Tipton underneath the reconstructed foundation (Feature 106) (Figure 134).

Another six test units (TU 13-18) were opened near the farmhouse in the path of proposed drainage lines. The test units also revealed heavily disturbed deposits near the house from previous renovations and installation of modern improvements. However, a few test units also uncovered intact construction remains and a nineteenth-century midden in the east yard.

TU 13

Test Unit 13 was excavated two feet south of the southwest corner of the front portico (Figure 112). Four disturbed levels were excavated which exposed a large cut limestone footing labeled Feature 109 (Figure 135). Window glass dates correlate to within a few years after Tipton, Jr. is thought to have taken up residence at the home though the sample was too small to be reliable. Though the deposit is disturbed, the artifacts are believed to be relics from the early renovation of the home completed by Tipton, Jr. One of the additions to the home at this time was a Federal-style front porch which stretched the width of the front façade and is estimated to have extended 10 feet from the face of the building (Bailey 1991:21). The footer stone extends a total of 12 to 13 ft from the face of the building and is believed to support the base of a stairwell

Figure 134. Intact remnants of original pier stone (Feature 106).

Figure 135. Base of test unit with cut limestone footer (Feature 109).

or a possible gate at the front of the home. Probing on the southeastern edge of the portico also revealed the presence of a large stone at a similar depth. The flat glass would have been deposited after Tipton, Jr.'s renovation of the farmhouse; therefore, the stairwell or gate was probably removed when Haynes renovated the house.

TU 14

Test Unit 14 was excavated 11 ft south of the southeast corner of the farmhouse exposing a layer of small limestone chippage used for dressing stones (Figure 112). This is believed to be scrap related to a previous building episode. The inferred conclusion is that TU 14 contains an intact deposit related to general yard debris deposited in front of the house during the early to

mid-eighteenth century capped by a layer of limestone construction debris related to Haynes' renovation.

TU 15

Test Unit 15 was located in the east side yard of the farmhouse (Figure 112). A number of limestone fragments were encountered mixed with large amounts of ash, charcoal, and mortar inferred to be an organic-rich midden deposit (Figure 136). Other artifacts were recovered including faunal material such as bone, eggshell, and charred walnut shells as well as glass, metal, and ceramics (Table 79). A calculated mean ceramic date places the total assemblage at 1824.41, though the deposit most definitely post-dates this period (Table 80). Window glass fragments date to 1873.56 for the small representative assemblage.

Figure 136. Test Unit 15, Level 3.

Table 79. Test Unit 15 artifact totals.

Class	Class	Level 1	Level 2	Level 3	Total
Prehistoric	Stone	-	3	20	23
Historic	Faunal	-	5 (2.8 g)	20 (23.5 g)	25 (26.3 g)
	Botanical	-	2 (0.1 g)	2 (0.6 g)	4 (0.7 g)
	-Charcoal	-	8 (1.2 g)	377 (43.1 g)	385 (44.3 g)
	Ceramic	1	12	19	32
	-Brick	-	4 (13.0 g)	-	4 (13.0 g)
	Glass	-	5	18	23
	Metal	-	7	9	16
	-Tombac Button	-	-	1	1
	Mortar	-	7 (1.5 g)	120 (139.8 g)	127 (141.3 g)
	Stone -Limestone	-	10 (500 g)	56 (9060.6 g)	66 (9560.6 g)
	-Coal	-	1 (0.5 g)	4 (9.2 g)	5 (9.7 g)
Total		1	64	646	711

Table 80. Test Unit 15 ceramics and corresponding dates.

Ware	Decoration	Decoration Notes	Total	Date Range	Date	Source
Coarse Earthenware	Lead Glazed	Orange Body	7	-	-	-
Coarse Earthenware	Lead Glazed	Tan Body	8	-	-	-
Pearlware	Undecorated		5	1780-1830	1805	South 1977
Pearlware	Industrial Slipware, Banded	Tan Annular Band	1	1790-1830	1810	Smith 1983
Pearlware	Industrial Slipware, Banded	Polychrome	6	1790-1830	1810	Smith 1983
Whiteware	Undecorated		4	1830-1900	1860	Miller et al. 2000; South 1977
Yellowware	Undecorated		1	1830-1930	1880	Ketchum 1971, Garrow 1983, Smith 1983
Total			32			
Date			1824.41			

Test Unit 15 is believed to represent a construction fill episode capped by a historic midden. Previous excavation in this area also turned up similar evidence of construction materials (Boyd and Riggs 1990:34, 74). Ceramics recovered from Boyd's 1985 Test Unit 4 arrived at a similar mean ceramic date of 1821 when calculated (Table 81). The construction fill is probably related to the east farmhouse chimney which was believed to be reconstructed by Haynes when renovating the home (Boyd and Riggs 1990:34, 74).

Table 81. 1985 Test Unit 4 ceramics (Boyd and Riggs 1990) and corresponding dates.

Ware	Decoration	Decoration Notes	Total	Date Range	Date	Source
Coarse Earthenware	Unglazed		1	-	-	-
Coarse Earthenware	Lead Glazed		9	-	-	-
Coarse Earthenware	Unidentified		8	-	-	-
Stoneware	Salt Glazed		2	-	-	-
Pearlware	Undecorated		8	1780-1830	1805	South 1977
Pearlware	Hand Painted	Blue	2	1780-1830	1805	South 1977
Pearlware	Hand Painted	Polychrome	2	1795-1830	1813	Miller et al. 2000
Pearlware	Transfer Printed	Blue	1	1784-1840	1812	Samford 1997
Whiteware	Undecorated		1	1820-1900	1860	Miller et al. 2000; South 1977
Whiteware	Transfer Printed	Blue	2	1830-1859	1840	Samford 1997; Miller et al. 2000;
Yellowware	Undecorated		1	1830-1930	1880	Ketchum 1971; Garrow 1983; Smith 1983
Ironstone	Undecorated		1	1830-1900	1870	Smith 1983
Porcelain	Relief Molded	Lavender Floral Design		-	-	-
Total			39			
Date			1821			

TU 17

Test Unit 17 was placed east of the farmhouse in the path of a proposed drainage line (Figure 112). This shallow deposit mainly consisted of a very dark nineteenth-century midden deposit similar to that found in TU 15. Artifacts were primarily recovered from the second level and included bone, ceramics, glass, metal, a clay marble, and a drawer pull fragment with a molded floral design (Figure 137). Looking at the ceramic assemblage a mean ceramic date of 1826 remains consistent with recovered artifacts from the east yard area. Though statistically insignificant, two shards of flat glass also arrive at an average date of 1816.29 using Moir's (1987) formula. Clay marbles, however, are known to have replaced earlier stone marbles by the mid-eighteenth century (Faulkner 2008:102). The deposit uncovered represents an intact nineteenth-century midden found to exist east of the farmhouse also seen in TU 15 and previously in Boyd's 1985 Test Unit 4 (Boyd and Riggs 1986, 1990).

Figure 137. Press-molded glass drawer pull with fluted neck and floral design on face.

Barn Yard Excavations

Three test units were placed within the barn yard surrounding the standing barn, corn crib, and George Haynes Cabin. The units were excavated to obtain comparative data concerning the origins of the barn and corn crib as well as previously-standing structures seen in a 1960s aerial photograph (Figure 19-20). Using the geophysical data as a reference, three 2 x 2 ft test units (TU 19, 20, and 22) were excavated locating general farm debris and an early twentieth-century trash pit (Figure 138). Test Unit 19 was excavated within a portion of the cantilevered addition to the barn providing artifacts which point to a post-1858 construction date. Artifacts totaled 156 and were primarily recovered from Level 2 (Table 82). Artifacts included bone, clear bottle glass, a single lead-glazed coarse earthenware fragment, numerous metal items, two 0.22 cal brass shells, debitage, some mortar and coal fragments, as well as limestone and

Figure 138. Barnyard test units overlain with geophysical survey data.

Table 82. Test Unit 19 artifact totals.

Class	Class	Level 1	Level 2	Level 3	Total
Prehistoric	Stone	2	2	-	4
Historic	Faunal	-	2 (2.7 g)	-	2 (2.7 g)
	Ceramic -Coarse Earthenware	-	1	-	1
	-Brick	3 (52.5 g)	7 (12.3 g)	11 (152.5 g)	21 (217.3 g)
	Glass -Mason Jar	-	6	9	15
	Metal	5	42	15	62
	- Firearms	-	2	-	2
	Mortar	-	1 (0.1 g)	-	1 (0.1 g)
	Stone -Limestone	-	15 (1000 g)	24 (10,000 g)	39 (11,000 g)
	-Coal	1 (0.9 g)	5 (2.9 g)	3 (0.4 g)	9 (4.2 g)
Total		11	83	62	156

hand-made brick fragments. Metal artifacts included wire, nails, tinware fragments, a handle fragment, a horse bit, and some unidentified iron oxide fragments (Table 83). Artifacts associated with the stone debris uncovered in Level 3 are comprised of nine glass fragments believed to be Mason Jar fragments, a single late machine-cut nail, unidentified nails, tinware

Table 83. Test Unit 19 metal artifacts.

Form	Description	Level 1	Level 2	Level 3	Total
Wire	Thin Gauge	-	1	-	1
Handle	Thick Iron Wire Handle	-	1	-	1
Nail	Late Machine Cut	-	4	1	5
Nail	Wire	3	-	-	3
Nail	Unidentified	2	20	11	33
Tinware	Fragments	-	12	2	14
Bit	Equine Hardware	-	-	1	1
Unidentified	Iron Oxide Fragments	-	4	-	4
Total		5	42	15	62

fragments, a horse bit, coal, brick, and stone. Artifacts recovered within this level are probably related to Haynes' renovation.

Based on the artifact data, the barn's cantilever addition is believed to have been added during the time that Haynes also renovated the farmhouse circa 1857 to 1858. The barn is seen prior to the renovation in Strother's (1857) woodcut (Figure 11). The presence of Mason jar fragments, which became available in 1858, surrounding stone associated with construction of the cantilevered addition places the construction to sometime shortly after that time (Miller et al. 2000:8).

Test Unit 20 was located near the corn crib and contained artifacts attributed primarily to the Haynes and Simerly periods of occupation. Test Unit 22 was placed just south of the George Haynes Cabin over a substantial anomaly present in the GPR data (Figure 103-107). The excavated anomaly is interpreted as a late nineteenth- to early twentieth-century refuse pit deposited by the Simerly family associated with a previously-standing structure interpreted as a possible storage shed seen in a 1960s aerial photograph in the rear yard (Figure 19-20). Based on the context of the deposit, it is believed that this shed served principally as a coal shed with 2,036 pieces of coal and cinders weighting 1637.1 grams being recovered (Table 84). Final conclusions reached from test units within the barnyard point to an intensive use of the area

Table 84. Test Unit 22 artifact totals.

Class	Class	Level 1	Level 2	Level 3	Total
Prehistoric	Stone	-	10	4	14
Historic	Faunal	-	15 (16.3 g)	8 (5.2 g)	23 (21.5 g)
	Botanical	-	1 (0.1 g)	-	1 (0.1 g)
	-Charcoal	-	2 (0.2 g)	-	2 (0.2 g)
	Ceramics	-	11	2	13
	-Brick	1 (2.0 g)	22 (84.7 g)	-	23 (86.7 g)
	Glass	-	40	4	44
	Metal	-	258	10	268
	Mortar	-	-	2 (3.3 g)	2 (3.3 g)
	Stone -Limestone	-	14 (1000 g)	7 (500 g)	21 (1500 g)
	-Coal	3 (0.8 g)	290 (310.1 g)	3 (3.4 g)	296 (314.3 g)
	-Coal (Cinders)	7 (28.1 g)	1730 (1292.2 g)	3 (2.5 g)	1740 (1322.8 g)
Total		11	2393	43	2447

during the later Haynes and Simerly periods of occupation.

East Field Excavations

Testing in the east field consisting of three test units (TU 21, 23, and 24) placed at strategic locations provided by the gradiometer survey (Figure 139). Test Units 21 and 22 were located over large high-contrast gradiometer anomalies which turned out to be related to natural drainage features with few artifacts recovered. Test Unit 24 was also excavated over an anomaly present near the stillhouse uncovering a prehistoric hearth with a quartzite Appalachian Stemmed projectile point dating to the Archaic to Early Woodland period (Lewis and Kneberg 1957). Overall, little information was obtained concerning the historic occupation of the east field due to its use for agricultural production. It is probable that most anomalies seen in the gradiometer data near Catbird Creek are associated with the prehistoric component of the site.

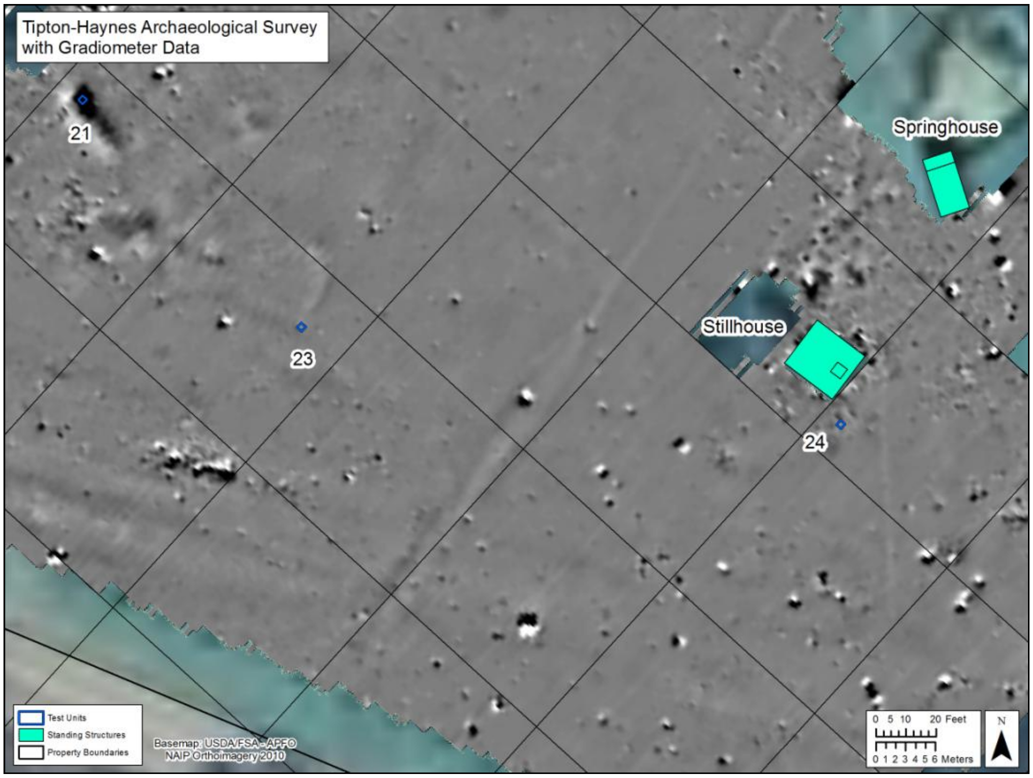

Figure 139. East field test units overlain with geophysical survey data.

CHAPTER VII

THE TIPTON-HAYNES LANDSCAPE

The Tipton-Haynes Landscape Archaeological Project (THLAP) was a multidisciplinary investigation of the historic farmstead landscape. The project specifically focused on the core 17-acre site as it survives today, but used previously recorded historic documentation to expand beyond those boundaries where possible. Landscape is viewed as a type of material culture investigated through the means of many different disciplines. Interpretation of the material landscape is analogous to reading of an historical document which is used to unravel the complexities of the landscape and recover meaning in the past. The different methodologies used to interpret the Tipton-Haynes site included historic research, architectural survey, dendrochronology, geophysical survey, and archaeology.

Data collection centered primarily on continuity and change within the built environment including the architecture of buildings and groups of buildings through time. Integrating these different datasets creates a framework which provides meaning for the evolving farmstead and aids in the interpretation of landscape change at Tipton-Haynes. By using a contextual approach, the varying methodologies were combined to interpret the past landscape and provide the reasons for change without privileging one dataset over another. Rather, each piece of information was combined to understand form and behavior made meaningful within the parameters of cultural circumstance. The result is a more complete historic account of landscape change and the processes that influenced the transformations seen at the Tipton-Haynes site.

Historical Research

Part of the interdisciplinary work undertaken as part of the project included historical research drawing on the archives of numerous agencies. Documents included deeds, wills, census records, probate inventories, estate sales, land sales, portraits, and historic images. The compiled research has allowed for a better understanding of the people who lived on the property as well as the provenience of structures and production on the farm.

Based on available deeds and land titles, a chronology of site ownership was created (Table 85). Occupants of the site included Col. John Tipton and his family, John Tipton, Jr. and his family, Landon C. Haynes and his family, and the Simerly family. Using the available data collected during the project, a chronology was assembled which placed occupants on the historic landscape (Table 86).

Census records, grant and deed records, tax records, and estate settlements provided other

Table 85. Trace of deeds and titles.

Property Owner	Dates of Ownership	Source
Jonathan Tipton	1775-1777 (Watauga Purchase)	Keesee 1997:43; Williams 1949:11
Samuel Henry	1782-1784 (Grant)	WCDB 1:100-101; 1:110-111
John Tipton	1784-1813 (Deed)	WCDB 1:301-302; 3:261-263
Abraham Tipton	1813-1820 (Will)	Speers 2000:24
Mary "Polly" Boren Tipton and Children	1820-1823 (Will)	WCDB 20:138-140
Chana Boren	1823-1837 (Title)	WCDB 21:242-243
John Tipton, Jr.	1821/1824-1831 (Right of Redemption)	WCDB 21:242-243
Samuel, Elizabeth, and Edna Tipton	1831-1837 (Will/Right of Redemption)	WCWB 1:244
David Haynes	1837-1839 (Deed)	WCDB 22:177-178
Landon C. Haynes	1839-1865 (Gift)	Bailey 1991:31; Bellamy 1952:5; Speer 2000:27; Tomlinson 2008
James R. Branner	1865-1867 (Deed)	WCDB 40:498-499
Robert and Landon C.Haynes	1867-1871(Deed)	WCDB 40:499
John White	1871-1872 (Deed)	WCDB 48:531-532
Sarah S. Simerly	1872-1935 (Deed)	WCDB 48:533-534
Samuel and Lawson Simerly	1935-1965 (Will)	Bailey 1991:56; Lawson 1970:121
State of Tennessee	1965-Present (Deed Conveyed in 1944)	WCDB 227:344-345, 450; 374:501-504; 407:111-116; WCMB 77:633-636

Table 86. Household occupation dates.

Household	Dates of Occupation
John Tipton	1784 to 1813
John Tipton, Jr	ca. 1820-25 to 1831
Landon C. Haynes	1839 to 1865
Simerly Family	1872 to 1962

important information. Census records, purchases, payments, and land dealings provided contextual information for each occupant. The available data were then used to build a record of the Tipton-Haynes' households, the enslaved households, land dealings, and agricultural production at the site for interpretation of the historic landscape.

Architectural Survey

The examination of extant structures on the property was also completed as part of this multidisciplinary study. The survey was able to define alterations to the farmhouse and assess changes in style and arrangement. Based on architectural features, the original log cabin is believed to have been constructed sometime in the 1790s (Jones 2009a:2). The ell is also noted as having been constructed in stages (Bailey 1989:2, 1991:22; Baratte 1970:125).

Other outbuildings were able to be placed on the historic landscape providing information about their periods of construction and renovation. The architectural survey was necessary to evaluate the site due to the complex architectural change that occurred at the farm over its long history. A revised inventory of standing and non-standing structures is provided in Tables 87 and 88 as well as Appendix X.

Table 87. Architectural inventory.

Structure	Historic	Constructor	Construction Year	Reconstruction Year	Renovation Year	Restoration Year	Story	Rooms	Total Dimensions (N/S ft)	Structure Dimensions (N/S ft)	Roof or Porch Extension	Roof Material	Construction Type	Foundation Type
Farmhouse	Historic	Col. John Tipton, Tipton, Jr.	ca. 1784	1799	1820s/ 1857-1858	1965, 1969, and 1989	2	8	30 x 40	30 x 40	10 x 15	Standing-Seam Metal	Log with V-Notching and Braced Frame Structure with Weatherboard Siding	Limestone Pier, Limestone
Farmhouse Ell	Historic	Landon C. Haynes	1857-1858	-	1857-1858	1965, 1969, and 1989	1	3	46 x 23	44 x 16	46 x 7	Standing-Seam Metal	Braced Frame Structure with Weatherboard Siding	Limestone Pier, Brick, Limestone
Law Office	Historic	Haynes	1857-1858	-	-	1965	1	1	26 x 20	20 x 20	6 x 20	Standing-Seam Metal	Braced Frame with Weatherboard	Limestone
Barn	Historic	Col. John Tipton, Tipton, Jr.	Late Eighteenth Century/Early Nineteenth Century	1960s	1850s	-	1	2 Pens	24 x 70	Pens 24 x 22	48 x 94	Wood Shingles	Log with V-Notching	Limestone Pier
Smokehouse	Historic	Tipton, Jr.	ca. 1820s	1969	ca. 1857	-	1	1	24 x 10	20 x 10	4 x 10	Wood Shingles, Standing-Seam Metal	Log with Half Dovetail Notching	Limestone Pier
Corn Crib	Historic	Col. John Tipton, Tipton, Jr.	1851	-	-	1960s	1	2 Pens	45 x 18	Pens 18 x 9	45 x 9	Wood Shingles	Log with Half Dovetail Notching	Limestone Pier
Stillhouse	Historic	Col. John Tipton	ca. 1784	1960s	-	-	1	1	18 x 20	18 x 20	4 x 4 Ventilation Shaft	Wood Shingles	Log with Half Dovetail Notching	Limestone Pier
Springhouse	Historic	Col. John Tipton	Late Eighteenth Century	1960s	-	1953 (Spring Box)	1	1	20 x 10	16 x 10	3	Wood Shingles	Log with Half Dovetail Notching	Limestone Pier
Pig Pen	Historic	Col. John Tipton	Late Eighteenth Century	1960s	-	-	1	1	16 x 10	16 x 8	2	Wood Shingles	Log with Half Dovetail Notching	Limestone Pier
Necessary	Historic	Landon C. Haynes	ca. 1857	1969-1970	-	Late Eighteenth Century	1	1	5 x 4	5 x 4	-	Wood Shingles	Frame with Vertical Board Siding	Limestone Pier
Joinery/Loomery	Historic	Landon C. Haynes	ca. 1857	-	-	1970s, 1989	1	1	20 x 12	20 x 12	-	Wood Shingles, Standing-Seam Metal	Frame with Weatherboard	Limestone Pier
George Haynes Cabin	Non-Historic	Landon C. Haynes, State of Tennessee	Early to Mid-Eighteenth Century	-	-	1999-2001	1	1	20 x 24	20 x 16	20 x 8	Wood Shingles	Log with Half Dovetail Notching	Limestone Pier
Museum	Non-Historic	State of Tennessee	1969 (Goist 1994:4)/1970 (Bailey 1991:86)	-	1974, 2000	-	2	5+	-	-	-	-	-	-
Tool Shed	Non-Historic	State of Tennessee	1984	-	-	-	1	1	-	-	-	-	-	-
Shelter	Non-Historic	State of Tennessee	Late Twentieth Century	-	-	-	1	Open Air	-	-	-	-	-	-

Table 88. Non-standing structures.

Structure	Historic	Constructor	Construction Year	Demolition Year	Story	Rooms	Estimated Dimensions (N/S ft)
Storage Shed	Historic	Landon C. Haynes, Simerly	Mid to Late Nineteenth Century	1960s	1	1	10 x 10 (1960s Aerial)
Barn	Historic	Col. John Tipton	Late Eighteenth Century	Late Eighteenth/ Early Nineteenth Century	1	-	30 x 40 (Draper 1944-1949:56)
Stable	Historic	Col. John Tipton	Late Eighteenth Century	Late Eighteenth/ Early Nineteenth Century	1	-	25 x 30 (Draper 1944-1949:56)
Chicken Coop	Historic	Simerly	Late Nineteenth Century	1960s	1	-	4 x4 (Eason 1936)
Kitchen/Slave Quarter	Historic	Tipton, Jr.	1820s	1840s-1850s	1	1	12 x 12 (THLAP)
Coal Shed	Historic	Simerly	Late Nineteenth Century	1960s	1	-	12 x 12 (1960s Aerial)
Slave Quarter	Historic	Landon C. Haynes	1840s-1850s	Late Eighteenth Century	1	-	20 x 16 (Strother 1857:723) [22 x 30 (Bailey 1991:25-26)]
Unidentified Structure (Farm Outbuilding possibly relocated Slave Quarter)	Historic	Landon C. Haynes, Simerly	Mid to Late Nineteenth Century	1960s	1	-	16 x24 (1960s Aerial) [20 x 30 (Bailey 1990, 1991:86)]
Unidentified Structure (Possible Kitchen Addition)	Historic	Landon C. Haynes	1840s-1850s	1857-1858 (Possibly added to ell)	1	-	16 x 20 (Strother 1857:723) [20 x 16 (Bailey 1991:9)]

Dendrochronology

Dendrochronology was also used to interpret the changing Tipton-Haynes landscape by dating the construction and renovations of existing historic structures. Core samples were collected from Col. John Tipton's cabin and the corn crib. The farmhouse cabin was dated to 1799 (Table 43). The dated logs correlate to the year Col. Tipton retired from the state senate (Hall and Merritt 1913:2602; Lawson 1970:116; Massengill1942:19; Parrish 2008:7). However, the historical documentation shows that Col. Tipton was living at the site prior to 1799 (Burgner 1981; Byron and Sistler 1998; Creekmore 1980; Griffey 2000; McCown et al. 1964; Rae 1991; WPA 1938, 1940). The original 1784 cabin was likely razed and a new one-and-a-half story cabin was constructed between 1798 and 1799 on the same site to serve as Col. Tipton's home after retirement. Logs from the original cabin may have been reused in the construction of other

buildings on the property, a possibility that may be explored through future research of extant structures not dated for this project. A sill log was also successfully dated to a near-cutting date of post-1821, providing clues to Tipton, Jr.'s later renovations (Table 43). The date verifies that John Tipton, Jr. added the full-length rear porch addition seen in Strother's (1857) woodcut between 1821 and 1825 (Bailey 1991:20; Tomlinson 2008).

The corn crib logs dated the construction of that building to 1851 (Table 46). This year coincides with Haynes' retirement from politics for eight years, during which time he devoted his energy to his law practice (Lawson 1970:118; Toncray 1987:67). The data collected through this technique provides a deeper understanding of the history of construction on site and the changing landscape through time.

Geophysical Survey

A geophysical survey was also conducted including the use of gradiometer, soil resistivity, and ground-penetrating radar. The survey's intent was to locate features associated with standing or previously-standing structures and to define any possible historic landscape features through the interpretation of identifiable anomalies. A number of anomalies were identified by the gradiometer and GPR including the location of Structure 1. Other anomalies included midden deposits and a coal-filled feature near a previously-standing shed seen in aerial photography (Figures 19-20, 91-95). Some of the larger features revealed in the data include roads, fencelines, planting beds, and a few locations of known previously-standing structures mentioned in the architectural survey (Figure 83). The location of the necessary and the outline of the cantilevered siding addition to the barn constructed by Haynes were also identified. The

survey was used in the classification of some known and unknown cultural features helping to identify their location on the historic landscape.

Archaeology

Archaeology completed as part of THLAP focused on locating previously-standing structures, testing geophysical anomalies, and mitigating drainage work around the farmhouse in order to analyze the historic landscape. Excavations were able to locate a previously undocumented structure, midden locations, and architectural features associated with the farmhouse as well as to date the construction or renovation episodes of various structures and assess their possible functions. Archaeological investigations were conducted within four main areas of the property including the causeway, the farmhouse, the barnyard, and the east field.

Excavation of the causeway located Structure 1 and associated middens, provided data concerning the storage shed seen in historic photographs, and data regarding the continued maintenance of the law office during the late occupation of the site. Structure 1 was interpreted as a Tipton, Jr. through Haynes era kitchen/slave quarter. Middens associated with Structure 1 included an occupational midden and a post-occupational midden dated post-1840s. The storage shed located behind the law office was also estimated to have been used during the Haynes and Simerly occupations of the site possibly for food storage.

Mitigation of the farmhouse drainage system yielded information concerning the front and side yards. Deposits directly around the home were completely disturbed; however, preserved architectural remains were found intact. A late eighteenth-century pier on the southeast corner was found intact beneath the restored limestone foundation. Another limestone pier possibly used for a gateway or stairs to the front porch of the home was also found in the

front yard dating to the Tipton, Jr. renovation and later removed. A nineteenth-century midden was found in the east side yard of the farmhouse associated with Haynes occupation of the site.

Excavation of the barn yard consisted of testing the barn, corn crib, and a geophysical anomaly associated with a structure seen in the 1960s aerial photograph (Figure 19-20). The barn yard generally contained Haynes- though Simerly-era artifacts. Testing near the barn showed evidence for a post-1858 date for the addition of Haynes' cantilever siding. Excavation at the corn crib provided a Haynes through Simerly period of use. A structure located in the rear yard previously investigated by Coxe (1993) was concluded to be a coal shed used by the Simerly family.

The east field, while minimally tested, provided no evidence of sustained historic use. Very few historic artifacts were recovered and the only cultural feature found was associated with the prehistoric component of the site. These data support the idea that the east field was primarily being used for agriculture.

Archaeology was applied at the Tipton-Haynes site to assess the historic landscape. Excavation results were able to provide context for structures and use of the site since its early occupation as well as information about its inhabitants. Using this information compiled with previously discussed data, a more complete interpretation of the Tipton-Haynes landscape can be achieved.

Landscapes

<u>Col. John Tipton Landscape (1784-1813)</u>

The Tipton-Haynes landscape during Col. John Tipton's residency can be pieced together from the available documentation previously mentioned in this section. Primary information

comes from the description of the Battle of the Lost State of Franklin in which the house and a few outbuildings are mentioned. Specifically, the log cabin, stables, barn, and stillhouse are believed to be standing by 1788 (Draper 1944-1949:54-63). Other additions to the property at that time include the construction of the springhouse adjacent to the stillhouse in the east field (Baratte 1970:127). Based on the current location of the cabin, stillhouse, and springhouse as well as historical documentation related to the Battle of the Lost State of Franklin, an interpretative map of the landscape during Col. John Tipton's early occupation can be created (Figure 140).

The home was built with a vernacular symmetry facing the Old Jonesborough East-West Road. The cabin itself was a story-and-a-half rectangular structure, built of squared logs and stone, with one chimney, a basement kitchen, and a few small windows on the second floor (Cooper et al. 1993:9; Draper 1944-1949:54-63). Elms lined the front of the house and a fenceline ran the length of the road (Lawson 1970:105). The log cabin is believed to have been dismantled and a new structure was built in 1799 for use as Col. Tipton's retirement home.

Other outbuildings mentioned include a stable and barn located, roughly 150-200 yards to the west of the house along the Old Jonesborough East-West Road. A stillhouse is also mentioned in the east field, being the location at which a participant in the Battle of the Lost State of Franklin fired upon some women from an eminence of rocks (Draper 1944-1949:56; Fink 1957:211; Williams 1933:200). It is here that a springhouse is believed to have been constructed. The standing double-crib log barn is also thought to have been constructed by Col. Tipton at a later date at this location (Bailey 1991:12; Goist 1994:4). Other standing outbuildings attributed to Col. Tipton include the pig sty. The construction of these buildings could possibly correlate with renovations conducted during his retirement years. The barn

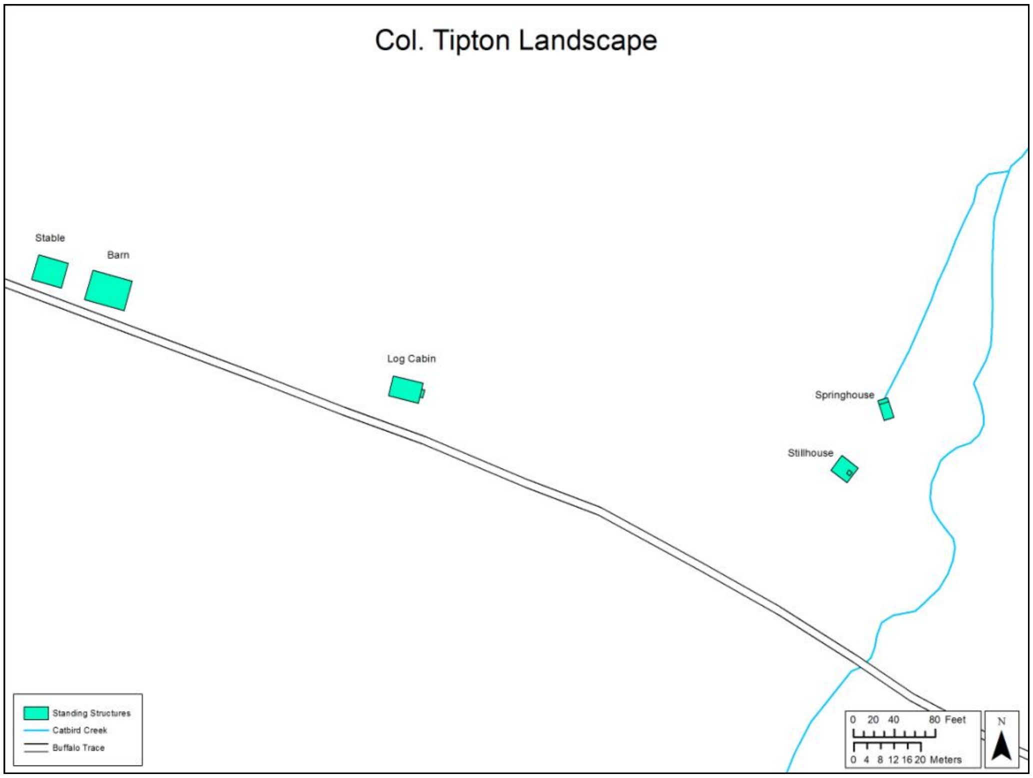

Figure 140. Interpretive map of Col. John Tipton's late eighteenth-century landscape.

and stables described in the account would have possibly been dismantled at this time. Other cultural features also mentioned in the account include a fence fronting the lane of Col. Tipton's home as well as the altered landscape of cleared fields for agriculture.

Col. Tipton also created a family cemetery on a knoll approximately 1,350 feet northwest of his home (Figure 2). Col. John Tipton, some of his family, and possibly a few of his slaves were buried in this location oriented towards the east (Bailey 1991:8; Young 1993:4). The cemetery was continually used until the middle of the twentieth century.

John Tipton, Jr. Landscape (1820s-1831)

After Col. Tipton's death, the landscape is believed to have remained static until Tipton, Jr. returned to the home in the 1820s. The one-and-a-half-story log cabin, stillhouse, and

springhouse built by his father are believed to have been standing at that time. These structures continued to be utilized by Tipton, Jr. as well as the family cemetery located northwest of the house.

After acquiring the property, John Tipton, Jr. began upgrading the property. One major renovation included enlarging the home in the 1820s (Bailey 1991:16). Tipton, Jr. tore down the west wall and constructed a new addition. He finished the second story and placed clapboard siding on the exterior to create a Federal-style home (Figure 8). A front and rear porch were also constructed which ran the length of the house (Bailey 1991:21). “The Federal-style house built by Jr. was shaped by the utilitarian lifestyle of the gentleman farmer and by the popular taste of its time” (Bailey 1991:43). “It was a large, imposing structure adaptable to the workman, the farmer, and the gentleman’s needs of the day” (Bailey 1991:17).

Tipton, Jr. also altered the farm’s landscape by constructing at least two outbuildings offset from the alignment of the house. One is believed to have been a log smokehouse located at the rear of the home and Structure 1, a kitchen/slave quarter (Bailey 1991:25; Chapter VI). The smokehouse was built of stacked logs, with a single door on the south wall and a small window in the north wall (Bailey 2000:25). Based on the archaeological and geophysical data, the kitchen/slave quarter is interpreted as a 12 x 12 ft, single-story log structure with a single room, windows, wood flooring and trim, a wood-shingled roof, and possibly a clapboard exterior. The double-pen barn and pig sty at the rear of the house are known to have been standing by this time. Though attributed to his father, it is possible that these outbuildings were constructed by Tipton, Jr.

The stillhouse is also thought to have been standing and in use at the time as indicated by some of Tipton’s financial dealings. It is also possible that a mill or grindhouse was also

constructed or an open-air milling area using cattle or the windmill as a power source (WCIB 1:143-146; WPA 1939b:89-91).

Additional improvements made on the farm included the addition of elm and maple trees planted on an eighteen foot grid on the four sides of the farmhouse, two of which are still standing today (Bailey 1991:26). The property was also fenced by John Tipton, Jr. with a snake style split-rail fence (Bailey 1991:51). Bailey (1991:72) also cites a cistern being installed during Tipton, Jr.'s tenancy due the presence of the windmill (WCIB 1:143-146; WPA 1939b:89-91). Other cultural features included altering the landscape by clearing fields for agriculture. Based upon the current location of standing and non-standing structures as derived from the historic and archaeological record, an interpretive map was created displaying Tipton, Jr.'s landscape using the available evidence (Figure 141).

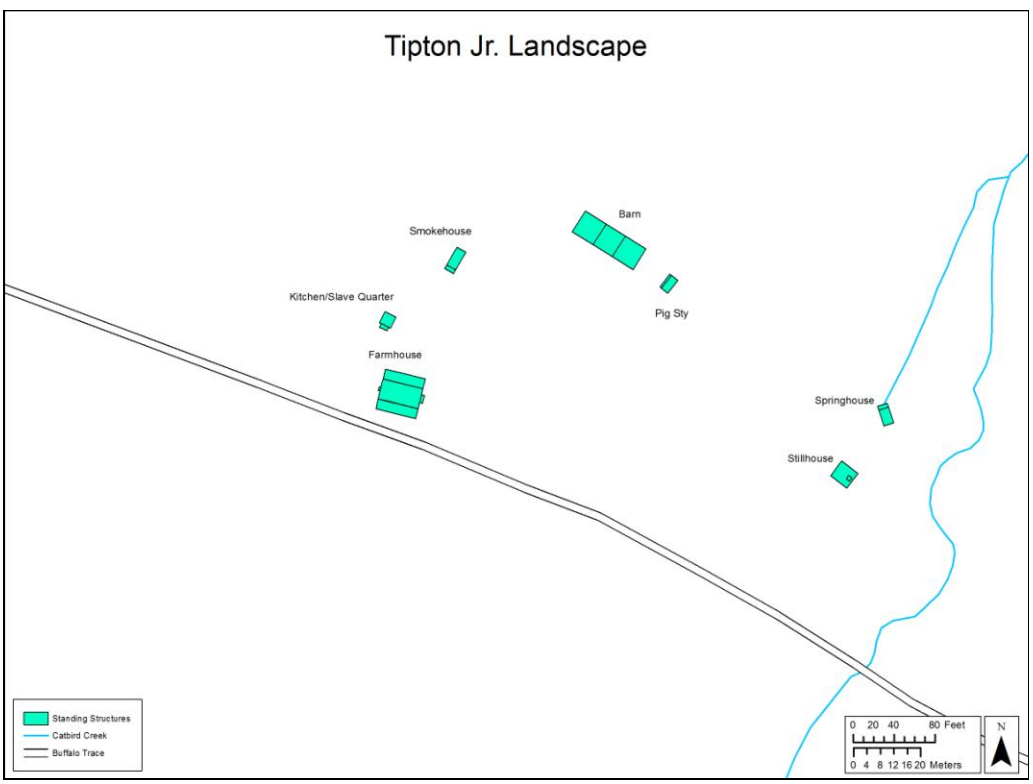

Figure 141. Interpretive map of John Tipton, Jr.'s early nineteenth-century landscape.

Landon C. Haynes Landscape (1839-1865)

The landscape of the Landon C. Haynes farm changed dramatically during his residence (Figure 142). When he moved to the property, both housing styles and lifestyles had changed. He completely renovated the Federal farmhouse creating a Greek-Revival home. The house kept the clapboard siding but it was now painted white. It also contained a front portico and the addition of an ell extending north from the main structure. A law office was also constructed next to the home in the same style. Based on Strother's (1857) woodcut and Shaver's portraits, these renovations are believed to have taken place in 1857 to 1858 (SIRIS 2009a, 2009b). The house as it stands today is an interpretation of this time period.

When Haynes moved to the property early structures constructed by Tipton and/or Tipton, Jr. were still standing including the kitchen/slave quarter, smokehouse, barn, stillhouse, springhouse, and pig sty. Besides the house, it is thought that the barn and smokehouse were renovated at this time. The barn had cantilevered sides placed on a 12-foot grid on all four sides with vertical siding running from the eaves to the ground (Figure 55) (Bailey 1991:26). The smokehouse was also modified during Haynes occupation. Tipton, Jr.'s smokehouse was razed and a new frame smokehouse covered in clapboard siding was constructed (Figures 52 and 53) (Bailey 1991:51). The stillhouse and springhouse are believed to have eventually been dismantled by Haynes.

Other outbuildings aligned to the main house were also constructed by Haynes. The corn crib is known to have been constructed by Landon C. Haynes in 1851 oriented with other barnyard outbuildings. Other structures constructed by Haynes included the joinery or loomery, necessary, and possibly a storage shed behind the law office, most of which were built in alignment with the farmhouse. The storage shed is seen in early photographs of the site and

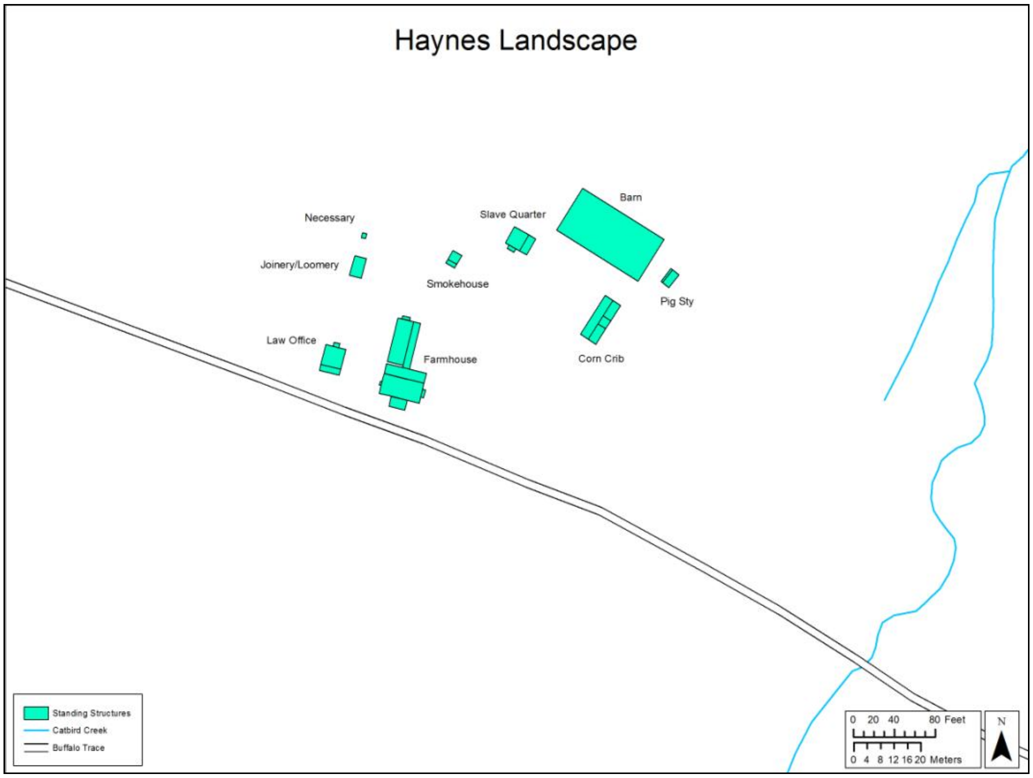

Figure 142. Interpretive map of Landon C. Haynes' mid-nineteenth-century landscape.

while archaeological evidence points to a middle to late nineteenth-century use of the structure, the orientation of the shed and style of construction do not match other outbuildings constructed by Landon C. Haynes pointing to a Simerly period construction (Figures 14, 18-20). A new slave quarter was also known to be standing at this time as seen in the Strother's (1857) woodcut and documented in the 1860 Slave Schedule (USBC 1860b). One other possible structure built by Haynes is seen in Strother's (1857) woodcut and is believed to be a new kitchen. A kitchen outbuilding is mentioned by Bailey (1991:9) as having been constructed where the current kitchen stands today.

The landscape at the Haynes farm contained a stylish farmhouse, numerous outbuildings, established gardens, grain fields, and pastures (Cooper et al. 1993:16). Other altered features included the lane fronting the house, which was brought around the front of the law office. A

drive entered the yard between the house and office and swung sharply left in front of Haynes' place of business then swung back out to the road (Bailey 1991:51). Haynes is also believed to have planted additional trees around the law office (Bailey 1991:51). The split-rail fence installed by Tipton, Jr., and still seen in the woodcut, was replaced by Haynes with one constructed of rough-cut square posts and boards in an attempt to formalize the yard around the house. The fences around the property can be seen in the background of the Shaver portrait (Bailey 1991:51). Water was probably gathered from the cistern constructed by Tipton, Jr. requiring no further need for a springhouse, which is believed to have been dismantled during his ownership (Bailey 1991:72).

The cemetery, first used by Col. Tipton, was still used by the Haynes family. Haynes' family members, however, are buried southeast and down slope of the knoll on which the Tiptons are buried (Young 1993:4). The orientation of the graves also shifted with the Haynes family graves being positioned approximately 18 degrees west of magnetic north along the short axis (Young 1993:4).

Simerly Landscape (1872-1962)

The Simerlys were the first owners of the site not to hold political office and used the site as a home and small-scale farming operation (Bailey 1991:62). During their tenure, the site once again saw some changes with the advent of the modern era. This includes construction of more outbuildings, minor renovations to the house including enclosing the back porch, and the addition of modern improvements (Bailey 1991:54-62).

The home was in poor shape when they acquired it as seen in the 1969 court record (Bailey 1991:54-55). The Simerlys went about refurbishing the house, including placing a

standing-seam tin roof on all buildings on the estate (Bailey 1991:62). Another major renovation included enclosing the back porch to create a sun porch, taking maximum advantage of the house's southern exposure (Bailey 1991:58). Completed in the 1880s, this renovation connected the ell with the principle structure and created an additional space between the two buildings (Bailey 1991:57). At an unknown date, a chimney was installed in the west end of the room with the flue from the fireplace being located in the narrow passage between the main house and ell (Bailey 1991:57). The fireplace in the room was used only a short time before a stove was installed (Bailey 1991:58). At a later date, the newly created sun room was subdivided into two more rooms separated by a hall (Bailey 1991:58). After the death of Sarah, her sons inherited the property and installed electricity in the house in 1935 (Bailey 1991:57). Lawson constructed a ramp off the north end of the back porch so that his brother could maneuver about the property (Bailey 1991:58).

When the Simerly family acquired the property there were several Haynes outbuildings still standing including the law office, corn crib, joinery/loomery, necessary, and the renovated barn and smokehouse. The slave quarter constructed by Haynes is believed to have been torn down either during his late occupancy or by the Simerly family. The necessary is also thought to have moved based on probing and the geophysical results. There are also two structures seen in historic photographs that the Simerlys constructed including a coal shed located near the standing George Haynes Cabin and another unidentified farm outbuilding (Figures 19 and 20). This building is believed to have been described by Bailey (1990, 1991) as being the former slave quarter which was reconstructed as the original log visitor's center and museum; however, its orientation and dimensions do not match the cabin seen in Strother's (1857) woodcut (Goist 1994:4; Jones 1970:6). The outbuilding is therefore thought to have been a construction

completed by the Simerly family during their tenancy. It is also possible that it was a repositioned outbuilding, possibly the former slave quarters. The shed located in the rear yard is believed to have functioned as a coal shed based on the excavation of an associated geophysical anomaly. A storage shed previously located behind the law office is also believed to have been constructed by the Simerly family based on its configuration and style of construction (Figures 14, 18-20). A new spring box was also installed in the east field, possibly indicating the abandonment of the possible cistern installed by Tipton, Jr. A chicken coop seen in historic photographs was also constructed near the smokehouse (Figure 23). Using these data, an interpretive map of the Simerly-era landscape was constructed (Figure 143).

The Buffalo Road fronting the house was an unimproved dirt road which was later regraded and paved in 1962 (Figure 17) (Bailey 1991:62). The "Three C's" Railroad was also constructed along the Buffalo Road in the 1880s and was laid in a new elevated bed when the road was paved (Bailey 1991:62; Cox 2008:54-55; Poole 1995:77). The Buffalo Road, formerly known as the Buffalo Trace, moved from the front of the house to its current position sometime during the Simerly's tenancy most likely when the original rail line was laid in the 1880s. The fences around the property also changed at this time (Figure 17). The old rough-cut square post and board fences installed by Haynes are seen located around the barn area with the rest of the property being bounded by barbed wire fencing which became available in 1886 (Miller et al. 2000:15).

The site cemetery was again used by the Simerly family. The Simerlys continued to bury their dead with members of their kin, the Haynes family, down slope of the Tiptons (Young 1993:4). Again the graves were oriented 18 degrees west of magnetic north along the short axis (Young 1993:4).

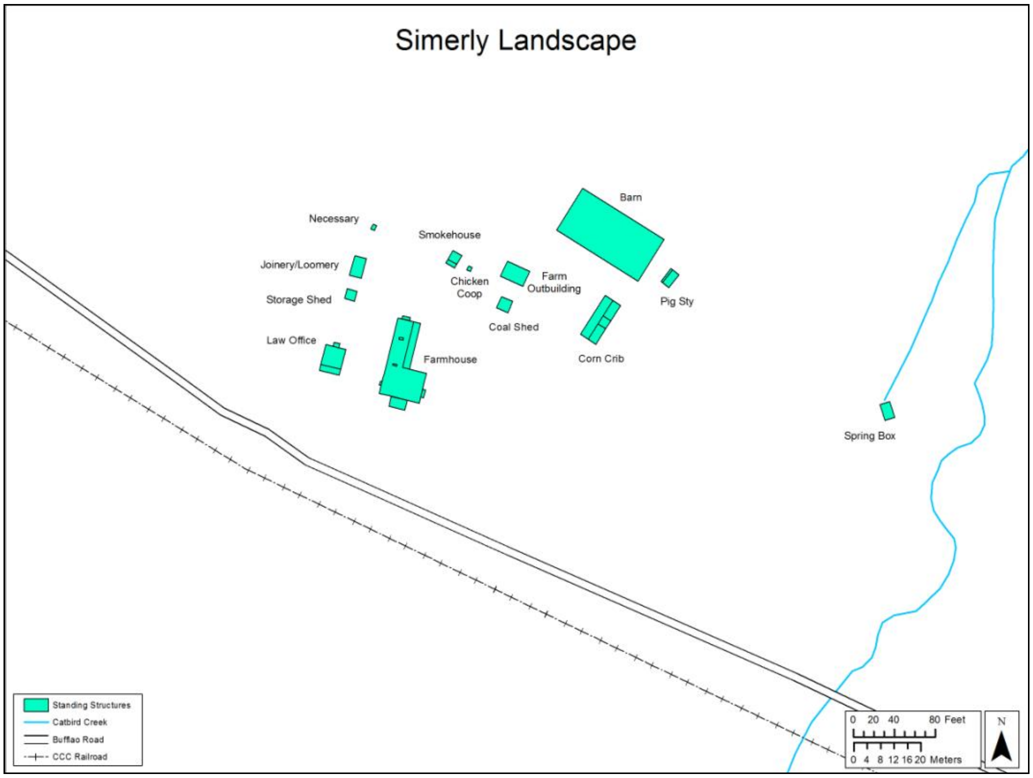

Figure 143. Interpretive map of Simerly family's late nineteenth-century landscape.

State Historic Site Landscape (1962-present)

In 1962, the State of Tennessee acquired 17 acres of the core historic property as well as the Tipton-Simerly cemetery from the Simerly brothers (Bailey 1991:56-57; Lawson 1970:121; Speer 2000:41; WCDB 227:344-345). The remainder of the property was sold to Clinton and Ruby Garland who converted it into a subdivision in the 1960s (Bailey 1991:56; WCDB 321:32, 407:111-116). After the state acquired the property, the nonprofit Tipton-Haynes Historical Association was formed and granted management rights to restore and preserve the site as an educational institution opening the site to the public in the early 1970s (Baratte 1970:125; Cooper et al. 1993: 21; Fields 1998:982). The state-owned site today contains 47 acres with historic buildings, a new museum and education center, interpretive structures, as well as the

Tipton-Simerly cemetery. The site serves as a historical house and grounds museum which is intended to help preserve and interpret Tennessee's history (Figure 144).

When the state acquired the property, the farmhouse, law office, and several outbuildings were standing. The condition of the estate at the time called for the restoration of the house and outbuildings to be completed in order to open the site to the public for interpretive purposes. The farmhouse, law office, barn, smokehouse, stillhouse and other outbuildings were restored, and a visitor's center/museum was constructed beginning in 1965 (Baratte 1970:125; Speer 2000:42).

The site has since seen several restorations of the house and outbuildings as well as the construction of the offices, museum, and interpretive structures to create the landscape we see today. Two major restoration efforts were conducted on the property between 1965-1971 and 1989-1991. Numerous small-scale restorations have also been conducted on the property to the

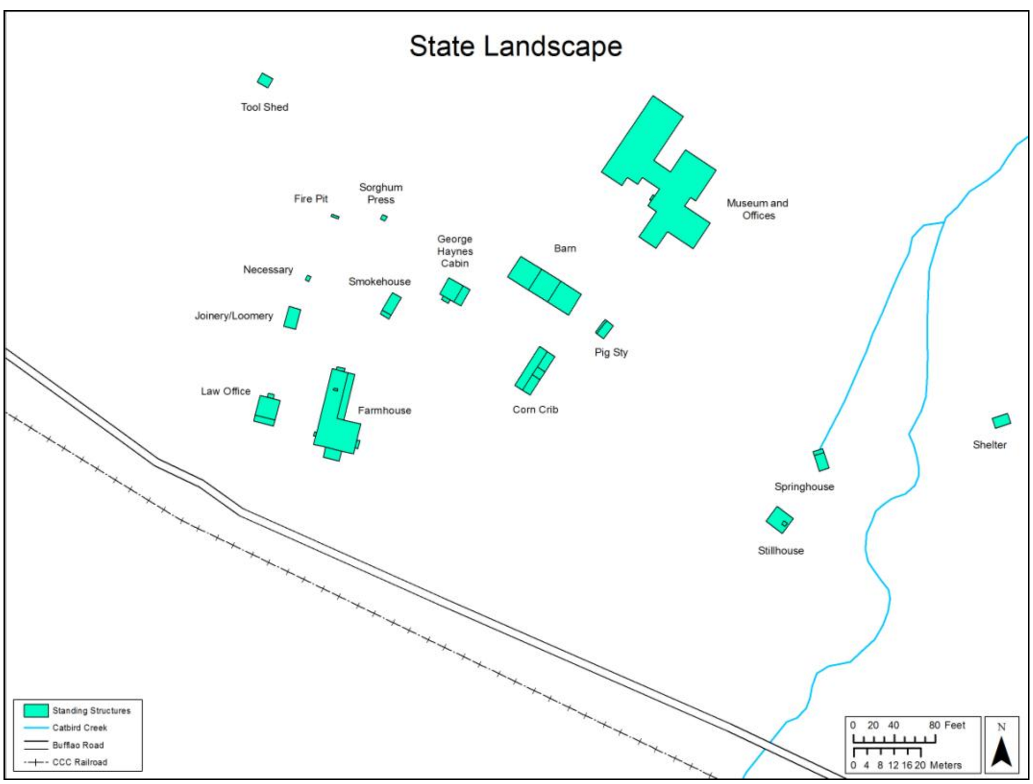

Figure 144. State-owned landscape.

farmhouse and outbuildings over the years. The first restoration of the Tipton-Haynes house and outbuildings began in 1965 (Baratte 1970:125; Speer 2000:42). In 1989, another major restoration and stabilization project was conducted on the Tipton-Haynes farmhouse (Bailey 1991, appendix V; Goist 1994).

During state ownership, the restoration and reconstruction of historic outbuildings was completed for interpretive purposes. Restoration of the law office was conducted in 1965 (Bailey 1991:288, appendix VI; Jones 1970:2). During early restoration efforts, the joinery/loomery was also minimally restored. Later in 1989, original features of the joinery/loomery were changed including the removal of the board-and-batten façade, the tin roof, and the brick enclosing the foundation (Story 1989:18). The necessary is also thought to have been dismantled and a new one reconstructed during the early restorations to the property (Goist 1994:4, 5; Jones 1970:6). The reconstruction is also believed to have been moved from the necessary's original location.

During the 1960s restoration, the smokehouse was demolished and a new reconstructed log smokehouse was built in its place (Goist 1994:4; Jones 1970:3). The double-pen barn was also reconstructed at this time (Bailey 1991:86; Baratte 1970:127). The pig pen was reconstruction in 1970 based on Strother's (1857) woodcut (Jones 1970). The corn crib was also restored during the 1960s restoration (Baratte 1970:127; Jones 1970:4). The roof, as well as a few logs, has since been replaced.

An undocumented archaeological investigation was conducted in the 1960s which located the foundations of the stillhouse and springhouse (Bailey 1991:86; Baratte 1970:127-128). These structures were reconstructed in the 1960s based on the foundations and configurations

specified by the archaeologist (Bailey 1991:86; Jones 1970:5). In 1970, the area fronting the springhouse was dammed and flooded to create a reflecting pond.

The George Haynes Slave Cabin is a relocated historic structure reconstructed for interpretive purposes in the area believed to have housed the slave quarters (Figure 60). The structure was repositioned to fit the location of the building seen in the Strother's (1857) woodcut which is believed to have been the slave quarter.

After the state acquired the property and the management rights were given to the Tipton-Haynes Historical Association, a visitor's center was constructed for interpretative purposes in 1969 (Figure 61) (Goist 1994:4). During the early restoration years, an undocumented archaeological excavation on the property is believed to have possibly found the original foundation of the slave quarters (Baratte 1970:128). Based on the excavation, the structure was then reconstructed as a visitor's center on the east side of the barn (Baratte 1970:128).

Again in 2000, renovations were made to the visitor's center creating the building seen today (Figure 61) (Speer 2000:44). The visitor's center serves as a modern interpretive center and houses the museum, archives, offices, and apartment space. Besides the visitor's center, another small modern structure was constructed in 1984 to serve as a tool shed in the northwest corner of the property (Figure 3). A modern log shelter was also constructed in the northeast field of the property for visitors. Other constructions included a brick fire pit and free-standing sorghum press.

The state used the site for their own purposes to create an interpretive landscape which serves as public museum. Changes that occurred due to its use as a museum included tearing down any Simerly-era structures during the early restoration including the storage shed, chicken coop, coal shed, and an unidentified farm outbuilding thought to be the former slave quarters

(Bailey 1991). An entrance road was also constructed leading from the north entrance on South Roan Street and a parking area was also installed in front of the museum for visitors to the site. Recent improvements were also made during the state's ownership including the installation of modern utilities as well as the addition of interpretive fences, plantings, and gardens.

Conclusions

Landscape change at Tipton-Haynes is recovered through the use of a contextual approach to historical archaeology which has allowed the reasons why changes took place at Tipton-Haynes to be understood. The different methodologies used during the project were combined to interpret the past landscape and provide the reasons for change by combining each piece of information to create an historical account of the physical landscape and its spatial, temporal, and cultural context. Changes seen in the landscape at Tipton-Haynes can be related to a number of different physical, cultural, social, economic, and ideological influences. These include household dynamics, production, wealth, employment, and land holdings. Other influences consist of consumer access, attitudes towards construction, and progressive farming.

The changing dynamics of the household plays a major role in landscape development (Groover 2008). Examination of varying family sizes at Tipton-Haynes puts into perspective the changes seen at the property (Table 89). The acquisition of the property by different family

Table 89. Family size by household.

Household	Family Size	Slaves
Tipton	6	5
Tipton, Jr.	5	6
Haynes	9	3
Simerly	4	-

members necessitated change as did the size of the family.

The maturity of the household also played a role in the changing landscape. During the Tipton family tenancy, Tipton, and later his son, moved to the site with their mature families later in life. However, Haynes was young, just out of college, and recently married upon acquiring the property. He was just building a family upon his arrival. Haynes enlarged his family over time, increasing the need for more living space.

Other factors included the head of household's employment (Table 90). The Tipton and later Haynes families were upper class families whose leaders were politicians first and farmers second, followed by the lower to middle-class Simerly family that primarily practiced farming and trade. Renovations to the property were conducted by Tipton in 1799 when he retired from political office. The home is believed to have been rebuilt specifically for his retirement residence. After Tipton, Jr.'s term as a state senator, he removed to his father's home, constructing a Federal-style farmhouse while trying to run for the United States House of Representatives. Never attaining that position, Tipton, Jr. returned to the state house dying while in office. Landon C. Haynes is also attributed with renovating the landscape based on his career. The first known renovation to the farm completed by Haynes was the construction of the corn crib in 1851 coinciding with his temporary retirement from political office after losing an election to Andrew Johnson. Again the farmhouse was renovated and an adjacent law office was constructed in the Greek-Revival style. Shortly after these renovations, Haynes again entered the

Table 90. Head of household's employment.

Head of Household	Employment
Col. Tipton	Politician, Military, Farmer
Tipton, Jr.	Politician, Military, Farmer
Haynes	Lawyer, Politician, Farmer
Simerlys	Railroad Worker, Farmer

political arena running for Congress then serving as a presidential elector and later as a Confederate State Senator. Restoration of the home can also be seen as being influenced by the need for family space as well as by the need for expressing a dominant ideology in order to attain political aspirations (Leone 2005).

Other influences seen on the landscape can be related to production on the farm and the influence of progressive farming ideals. Many farmers were influenced by progressive reform movements meant to increase efficient production. The movements included ideas about what types of crops to grow, what types of animals to raise, as well as what structures to build and how to arrange them (Beaudry 2002:130). This also included advice on the living conditions of the slaves, such as proper construction techniques for their quarters as well as their size and placement.

Col. John Tipton and his son John Tipton, Jr. were invested in farming the site for sustenance and trade, though a majority of their interests were in land holdings at the site and throughout northeast Tennessee. The property size shrank from about 1,000 acres during Tipton, Sr.'s tenancy to 300 acres during Tipton, Jr.'s occupancy. Haynes, however, diversified crops, and animals, and increased production of a variety of household goods, creating a prosperous farm economy on only 200 acres of the original property. The later Simerly residents farmed the site less intensively, primarily living on wages from practicing a trade or railroad stocks.

The arrangement of the farm over time shows the influence of progressive ideals with the creation of a nucleated landscape with specialized outbuildings for production (Cabak and Groover 2004; Sayers 2003). When Col. John Tipton constructed his farm in the late eighteenth century, it was a vernacular dispersed landscape fronting the Buffalo Trace. Later, the property evolved more specialized outbuildings, including slave quarters, in a consolidated asymmetrical

fashion creating a nucleated landscape influenced by progressive farming movements. This included the placement of outbuildings and associated work areas to the side and/or rear of the house (Sayers 2003:391).

The outbuildings were at this time set askew from the farmhouse. This arrangement could possibly have been first laid out by Col. Tipton if he did indeed construct the double-pen barn and pig sty in the rear yard. In this case, it would seem to be reflecting Tipton's vernacular landscape based on the natural topography of the site (Figure 145).

If, however, Tipton, Jr. constructed all of the outbuildings in the rear yard that stood during his occupation, it is probable that the buildings were placed in their positions based on other influences. The alignment of outbuildings could have shifted due to a segregation between formal space and work space. Haynes is believed to have followed this same paradigm by continuing to construct more formalized outbuildings such as the law office aligned with farmhouse and informal outbuildings such as the slave quarters and corn crib aligned with other outbuildings in the barn yard.

The two differing alignments observed between structures at the Tipton-Haynes site could also be indicating a previous alignment from shifting of the house. Tipton is originally believed to have constructed a story-and-a-half log cabin for his home at the site. The results of the dendrochronology dated the standing cabin within the farmhouse to 1799, refuting the assumption that this was Tipton's original home. It is not know what happened to the original cabin, but it is assumed that Tipton's retirement residence was constructed on the same footprint. The foundations of the farmhouse were renovated during previous restorations; however, archaeological evidence did locate a portion of a late eighteenth-century pier stone at the southeastern corner of the cabin (Figure 134). The cabin built by Col. Tipton for his retirement

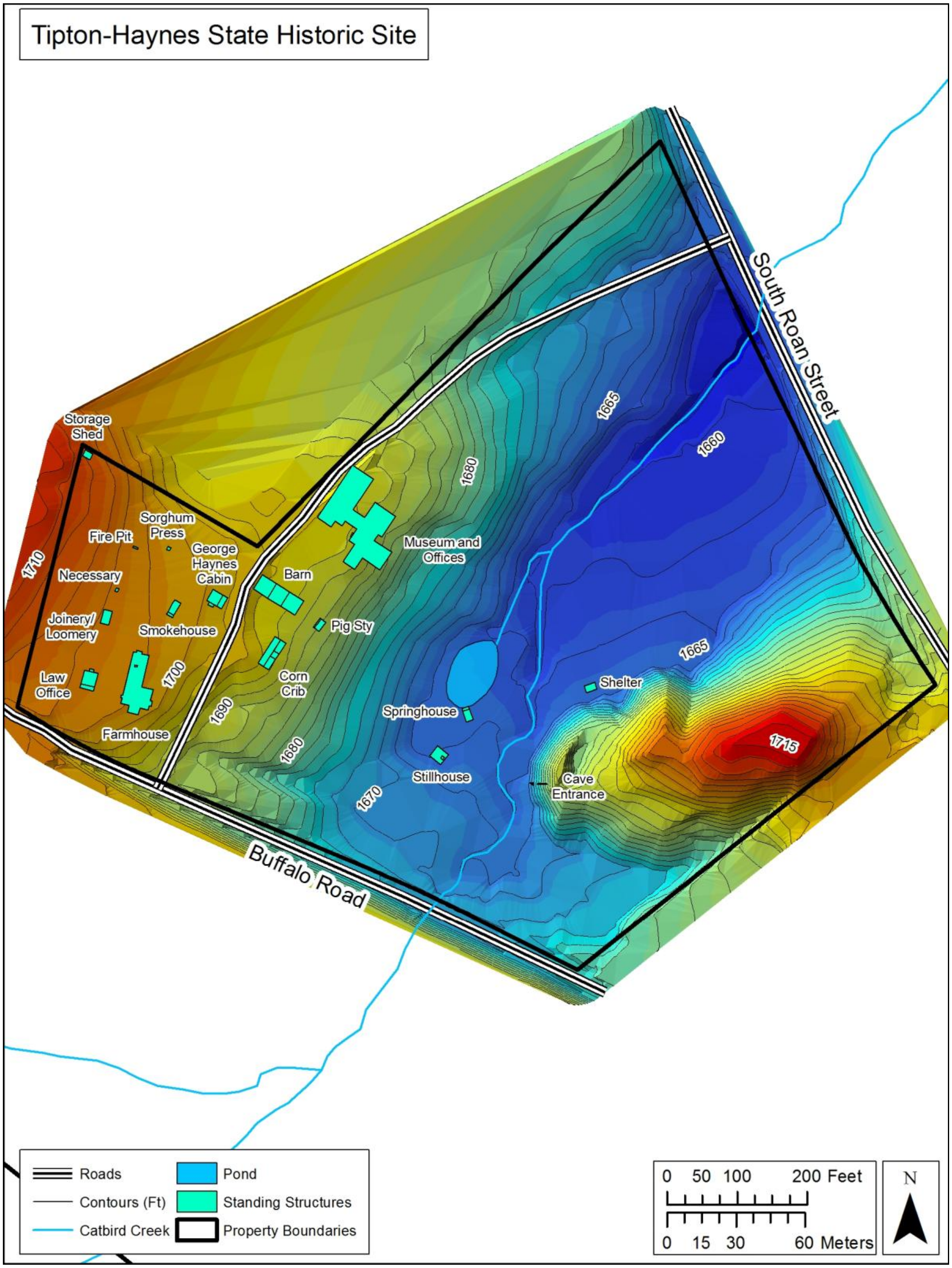

Figure 145. Tipton-Haynes contour map.

residence could have shifted on this axis a few degrees west. This scenario would indicate that Col. Tipton did construct the barn and pig sty behind his home, though it is not clear why he would have wanted to shift the building.

It is also possible that the shifting of the farmhouse occurred during Haynes renovation completed around 1857. During Haynes occupation, outbuildings are for the first time believed to have been oriented with the farmhouse. Haynes could have been following the prescribed vernacular layout of the property or creating his own formally-designed landscape. A similar shifting of alignments during Haynes occupation was also seen with burials at the Tipton-Simerly cemetery (Young 1993:4). However, no other evidence suggests that the farmhouse was reoriented after 1799 when Col. Tipton reconstructed his cabin which remains as the core of the house today.

The landscape was also influenced by production on the farm and changing attitudes towards space and slave conditions. The size of the enslaved workforce fluctuated over time adjusting to each household (Table 89). The Tipton family as a whole maintained a relative equilibrium between freed and enslaved to work the large acreage of the farm during its early years. Later, the large Haynes household had a reduced enslaved workforce, thereby requiring the family to invest more of its time into farm production. Emancipation also changed the dynamics of the workforce at the site, creating a solely family-based labor force during the Simerly's operation of the farm.

Changing attitudes towards space and living conditions for the enslaved can also be seen at Tipton-Haynes. Over time the slaves were removed farther and farther from the household. The slaves originally would have slept in the loft within Tipton's cabin and then were removed to the basement after renovations. During Tipton, Jr.'s tenancy, the slaves resided in a new

kitchen/slave quarter at the rear of the home. After Haynes' renovations, again the slaves were moved to a larger structure behind the ell addition. This is in step with progressive ideals which were meant to improve the quality of slave life by providing larger living quarters which alleviated crowded conditions and created a healthier environment (Strutt 2010:229). The location of the enslaved on the property was also meant to increase efficiency by placing them near their respective duties. Placement away from the house also underscored the residents' ideas about racial separation during the nineteenth century (Kelso 1992).

The influence of local economic growth also contributed to changes seen at Tipton-Haynes. New renovations to the home were made possible by the introduction of goods and services to the area not previously available or affordable. The frame addition and clapboard siding for example were only made possible with the construction of local saw mills introduced to the area at the time (Bailey 1991:16-17). The arrival of the railroad in nearby Johnson City in 1857 heralded the Greek-Revival renovation to the farmhouse by Haynes. The continued presence of the local railroad and construction of a new line near the house in the 1880s also helped to provide employment and funds from railroad stocks to the later Simerly occupants (Tables 37-39) (Bailey 1991:56).

Other culture influences include the acceptance of a dominant ideology associated with the varying styles of architecture. Originally Tipton constructed a vernacular log cabin like many of his neighbors; log cabins being a popular form of construction in Tennessee well into the twentieth century (Morgan 1990). The home was later rebuilt to accommodate his needs during retirement. Later in the 1820s, Tipton, Jr. renovated the home into a Federal farmhouse following the dictums of Sir Christopher Wren and James Gibbs (Hammett 1976:3). Tipton, Jr. would have been informed on the popularity of this style based on his local experiences as well

as with public and private residences in the capitals of Tennessee including Knoxville and Nashville. Again the home was renovated in 1857 by Landon C. Haynes who created a Greek-Revival, temple-style house. Greek-Revival architecture was commonly used for courthouses, city halls, and residences (Hammett 1976:25). Haynes' architectural preferences would also have been influenced by his experiences in Nashville while serving as a state legislator (Jones 2009a:6). Based on these changes, the residents of the Tipton-Haynes site can be seen as ascribing to a dominant ideology involving statements of social position. Tipton, Jr. and Landon Haynes both were still actively involved in politics and therefore their homes were constructed to emulate the plantation elite while aspiring for political office thus publicly confirming their status.

To conclude, numerous changes to the landscape occurred at Tipton-Haynes over its 237-year history. The results of the Tipton-Haynes Landscape Archaeological Project have provided reasons for the changing landscape over time. Data provided by multiple methods of investigation have allowed for the construction of the landscape history and context of the site creating a more complete interpretation of Tipton-Haynes. To the residents of the site, it was a home, farm, cemetery, means of subsistence, and a statement of sophistication. By discovering and interpreting the changes that took place and their underlying causes, we attain understanding for those in the past as well as meaning for ourselves in the present.

BIBLIOGRAPHY

Abernathy, Thomas P.
1967 *From Frontier to Plantation in Tennessee: A Study in Frontier Democracy*. Southern Historical Publications No. 12. University of Alabama Press, University.

Adams, Williams H.
1990 Landscape Archaeology, Landscape History, and the American Farmstead. *Historical Archaeology* 24(4):92-101.

2002 Machine Cut Nails and Wire Nails: American Production and Use for Dating 19th-Century and Early-20th-Century Sites. *Historical Archaeology* 36(4):66-88.

Albert, Alphaeus H.
1969 *Record of American Uniform and Historical Buttons*. Boyertown Publishing Company, Boyertown, PA.

Alderman, Pat
1986 *Overmountain Men: Battle of King's Mountain, Cumberland Decade, State of Franklin, Southwest Territory*, 2nd edition. Overmountain Press, Johnson City, TN.

Alexander, Thomas B.
1956 Thomas A. R. Nelson of East Tennessee. Tennessee Historical Commission, Nashville.

Amrine, David M.
2010 Nail Distributions as Structural Insight at the Beaver Creek Trail Crossing Site (25SW49), Seward County, Nebraska. Master's Thesis, Department of Anthropology, University of Nebraska, Lincoln.

Aspinall, Arnold, Chris Gaffney, and Armin Schmidt
2008 *Magnetometry for Archaeologists*. AltaMira Press, Lanham, MD.

Bailey, William P.
1989 Tipton Haynes Historic House, Historic Structures Report. On file at the Tennessee Historical Commission, Nashville.

1990 Correspondence from William Bailey (President, Board of Trustees, Tipton-Haynes Historical Association) to Herbert Harper (Executive Director, Tennessee Historical Commission). On file at the Tennessee Historical Commission, Nashville.

1991 Green Meadows Mansion, Tipton-Haynes State Historic Site, Historic Structures Report. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Bannister, Bryant
1962 The Interpretation of Tree-Ring Dates. *American Antiquity* 27(4):508-514.

Baratte, John J.
1970 The Tipton-Haynes Place: II. The Later Years. *Tennessee Historical Quarterly* 29(2): 125-129.

Baugher, Sherene and Terry H. Klein
2002 Special Issue: Historic Preservation and the Archaeology of Nineteenth-Century Farmsteads in the Northeast. *Northeast Historical Archaeology,* Vol. 30-31.

Beaudry, Mary C.
1996 Reinventing Historical Archaeology. In *Historical Archaeology and the Study of American Culture*, Lu Ann De Cunzo and Bernard L. Herman, editors, pp. 473-497. The University of Tennessee Press, Knoxville.

2002 Trying to Think Progressively about 19th-Century Farms. *Northeast Historical Archaeology* (30-31):129-142.

2006 *Findings: The Material Culture of Needlework and Sewing*. Yale University Press, Newhaven, CT.

Beaudry, Mary C., Lauren J. Cook, and Stephen A. Mrozowski
1991 Artifacts and Active Voices: Material Culture as Social Discourse. In *The Archaeology of Inequality*, Randall H. McGuire and Robert Paynter, editors, pp. 150-191. Basil Blackwell Inc., Cambridge, MA.

Bellamy, James W.
1952 The Political Career of Landon Carter Haynes. Master's Thesis, Department of History, University of Tennessee, Knoxville.

Benthall, Joseph L.
1985 Archaeological Testing of the Construction Sites of the Proposed Parking Lot, Access Road, Picnic Shelter and Amphitheater, Tipton Haynes Historical Farm. On file at the Tennessee Division of Archaeology, Nashville.

1999 Letter to Mike Moore, September 29. Archaeological Testing of the Site of the Proposed New Cabin at the Tipton Haynes Historical Farm. On file at the Tennessee Division of Archaeology, Nashville.

Bergeron, Paul H., Stephen V. Ash, and Jeanette Keith
1999 *Tennesseans and Their History*. The University of Tennessee Press, Knoxville.

Bevan, Bruce W.
2006 Geophysical Exploration for Buried Buildings. *Historical Archaeology* 40(4):27-50.

Boyd, C. Clifford, Jr.
1986 The 1985 Summer Archaeological Field School at the Tipton-Haynes Living Historical Farm. On file at the Tennessee Division of Archaeology, Nashville.

1989 Evaluation of Archaeological Resources Tipton-Haynes Farm. On file at the Tennessee Division of Archaeology, Nashville.

Boyd, C. Clifford and Brett H. Riggs
1990 Archaeological Investigations at the Tipton-Haynes Historical Farm, Johnson City, Tennessee. On file at the Tennessee Division of Archaeology, Nashville.

Burgner, Goldene Fillers
1981 *North Carolina Land Grants in Tennessee, 1778-1791*. Southern Historical Press, Inc., Easley, SC.

1985 *Washington County, Tennessee Marriages, 1780-1870*. Southern Historical Press, Inc., Easley, S.C.

1987 *Chancery Court Minutes, Greene County, Tennessee, November 1825-January 1831*. Southern Historical Press, Inc., Easley, SC.

Byron, Barbara and Samuel Sistler
1998 *Tennessee Land Grants,* Vol. 2. Surnames L-Z and Cross-index. Byron Sistler and Associates, Nashville, TN.

Cabak, Melanie A., and Mark D. Groover
2004 *Plantations without Pillars: Archaeology, Wealth, and Material Life at Bush Hill*. Savannah River Archaeological Research Papers 11. Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Carr, Howard Ernest
1935 *Washington College: A Study of an Attempt to Provide Higher Education in Eastern Tennessee*. S. B. Newman and Co. Publishers, Knoxville, TN.

Clark, Anthony J.
2000 *Seeing Beneath the Soil: Prospecting Methods in Archaeology*. Routledge, London, UK.

Clark, Murtie June
2003 *American Militia in the Frontier Wars, 1790-1796*. MyFamily.com, Inc. Baltimore, MD.

Conklin, Forrest
1998 William Gannaway "Parson" Brownlow. In *Tennessee Encyclopedia of History and Culture,* Carroll Van West, editor, pp. 98-99. Tennessee Historical Society, Rutledge Hill Press, Nashville.

Conyers, Lawrence B.
2004 *Ground-Penetrating Radar for Archaeology*. AltaMira, Walnut Creek, CA.

2006 Ground-Penetrating Radar. In *Remote Sensing in Archaeology: An Explicitly North American Perspective*, Jay K. Johnson, editor, pp. 131-159. The University of Alabama Press, Tuscaloosa.

Conyers, Lawrence B. and Dean Goodman
1997 *Ground-Penetrating Radar: An Introduction for Archaeologists*. AltaMira, Walnut Creek, CA.

Cooper, Bill, Kenneth Fields, Pat Buck, and Penny McLaughlin
1993 Tipton-Haynes: A History in Common. Tipton-Haynes Historical Association. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Corlew, Robert E.
1981 *Tennessee: A Short History*, 2nd edition. The University of Tennessee Press, Knoxville.

Coulter, E. Merton
1937 *William G. Brownlow: Fighting Parson of the Southern Highlands*. University of North Carolina Press, Chapel Hill, NC.

Cox, Bob L.
2008 *Remembering Johnson City*. The History Press, Charleston, SC.

Coxe, Carey L.
1993a The 1992 Field Season at the Tipton-Haynes Historical Site (40WG59), Johnson City, Washington County, Tennessee. On file at the Tennessee Division of Archaeology, Nashville.

1993b The 1992 Field Season at the Tipton-Haynes Historical Site, Johnson City, Washington County, Tennessee. *Tennessee Anthropological Association Newsletter* 18(5):1-15.

Creekmore, Pollyanna
1980 *Early Tennessee Taxpayers*. Southern Historical Press, Inc., Easley, SC.

Cupka, Kevin
2010 Archaeology of the Hoosier Hills: Exploring Economic and Material Conditions at the Charley Farmstead. Master's Thesis, Department of Anthropology, Ball State University, Muncie, IN.

Deagan, Kathleen A.
1988 Neither History Nor Prehistory: the Questions that Count in Historical Archaeology. *Historical Archaeology* 22(11):7-12.

De Cunzo, Lu Ann
1996 Introduction: People, Material Culture, Context, and Culture in Historical Archaeology. In *Historical Archaeology and the Study of American Culture*, Lu Ann De Cunzo and Bernard L. Herman, editors, pp. 1-17. The University of Tennessee Press, Knoxville.

De Cunzo, Lu Ann and Julie H. Ernstein
2006 Landscapes, Ideology, and Experience in Historical Archaeology. In *The Cambridge Companion to Historical Archaeology*, Dan Hicks and Mary C. Beaudry, editors, pp. 255-270. Cambridge University Press, New York, NY.

Deetz, James F.
1977 *In Small Things Forgotten: The Archaeology of Early American Life*. Anchor Doubleday, New York, NY.

1990 Prologue: Landscapes as Cultural Statements. In *Earth Patterns: Essays in Landscape Archaeology*, William M. Kelso and Rachel Most, editors, pp. 1-4. University Press of Virginia, Charlottesville.

DeWeese Wight, Georgina and Henri D. Grissino-Mayer
2004 Dendrochronological Dating of an Antebellum Period House, Forsyth County, Georgia, U.S.A. *Tree-Ring Research* 60(2): 91–99.

Draper, Lyman C.
1944-1949 The Tipton-Sevier Battle. Draper Manuscripts XX, Vol. 30S:54-63. State Historical Society of Wisconsin, Madison. Copy on file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Durham, Walter T.
1990 *Before Tennessee: The Southwest Territory, 1790-1796*. Rocky Mount Historical Association, Piney Flats, TN.

Dykeman, Wilma
1975 *Tennessee: A Bicentennial History*. Norton, New York, NY.

Eason, W. Jeter
1936 Haynes-Tipton House. Photographs, Written Historical, and Descriptive Data. Historic American Buildings Survey (HABS), Memphis, TN.

Edwards, Jay D. and Tom Wells
1993 Historic Louisiana Nails, Aids to Dating of Old Buildings. The Fred B. Kniffen Cultural Resources Laboratory Monograph Series No. 2. Department of Geography and Anthropology, Louisiana State University, Baton Rouge.

Ellis, Clifton
2010 Building for "Our Family, Black, and White": The Changing Form of the Slave House in Antebellum Virginia. In *Cabin, Quarter, Plantation: Architecture and Landscapes of North American Slavery*, Clifton Ellis and Rebecca Ginsberg, editors, pp.141-155. Yale University Press, New Haven, CT.

Fassbinder, J.W.E., H. Stanjek, and H. Vali
1990 Occurrence of Magnetic Bacteria in Soil. *Nature* 343:161-163.

Faulkner, Charles H.
1998 "Here are Frame Houses and Brick Chimneys": Knoxville, Tennessee, in the Late Eighteenth Century. In *The Southern Colonial Backcountry: Interdisciplinary Perspectives on Frontier Communities*, David C. Cass, Steven D. Smith, Martha A. Zierden, and Richard D. Brooks, editors, pp. 137-161. The University of Tennessee Press, Knoxville.

2008 *The Ramsey's at Swan Pond: The Archaeology and History of an East Tennessee Farm*. The University of Tennessee Press, Knoxville.

Fields, Kenneth
1998 Tipton-Haynes Historic Site. In *Tennessee Encyclopedia of History and Culture*, Carroll Van West, editor, pp. 981-982. Tennessee Historical Society, Rutledge Hill Press, Nashville.

Finchum, George
1959 Washington County Court, 1796-1836. Master's Thesis, Department of History, East Tennessee State College, Johnson City, TN.

Fink, Paul M.
1989 *Jonesborough: The First Century of Tennessee's First Town, 1776-1876*, 2nd edition. Overmountain Press, Johnson City, TN.

1957 Some Phases of the History of the State of Franklin. *Tennessee Historical Quarterly* 16(3):195-213.

Fitting, James E.
1977 The Structure of Historical Archaeology and the Importance of Material Things. In *Historical Archaeology and the Importance of Material Things*, Leland Ferguson, editor, pp. 23-35. Special Publications 2. Society for Historical Archaeology, Columbia, SC.

Franklin, Maria
1997 Out of Site, Out of Mind: The Archaeology of an Enslaved Virginia Household, ca. 1740-1778. Doctoral dissertation, Department of Anthropology, University of California, Berkeley.

2004 *An Archaeological Study of the Rich Neck Slave Quarter and Enslaved Domestic Life*. Colonial Williamsburg Research Publications. Dietz Press, Richmond, VA.

Fritts, Harold C.
1976 *Tree Rings and Climate*. Academic Press, New York, NY.

Gaffney, Chris and John Gater
2003 *Revealing the Buried Past: Geophysics for Archaeologists*. Tempus Publishing Ltd., Stroud, Gloucestershire, UK.

Galle, Jillian E.
2004 Designing Women: Measuring Acquisition and Access at the Hermitage Plantation. In *Engendering African American Archaeology: A Southern Perspective*, Jillian E. Galle and Amy L. Young, editors, pp.39-72. The University of Tennessee Press, Knoxville.

Garrow, Patrick H.
1983 Dating Nineteenth Century Ceramics. Paper Presented at the 16th Annual Society for Historical Archaeology Meeting, Denver, CO.

Glassie, Henry
1968 *Pattern in the Material Folk Culture of the Eastern United States*. University of Pennsylvania Press, Philadelphia.

1977 Archaeology and Folklore: Common Anxieties, Common Hopes. In *Historical Archaeology and the Importance of Material Things*, Leland Ferguson, editor, pp. 23-35. Special Publications 2. Society for Historical Archaeology, Columbia, SC.

Goist, David
1994 Conservation Assessment: Tipton-Haynes Historic Site. On file at the Tennessee Historical Commission, Nashville.

Goodspeed, Weston Arthur
1887 *Goodspeed's history of Tennessee; containing historical and biographical sketches of thirty east Tennessee counties: Anderson, Blount, Bradley, Campbell, Carter, Claiborne, Cocke, Grainger, Greene, Hamblen, Hamilton, Hancock, Hawkins, James, Jefferson, Johnson, Knox, Loudon, McMinn, Meigs, Monroe, Morgan, Polk, Rhea, Roane, Sevier, Sullivan, Unicoi, Union, Washington*. Charles and Randy Elder Booksellers Nashville, TN. Reprinted 1972 by Goodspeed Publishing Co., Nashville, TN.

Granger, Joseph E. and Donald B. Ball
1982 Historic Archaeological Investigations of the Linville Site, 15BK12, Bracken County, Kentucky. Granger Associates Inc., Louisville, KY.

Greer, Georgeanna H.
1981 *American Stonewares*. Schiffer Publishing Ltd. Exton, PA.

Griffey, Irene M.
2000 *Earliest Tennessee Land Records and Early Tennessee Land History*. Clearfield Co., Baltimore, MD.

Grissino-Mayer, Henri D.
2001 Evaluating Crossdating Accuracy: A Manual and Tutorial for the Computer Program COFECHA. *Tree-Ring Research* 57(2):205-221.

2009 An Introduction to Dendroarchaeology in the Southeastern United States. *Tree-Ring Research* 65(1): 5–10.

2010 Principles of Dendrochronology. Ultimate Tree Ring Web Pages, University of Tennessee, Knoxville. <http://web.utk.edu/~grissino/principles.htm>. Accessed 30 Nov. 2010.

Grissino-Mayer, Henri D., and Saskia L. van de Gevel
2007 Tell-tale trees: The historical dendroarchaeology of log structures at Rocky Mount, Piney Flats, Tennessee. *Historical Archaeology* 41(4): 32–49.

Grissino-Mayer, Henri D., Lisa B. LaForest, and Saskia L. van de Gevel
2009 Construction History of the Rocky Mount Historic Site (40SL386), Piney Flats, Tennessee from Tree-Ring and Documentary Evidence. *Southeastern Archaeology* 28(1):64-77.

Groover, Mark D.
2003 *An Archaeological Study of Rural Capitalism and Material Life: The Gibbs Farmstead in Southern Appalachia, 1790-1920*. Kluwer Academic/Plenum Publishers, New York, NY.

2008 *The Archaeology of North American Farmsteads*. University Press of Florida, Gainesville.

Hall, Martin and Stephen W. Silliman (editors)
2006 *Historical Archaeology*. Blackwell Publishing, Malden, MA.

Hall, Will T. and Dixon L. Merritt
1913 *A History of Tennessee and Tennesseans: The Leaders and Representative Men in Commerce, Industry and Modern Activities, Vol. 8*. The Lewis Publishing Company, Chicago, IL and New York, NY.

Hammett, Ralph W.
1976 *Architecture in the United States: A Survey of Architectural Styles since 1776*. John Wiley and Sons, Inc., New York, NY.

Haywood, John
1823 *The Civil and Political History of the State of Tennessee: From its Earliest Settlement Up to the Year 1796, including the Boundaries of the State*. Heiskell and Brown, Knoxville, TN. Reprinted 1891 by Publishing House of the Methodist Episcopal Church, South, Barbee and Smith, Agents, Nashville, TN.

Heath, Barbara, J.
1999 Nineteenth-Century Small Farms and Plantations. In *The Archaeology of 19th-Century Virginia*, John H. Sprinkle, Jr. and Theodore R. Reinhart, editors, pp. 53-76. Spectrum Press, Richmond, VA.

Heath, Barbara J. and Amber Bennett
2000 “The Little Spots Allow’d Them”: The Archaeological Study of African American Yards. *Historical Archaeology* 34(2):38-55.

Henderson, Joseph P., Henri D. Grissino-Mayer, Saskia L. van de Gevel, and Justin L. Hart
2009 The Historical Dendroarchaeology of the Hoskins House, Tannenbaum Historic Park, Greensboro, North Carolina, U.S.A. *Tree-Ring Research* 65(1): 37–45.

Herman, Bernard L.
1996 Introduction: Historical Archaeology and the Search for Context. In *Historical Archaeology and the Study of American Culture*, Lu Ann De Cunzo and Bernard L. Herman, editors, pp. 19-31. The University of Tennessee Press, Knoxville.

Historic American Buildings Survey (HABS)
1936 Haynes-Tipton House: Photographs, Written Historical and Descriptive Data. Historic American Buildings Survey, Memphis, TN.

Hodder, Ian
1986 *Reading the Past: Current Approaches to Interpretation in Archaeology*. Cambridge University Press, Cambridge, UK.

1988 *The Archaeology of Contextual Meanings*. Cambridge University Press, Cambridge, UK.

Hudson, John
2002 *Across the Land: A Regional Geography of the United States and Canada*. The Johns Hopkins University Press, Baltimore, MD.

Jenson, Robert
1971 Board and Batten Siding and the Balloon Frame: Their Incompatibility in the Nineteenth Century. *Journal of the Society of Architectural Historians* 30(1): 40-50.

Johnson City Planning Department
2004 Historic Preservation Element: Johnson City Comprehensive Plan. City of Johnson City, TN. Staff Responsible: Moody, James D., Steve Neilson, Wendy Jayne Bailey, James Donnelly, and Ann Howland.

Jones, Olive R.
2000 A Guide to Dating Glass Tableware: 1800 to 1940. In *Studies in Material Culture Research*, Karlis Karklins, editor, pp. 141-232. The Society for Historical Archaeology, Uniontown, PA.

Jones, Robbie
2009a Tipton-Haynes Historic Site Fieldwork Memorandum. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

2009b Architectural Survey Field Notes. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Jones, Russell
1970 Report of Investigation of the Tipton-Haynes Living Historical Farm, Johnson City, TN with Recommendations for Restoration, Interpretation and Safety. National Park Service, Washington, DC. On file at the Tennessee Historical Commission, Nashville.

Jordon-Bychkov, Terry
2003 *The Upland South: The Making of an American Folk Region and Landscape*. University Press of Virginia, Charlottesville.

Keesee, Troy R.
1997 *The Wataugah Land Purchases*. Troy R. Keesee, Knoxville, TN.

Kelso, William M.
1992 Big Things Remembered: Anglo-Virginian Houses, Armorail Devices, and the Impact of Common Sense. In *The Art and Mystery of Historical Archaeology, Essays in Honor of James Deetz*, Anne Elizabeth Yentsch and Mary C. Beaudry, editors, pp. 127-145. CRC Press, Boca Raton, FL.

1997 *Archaeology at Monticello: Artifacts of Everyday Life in the Plantation Community*. Thomas Jefferson Memorial Foundation, Inc., Charlottesville, NC.

Ketchum, William C., Jr.
1971 *The Pottery and Porcelain Collector's Handbook*. Funk and Wagnalls, New York, NY.

Klingelhofer, Eric
1987 Aspects of Early Afro-American Material Culture: Artifacts from the Slave Quarters at Garrison Plantation, Maryland. *Historical Archaeology* 21(2):112-119.

Kvamme, Kenneth L.
2003 Geophysical Surveys as Landscape Archaeology. *American Antiquity* 68(3):435-457.

2006a Magnetometry: Nature's Gift to Archaeology. In *Remote Sensing in Archaeology: An Explicitly North American Perspective*, Jay K. Johnson, editor, pp. 205-233. The University of Alabama Press, Tuscaloosa.

2006b Data Processing and Presentation. In *Remote Sensing in Archaeology: An Explicitly North American Perspective*, Jay K. Johnson, editor, pp. 235-250. The University of Alabama Press, Tuscaloosa.

Lamb, Lisa
2003 Historical Archaeology of Indian Key (8MO15) Warehouse: An Analysis of Nineteenth-Century Ceramics. Master's Thesis, Department of Anthropology, University of South Florida, Tampa.

Lawson, Dennis T.
1970 The Tipton-Haynes Place: I. A Landmark of East Tennessee. *Tennessee Historical Quarterly* 29(2): 105-124.

Lees, William B.
1986 Jonathan Meeker's Farmstead: Historical Archaeology at the Ottawa Baptist Mission, Kansas. Anthropological Series No. 13. Kansas State Historical Society, Topeka.

Leone, Mark P.
2005 *The Archaeology of Liberty in an American Capital: Excavations in Annapolis*. University of California Press, Berkeley.

Lewis, Thomas M. N. and Madeline D. Kneberg
1957 The Camp Creek Site. *Tennessee Archaeologist* 13(1):1-48.

Lewis, Daniel B., Whitney L. Nelson, Henri D. Grissino-Mayer, Edward R. Cook, and Robbie D. Jones
2009 Dendrochronological Dating of Eastern Red Cedar (Juniperus virginiana L.) Logs from Alfred's Cabin, The Hermitage, Home of President Andrew Jackson. *Tree-Ring Research* 65(1): 47–55.

Luscomb, Sally
1967 *The Collectors Encyclopedia of Buttons*. Bonanza Books, New York, NY.

MacRae, Ann Cameron
2001 Women at the Loom: Handweaving in Washington County, Tennessee, 1840-1860. Master's Thesis, Department of History, East Tennessee State University, Johnson City, TN.

Mann, David F.
2002 The Dendroarchaeology of the Swaggerty Blockhouse, Cocke County, Tennessee. Master's Thesis, Department of Geography, University of Tennessee, Knoxville.

Marcel, Sarah Elizabeth
1994 Buttoning Down the Past: A Look at Buttons as Indicators of Chronology and Material Culture. Honors Thesis Project, Department of Anthropology, University of Tennessee, Knoxville.

Martin, Ann Smart
2000 The Role of Pewter as Missing Artifact: Consumer Attitudes Toward Tablewares in Late 18th Century Virginia. In *Approaches to Material Culture Research for Historical Archaeologists*, 2nd edition, David R. Brauner, editor, pp.248-274. Society for Historical Archaeology, Uniontown, PA.

2008 *Buying into the World of Goods: Early Consumers in Backcountry Virginia*. The Johns Hopkins University Press, Baltimore, MD.

Martin, William
1862 *Peter Parley's Annual: A Christmas and New Year's Present for Young People*. Darton and Company, London, UK.

Maryland Archaeological Conservation Lab (MAC)
2009a The Oaks. Wood and Charcoal Identification in Southern Maryland, Jefferson Patterson Park and Museum, Maryland Department of Planning. <http://www.jefpat.org/wood&charcoalidentification/Webpages-trees/TheOaks.htm>. Accessed 1 Aug. 2011.

2009b Tulip Poplar/Yellow Poplar. Wood and Charcoal Identification in Southern Maryland, Jefferson Patterson Park and Museum, Maryland Department of Planning. <http://www.jefpat.org/wood&charcoalidentification/Webpages-trees/TulipPoplar.htm>. Accessed 1 Aug. 2011.

Massengill, Samuel Evans
1942 Colonel John Tipton. Washington County Historical Society of Abington, Virginia, Bulletin 7:19-28.

McBride, Robert M.
1975 *Biographical Directory of the Tennessee General Assembly,* Vol. I, 1796-1861. State Library and Archives and the Tennessee Historical Commission, Nashville.

McCown, Mary Hardin.
1933 *Tennessee Records, Bible Records and Marriage Bonds.* Cullom and Ghertner, Co., Nashville, TN.

McCown, Mary Hardin and Inez E. Burns
1959 *Soldiers of the War of 1812 Buried in Tennessee*. Tennessee Society, USD of 1812, Johnson City, TN.

McCown, Mary Hardin, Nancy E. Jones Stickley, and Inez E. Burns
1964 *Washington County, Tennessee Records, Vol. 1*. Lists of Taxables 1778-1801, pp.10-247. Privately Printed Johnson City, TN.

Meyers, Danielle F.
2001 Phase III Archaeological Testing of Site 40KN150 in the Proposed State Route 131 (Emory Road) Corridor from Near Gill Road to near Bishop 53 Road, Knox County, Tennessee. Center for Transportation Research, University of Tennessee, Knoxville.

Miller, George L.
1980 Classification and Economic Scaling of 19th Century Ceramics. *Historical Archaeology* 14:1-40.

Miller, George L., Patricia Samford, Ellen Shlasko, and Andrew Madsen
2000 Telling Time for Archaeologists. *Northeast Historical Archaeologist* 29:1-22.

Moir, Randall W.
1987 Socioeconomic and Chronometric Patterning of Window Glass. In *Historic Buildings, Material Culture, and People of the Prairie Margin: Architecture, Artifacts, and Synthesis of Historic Archaeology*, Randall W. Moir and David H. Jurney, editors, pp. 73-81. Richland Creek Technical Series, Vol. V. Archaeology Research Program, Institute for the Study of Earth and Man, Southern Methodist University, Dallas, TX.

Moore, Mary B. D.
1947 Record of Commissions of Officers in the Tennessee Militia, 1796-1811, Vol. 1. Tennessee Historical Commission, Nashville, TN.

Morgan, John
1990 *The Log House in East Tennessee*. The University of Tennessee Press, Knoxville.

Morris, Eastin
1834 *The Tennessee Gazetteer, or Topographical Directory; Containing a Description of the Several Counties, Towns, and Villages, Post Offices, Rivers, Creeks, Mountains, Valleys, &c. in the State of Tennessee, Alphabetically Arranged; to Which is Prefixed a General Description of the State*. W. Hasell Hunt and Company, Nashville, TN.

Nance, Benjamin C. and Samuel D. Smith
2005 Test Excavations on Roper's Knob: A Fortified Union Signal Station in Franklin, Tennessee. Report of Investigations No. 10. Tennessee Department of Environment and Conservation, Division of Archaeology, Nashville.

Nash, Steven E.
1999 *Time, Trees, and Prehistory: Tree-Ring Dating and the Development of North American Archaeology, 1914-1950*. University of Utah Press, Salt Lake City.

National Register of Historic Places
2008 Tennessee, Washington County: Tipton-Haynes House. <http://nationalregisterofhistoricplaces.com/TN/Washington/state.html>. Accessed 15 Oct. 2008.

Nelson, Lee H.
1968 Nail Chronology as an Aid to Dating Old Buildings. Technical Leaflet 48, American Association for State and Local History. *History News* 24(11).

Noël Hume, Ivor
1969 *A Guide to Dating Artifacts of Colonial America*. University of Pennsylvania Press, Philadelphia.

1973 Creamware to Pearlware: A Williamsburg Perspective. In *Ceramics in America*, Ian M.G. Quimby, editor, pp. 217-254. Winterthur Conference Report 1972. The University Press of Virginia, Charlottesville.

Orser, Charles E., Jr. (editor)
1990 Historical Archaeology on Southern Plantations and Farms. *Historical Archaeologist* 24(4):1-126.

2002 *Encyclopedia of Historical Archaeology*. Routledge, New York, NY.

Orser, Charles E., Jr.
1996 *A Historical Archaeology of the Modern World*. Plenum Press, New York, NY.

Orvis, Kenneth H., and Henri D. Grissino-Mayer
2002 Standardizing the reporting of abrasive papers used to surface tree-ring samples. *Tree-Ring Research* 58: 47–50.

Owens, Dalford Dean, Jr.
1995 The 1994 Archaeological Investigations at the Tipton-Haynes (40WG59), Johnson City, Tennessee. *Tennessee Anthropological Association Newsletter* 20(2):1-7.

1996 The 1994 Archaeological Investigations at the Tipton-Haynes (40WG59), Johnson City, Tennessee. On file at the Tennessee Division of Archaeology, Nashville.

Panshin, Alexis J. and Carl De Zeeuw
1980 *Textbook of Wood Technology: Structure, Identification, Properties, and Uses of the Commercial woods of the United States and Canada*, 4th edition. McGraw-Hill, Inc., New York, NY.

Parrish, John
2008 *A Biographical Sketch of the Life of Colonel John Tipton*. John Parrish, Ashville, NC.

2009 Colonel John Tipton. <http://www.coloneljohntipton.com>. Accessed 9 Sept. 2009.

Patrick, James
1981 *Architecture in Tennessee*. The University of Tennessee Press, Knoxville.

Poole, Cary Franklin
1995 *A History of Railroading in Western North Carolina*. The Overmountain Press, Johnson City, TN.

Price, Cynthia R.
1979 19th Century Ceramics in the Eastern Ozark Border Region. Monograph Series No. 1. Center for Archaeological Research, Southwest Missouri State University, Springfield.

Price, Prentiss
1952 Samuel Shaver: Portrait Painter. East Tennessee Historical Society's Publications No. 24, pp. 92-105. East Tennessee Historical Society, Knoxville.

Priess, Peter J.
2000 Historic Door Hardware. *Studies in Material Culture Research*, Karlis Karklins, editor, pp. 46-95. The Society for Historical Archaeology, Uniontown, PA.

Prown, Jules David
1988 Mind in Matter: An Introduction to Material Culture Theory and Method. In *Material Life in America, 1600-1860*, Robert Blair St. George, editor, pp. 17-37. Northeastern University Press, Boston, MA.

Rae, Loraine
1991 *Washington County, Tennessee: Deeds, 1775-1800*. Southern Historical Press, Inc., Greenville, SC.

Ramsey, James G.M.
1853 *Annals of Tennessee to the End of the Eighteenth Century*. Walker and Jones, Charleston, SC. Reprinted 1967 by East Tennessee Historical Society, Knoxville.

Ramsay, John
1939 *American Potters and Pottery*. Hale, Cushman, and Flint. New York, NY.

Riley, Noel
1991 *Gifts for Good Children, The History of Children's China, Part 1, 1790-1890*. Privately printed, Somerset, UK.

Russell, Aaron E.
2000 Material Culture and African-American Spirituality at the Hermitage. In *Approaches to Material Culture Research for Historical Archaeologists*, 2nd edition, David R. Brauner, editor, pp. 423-440. Society for Historical Archaeology, Uniontown, PA.

Samford, Patricia M.
1997 Response to a Market: Dating English Underglaze Transfer Printed Wares. *Historical Archaeology* 31(2):1-30.

2004 Engendering Enslaved Communities on Virginia's and North Carolina's Eighteenth- and Nineteenth-Century Plantations. In *Engendering African American Archaeology: A Southern Perspective*, Jillian E. Galle and Amy L. Young, editors, pp.151-176. The University of Tennessee Press, Knoxville.

2007 *Subfloor Pits and the Archaeology of Slavery in Colonial Virginia*. The University of Alabama Press, Tuscaloosa.

Sayers, Daniel O.
2003 Glimpses Into the Dialectics of Antebellum Landscape Nucleation in Agrarian Michigan. *Journal of Archaeological Method and Theory* 10(4):369-432.

Sayers, Jerry Alan
2002 Disunited States: The Lost State of Franklin and Frontier State Movements at the Dawn of the American Republic. Master's Thesis, Department of History, University of Virginia, Charlottesville.

Shenandoah County Deed Book
Book L. Shenandoah County Archives, Woodstock, VA.

Singleton, Theresa
1985 *The Archaeology of Slavery and Plantation Life*. Academic Press, New York, NY.

Slayton, Jessica D., Maggie R. Stevens, Henri D. Grissino-Mayer, and Charles H. Faulkner
2009 The Historical Dendroarchaeology of Two Log Structures at the Marble Springs Historic Site, Knox County, Tennessee, U.S.A. *Tree-Ring Research* 65(1):23-36.

Smith, Samuel D.
1983 Excavations of a Mid-Nineteenth Century Trash Pit, Wynnewood State Historic Site, Sumner County, Tennessee. *Tennessee Anthropologist* 8(2):133-181.

1993 Fort Southwest Point Archaeological Site, Kingston, Tennessee: A Multidisciplinary Interpretation. Research Series No. 9. Tennessee Department of Environment and Conservation, Division of Archaeology, Nashville.

Smith, Samuel D. and Benjamin C. Nance
2000 An Archaeological Interpretation of the Site of Fort Blount, A 1790s Territorial Militia and Federal Military Post, Jackson County, Tennessee. Research Series No. 12. Tennessee Department of Environment and Conservation, Division of Archaeology, Nashville.

Smith, Samuel D. and Stephen T. Rogers
1979 A Survey of Pottery Making in Tennessee. Research Series, No. 3. Tennessee Department of Environment and Conservation, Division of Archaeology, Nashville.

Smithsonian Institution Research Information System (SIRIS)
2009a Landon Carter Haynes, (painting). Art Inventories Catalog, Smithsonian American Art Museum, Washington, D. C. <http://siris-artinventories.si.edu/ipac20/ipac.jsp?session=129M80W08278J.62147&profile=ariall&source=~!siartinventories&view=subscriptionsummary&uri=full=3100001~!61476~!1&ri=2&aspect=Browse&menu=search&ipp=20&spp=20&staffonly=&term=Shaver%2C+Samuel+M.%2C+ca.+1816-1878%2C+painter.&index=&uindex=&aspect=Browse&menu=search&ri=2#focus>. Assessed 18 June 2009.

2009b Mrs. Landon Carter Haynes (Eleanor Powell), (painting). Art Inventories Catalog, Smithsonian American Art Museum, Washington, D. C. <http://siris-artinventories.si.edu/ipac20/ipac.jsp?session=129M80W08278J.62147&profile=ariall&source=~!siartinventories&view=subscriptionsummary&uri=full=3100001~!61477~!2&ri=2&aspect=Browse&menu=search&ipp=20&spp=20&staffonly=&term=Shaver%2C+Samuel+M.%2C+ca.+1816-1878%2C+painter.&index=&uindex=&aspect=Browse&menu=search&ri=2#focus>. Assessed 18 June 2009.

Snyder, Jeffrey B.
1997 *Romantic Staffordshire Ceramics*. Schiffer Publishing, Ltd., Atglen, PA.

Somers, Lewis
2006 Resistivity Survey. In *Remote Sensing in Archaeology: An Explicitly North American Perspective*, Jay K. Johnson, editor, pp. 109-129. The University of Alabama Press, Tuscaloosa.

South, Stanley
1977 *Method and Theory in Historical Archaeology*. Academic Press, New York, NY.

Speer, Ed
2000 Tipton-Haynes Historic Site. Tipton-Haynes Historical Association. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Stahl, Ray
1986 *Greater Johnson City: A Pictorial History*, 2nd edition. The Donning Company/ Publishers, Norfolk, VA.

Stine, Linda F., Melanie A. Cabak, and Mark D. Groover
2000 Blue Beads as African-American Cultural Symbols. In *Approaches to Material Culture Research for Historical Archaeologists*, 2nd edition, David R. Brauner, editor, pp.221-247. Society for Historical Archaeology, Uniontown, PA.

Stokes, Marvin A., and Terah L. Smiley.
1968 *An Introduction to Tree-Ring Dating*. University of Chicago Press, Chicago. Reprinted 1996 by University of Arizona Press, Tuscon.

Stone, Lyle M.
1974 *Fort Michilimackinac 1715-1781: An Archaeological Perspective on the Revolutionary Frontier*. Michigan State University, Lansing, MI.

Story, Chuck
1989 Tipton-Haynes Project Group Technology Practicum. On file at the Tennessee Historical Commission, Nashville, TN.

Stow, Cynthia Kesley
2004 The Samuel Shaver Portraits of the Haynes Family. Cumberland Art Conservation Center, Nashville, TN.

Strother, David Hunter
1857 A Winter in the South. *Harper's New Monthly Magazine,* 15(90):721-740.

Strutt, Michael
2010 Slave Housing in Antebellum Tennessee. In *Cabin, Quarter, Plantation: Architecture and Landscapes of North American Slavery*, Clifton Ellis and Rebecca Ginsberg, editors, pp. 223-232. Yale University Press, New Haven, CT.

Sullivan County Deed Book (SCDB)
Book 3. Sullivan County Archives, Blountville, TN.

Sussman, Lynne
1997 *Mocha, Banded, Cat's Eye, and other Factory-Made Slipware*. Studies in Northeast Historical Archaeology, No.1. Council for Northeast Archaeology, Boston, MA.

Temple, Oliver P.
1912 *Notable Men of Tennessee from 1833 to 1875: Their Times and Their Contemporaries*. The Cosmopolitan Press, New York, NY.

Tennessee Civil and Military Commission Book
Vol. 1, Book 1. Tennessee State Library and Archives, Nashville.

Tennessee Historical Commission Minutes
1943 Minutes of meeting of Executive Committee of the Tennessee Historical Commission. Nashville, TN. November 8, 1943, pp. A33-A34. On file at the Tennessee Historical Commission, Nashville.

Tennessee State Library and Archives (TSLA)
2009 County Formation in Acts of Tennessee, Carter County, Acts of Tennessee 1796 (March Session), Chapter 31. Tennessee State Library and Archives, Nashville. <http://www.tennessee.gov/tsla/history/county/actcarter.htm>. Accessed 19 Dec. 2009.

Thomas, Brian W. and Larissa Thomas
2004 Gender and Presentation of Self: An Example from the Hermitage. In *Engendering African American Archaeology: A Southern Perspective*, Jillian E. Galle and Amy L. Young, editors, pp.101-132. The University of Tennessee Press, Knoxville.

Thompson, Edgar T.
1975 *Plantation Societies, Race Relations and the South: The Regimentation of Populations*. Duke University, Durham, NC.

Thompson, Evelyn S.
1993 The Story of John Tipton, Jr. In *Families and History of Sullivan County, Tennessee*, Vol.1, 1779-1992, p. 1424, compiled by Holston Territory Genealogical Society. Walsworth Publishing Company, Waynesville, NC.

1998 The Story of John Tipton, Jr. *Bulletin of the Watauga Association of Genealogists* 27(2):128-133.

TNGenWeb Project
2007 Greene County, East Tennessee. Maps of Greene County and Surrounds: Map of the State of Franklin ca 1788. TnGenWeb website. <http://www.tngenweb.org/greene/maps/franklin-1788.html>. Accessed 29 Oct. 2010.

Tomlinson, Sally Ryan
2008 Notes of Speaker John Tipton, Jr. <http://www.coloneljohntipton.com/2008/09/16/updated-bio/>. Accessed 11 Dec. 2008.

Toncray, Gertrude B.
1987 Landon C. Haynes "Silver-Tongued Orator of the South." Confederacy Magazine, May 1987:66-67. Johnson City Chapter #754, Johnson City, TN. On file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Toomey, Michael
1998 State of Franklin. In *Tennessee Encyclopedia of History and Culture*, Carroll Van West, editor, pp. 337-339. Tennessee Historical Society, Rutledge Hill Press, Nashville.

2010 State of Franklin. North Carolina History Project, John Locke Foundation. Raleigh, NC. <http://www.northcarolinahistory.org/encyclopedia/99/entry>. Accessed 10 Aug. 2010.

Turner, Fredrick Jackson
1920 *The Frontier in American History*. Holt, Rinchart, and Winston. New York, NY.

United States Bureau of the Census (USBC)
1830 Fifth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1840 Sixth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1850a Seventh Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1850b Seventh Census of the United States, Agricultural Census, Stewart-Wilson Counties, TN National Archives and Records Administration, Washington, DC.

1850c Seventh Census of the United States, Slave Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1860a Eighth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1860b Eighth Census of the United States, Slave Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1880 Tenth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1900 Twelfth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1910 Thirteenth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1920 Fourteenth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

1930 Fifteenth Census of the United States, Population Schedules, Washington County, TN. National Archives and Records Administration, Washington, DC.

Virginia Gazette
1774 No Title. *Virginia Gazette* 430:1-2. Williamsburg, VA.

Washington County Court Minutes (WCCM)
1814 Court of Pleas and Quarter Sessions Minutes, February, 1814. Washington County Archives, Jonesboro, TN.

1820 Court of Pleas and Quarter Sessions Minutes, April, 1820. Washington County Archives, Jonesboro, TN.

1851 Minutes, December 1, 1851. Washington County Archives, Jonesboro, TN.

Washington County Deed Book (WCDB)
Books 1, 8, 18-22, 33, 40, 48, 227, 321, 347, 407. Washington County Archives, Jonesboro, TN.

Washington County Inventory Book (WCIB)
Book 1 (1826-1834). Washington County Archives, Jonesboro, TN

Washington County Miscellaneous Book (WCMB)
Book 77. Washington County Archives, Jonesboro, TN

Washington County Will Book (WCWB)
Book 1. Washington County Archives, Jonesboro, TN.

Watauga Association of Genealogists
1975a Washington County Tennessee Tax Lists – 1840. Bulletin of Watauga Association Genealogists 4(1):17.

1975b Washington County Tennessee Tax Lists – 1850. Bulletin of Watauga Association Genealogists 4(2):12.

Wayland, John W.
1927 *A History of Shenandoah County, Virginia*. Shenandoah Publishing House, Strasburg, VA.

Wells, Tom
1998 Nail Chronology: The Use of Technologically Derived Features. *Historical Archaeology* 32(2):78-99.

West, Carroll Van
1998 John Tipton. In *Tennessee Encyclopedia of History and Culture*, Carroll Van West, editor, pp. 980-981. Tennessee Historical Society, Rutledge Hill Press, Nashville.

White, Carolyn L.
2005 *American Artifacts of Personal Adornment, 1620-1820: A Guide to Identification and Interpretation*. AltaMira Press, Lanham, MD.

White, Marshall S.
1980 *Wood Identification Handbook: Commercial Woods of the United States*. Charles Scribner's Sons, New York, NY.

White, Virgil D.
1987 *Index to Volunteer Soldiers, 1784-1811*. National Historical Publishing Company, Waynesboro, TN.

Williams, Petra
1978 *Staffordshire Romantic Transfer Patterns: Cup, Plates, and Early Victorian China*, Vol. 1. Fountain House East, Louisville, KY.

Williams, Petra and Marguerite R. Weber
1986 *Staffordshire Romantic Transfer Patterns II: Cup, Plates, and Early Victorian China, Vol 2*. Fountain House East, Louisville, KY.

Williams, Samuel Cole
1928 *Early Travels in the Tennessee Country: 1540-1800*. The Watauga Press, Johnson City, TN.

1933 *History of the Lost State of Franklin*, revised from 1924 edition. The Press of the Pioneers, New York, NY. Reprinted 1974 by Porcupine Press, Inc., Philadelphia, PA.

1940 *Johnson City and Its Environs*. The Watauga Press, Johnson City, TN.

Wilson, John
1990 We've Got Thousands of These! What Makes an Historic Farmstead Significant? *Historical Archaeologist* 24(2):23-33.

Works Progress Administration (WPA)
1937-1941 Washington County Minutes of the Court of Pleas and Quarter Sessions, 1798-1842. The Tennessee Historical Records Survey (WPA), Nashville.

1938 Washington County Inventories of Estates, 1779-1821, Vol.00. The Tennessee Historical Records Survey (WPA), Nashville.

1939a Tennessee Records of Washington County Settlements of Estates, 1790-1841, Vol. 00. The Tennessee Historical Records Survey (WPA), Nashville.

1939b Records of Washington County Inventories of Estates, 1826-1843, Vol. 1. The Tennessee Historical Records Survey (WPA), Nashville.

1940 General Index to Deeds and Mortgages, 1779-1866, Vol. 1. The Tennessee Historical Records Survey (WPA), Nashville.

Yerka, Stephen J.
2010 Geophysical Study at Old Stone Fort State Archaeological Park, Manchester, Tennessee. Master's Thesis, Department of Anthropology, University of Tennessee, Knoxville.

Young, Amy L.
1993 Archaeological Testing of the Tipton-Haynes Cemetery by Students in the Governor's School for Tennessee Studies. *Tennessee Anthropological Association Newsletter,* 18(4):1-4.

1996 Archaeological Evidence of African-Style Ritual and Healing Practices in the Upland South. *Tennessee Anthropologist* 21(2):139-155.

2004 Risk and Women's Roles in the Slave Family: Data from Oxmoor and Locust Grove Plantations in Kentucky. In *Engendering African American Archaeology: A Southern Perspective*, Jillian E. Galle and Amy L. Young, editors, pp.133-150. The University of Tennessee Press, Knoxville.

Zierden, Martha and Linda F. Stine
1997 Introduction: Historical Landscapes through the Prism of Archaeology. In *Carolina's Historical Landscapes: Archaeological Perspectives*, Linda F. Stine, Martha Zierden, Lesley M. Drucker, and Christopher Judge, editors, pp. xi-xvi. The University of Tennessee Press, Knoxville.

APPENDIX

Appendix I. Transcription of "Tipton-Sevier Battle."

Draper, Lyman C.
1944-1949 The Tipton-Sevier Battle. Draper Manuscripts XX, Vol. 30S:54-63. State Historical Society of Wisconsin, Madison. Copy on file at the Tipton-Haynes State Historic Site, Johnson City, TN.

Note: The narration is transcribed directly from the handwritten papers by Draper. The words in brackets [ ] were added by transcriber mainly for words which were not readable. This section and other information related to the early history of Tennessee is on microfilm located at the ETSU library.

Tipton's court used to be held at Wm. Davis' on Buffalo creek, now in Carter County – three miles from Col. Tipton's, and some 11 miles East of Jonesboro. At one of these courts at Davis,' John Tipton and John Sevier, sons of the rival leaders, had a fist fight about a drawn battle.

Gen. Sevier with his men, probably 150 as stated by Haywood, and Cols. Chs. Robinson, Samuel Wear, and Major Elholm under him, camped some three or four hundred yards from Tipton's house, in a sunken or hollow place, which protected them from annoyance from Tipton's. At Col. Tipton's when Sevier first came, were Col. Rob. Love, James Stuart and old member of the Legislature both of North Carolina and Tennessee and Capt. Peter Parkeson [Parkinson] Alex Moffat with Jacob and John Tipton, the sons of the old Colonel, and perhaps Isaac Tipton and very likely a few others – Gen. L. [Love] thinks there certainly could not have been more than 15 persons with Tipton if that.

Col. Tipton's house was a large size house, some 25 by 30 feet, hewn logs a story and a half – no windows below – a two or three window holes, round, in each gable and above – a door in front. Gen. Love inclines strongly to the opinion that the battle was the first week in March and if Col. Jonathan is correct as to the time that Sevier made his appearance, ie 28th of Febe. 1788 and taking the time as occurrences took place as stated by Haywood and that being leap

year, the battle must have been fought the morning of March 3 – or possibly the morning of 2 March.

The surrender – refusal and correspondence all took place as stated by Haywood. During the siege, Sevier kept out scouts and sentinels to watch and prevent reinforcements – of nights, however, Tipton's friends came in one by one, undiscovered, through the fields – Jonathan Pugh, the N.C. sheriff of Washington County was of the number. A couple of women going there in daytime probably to see some of their friends, one of them was wounded in the shoulder by Sevier sentinels at the Limestone rocks.

Thos. Love who then resided the Greasy Cove on Chucky, just before the mouth of West Indian Creek and some 15 ms [miles] from Tipton's hearing of the trouble at Tiptons and his brother being among the besieged, raised a party of 10 or a dozen men in his neighborhood and started for Tiptons in the evening late – reached Maj. Thos. Stuart, within five miles of Tipton's, a brother of James Stuart, he and a few others joined there and on the way to the scene of war – making altogether some 18 men. Before reaching Stuart's met Col. Robe. Love, who had just stole out from the house and was going to the Greasy Cove settlement where he lived to raise men – Col. Love gave his brother the necessary information as to Sevier's position – the rocks and sentinels there – and the Col. R. L. [Love] went on toward the settlements – no one with him. When Thos. Love and party reached the summit of the high ground a few hundred yards – perhaps two or three – near to the Limestone rocks and on the road East of the rocks and reconnoiter. It was about three o'clock in the morning, dark and snowy and very cold. Love proposed he would go to the rocks, if any one would go with him – it was deemed a dangerous service and all excused themselves, some from bad guns, poor horses, etc. It was now talked of, about returning home –when Love said they had come to aid Tipton, and he was anxious to do it,

and if they would wait there, he would go alone and ascertain whether any sentry was placed at the rocks. He dashed off down a gradually descending road, on a fine prancing horse, with his musket loaded with 7 buck shot and two balls and finger on the trigger cocked and resting across the pommel of his saddle 0 when got opposite in the road, reined up hemmed and coughed to attract the attention of the sentry if there was one, intending if hailed to shoot at random and dash on to Tiptons – but there was no sentry, but a few minutes before young John Sevier and the sentinels with him had gone to camp to warm themselves. Love returned to his companions, with the intelligence that there was no sentry, and all put spurs to their horses and raising a low shout dashed on past the rocks, into the lane and down to the house, where they were gladly received. Tipton had already some 35 men there and this reinforcement under Love gave him such fresh vigor, that he declared he would fight Sevier in the morning.

Until morning, with their large comfortable fires, and talking and preparing for the fight, they kept up a vigilant watch Tipton's men, it is not recollected, fired at all on Seviers men during the siege. Just at day light the snow began to fall, and at this time a small party of horse from Sevier's camp pranced though the field between the house and Sevier's camp, and fired off a volley at the house, the balls striking the roof and gable end – without doing harm and then move on, on a scout. By this time, Col. Maxwell, Col Scott and Maj. Pemberton, with a party of about 100 men from Sullivan (some 40 min off) were within a mile and hearing the firing, concluded the battle had begun – dashed on to the rear of Sevier's camp and at a long shot, fired upon Sevier's men. At this announcement, Tipton opened the door, ran out and turning himself exclaimed "Boys, Every man who is a soldier come out" – and all dashed down the lane toward the camp, a portion under Col. Tipton cutting across the field from the stables to head Sevier's

men and Love with another portion dashed on down the lane to the camp and then took part in the fight and pursuit with [three words unreadable].

Maxwell's men had just before firing, mostly dismounted, some tied to their horses to trees and some let them go – the fire from Maxwell's men, together with their loud shouts made a great noise, - but the shot – some 200 yards, was too far for execution. Sevier's men returned fire and the fighting, or firing lasted a few minutes – Sevier's men taken by surprise, and in confusion and seeing the Sullivan men on their West and Tipton's men from the house on their East, they fled scattered, towards the North through the woods and along the fence, until they crossed and descended a ridge some two or three hundred yards from camp – The men pursued on foot as far as the ridge, and then returned, and made up a horse company and renewed the pursuit and took a few prisoners in the woods.

John Webb of Maxwell's men was mortally wounded on the top of his head and died the same day; and Dr. Delaney of the same party was slightly wounded in the arm. Jonathan Pugh of Tipton's party was shot through the breast and survived but a few days.

In a few minutes after the rout of Sevier, and when the victors were around the camp fires, when the troop of horsemen who fired upon Tipton's house and had just returned from a search – rode up to a camp, and did not discover their mistake until the presented guns of Tipton's men and an order to surrender, compelled them to dismount and give themselves up – one of the mounted men named Vaun, either from the fright of his horse or intentionally dashed off, through within 30 paces, and a volley of guns were shot – making the wool fly in every direction from his red coat, and slightly wounding his horse, and himself in the arm. He made his escape. He was the only one of Seviers men injured.

Gen. Love is very certain nay – positive it is erroneously stated by Haywood, that Sevier made an attack on Tipton's house, when Maxwell came upon him. Nor can be think there was anything like a battery formed, nor even a piece of ordinance.

Among the prisoners taken (and Gen. Love thinks between 20 and 30) were James and John Sevier, whom Tipton determined to hang probably incensed to so rash on act, from seeing his right hand man Pugh mortally wounded, and Webb almost expiring. The young men heard of this and sent for Thos. Love to intercede for their lives – Love took the Colonel to one side, represented the rashness of such an act – and appealed to him, how he would feel, supposing Sevier had possession of his sons and should execute them for their father's acts? With tears trickling down his cheeks, Tipton replied. "I'll desist from this act – from my impulsive feelings. I'm no more fit for a commander than a hog is for a King." Tipton was brave to a fault, and though it was his misfortune to be rash in his acts, he was always ready to yield to the dictates of reason and humanity, when properly make known to him.

The young Seviers, and all the other prisoners were liberated that evening and the horses, some 40 or 50, and other articles left in Sevier's camp, were given up to their owners. Robert Young, as stated by Haywood, came in with a flag – and no doubt the proposition sent by Sevier, led to this procedure. Robt. Love did not return till after the fight.

[One word unreadable] he added, that when the fight took place early in the morning, it was quite a dark morning, and the snow falling rapidly and in large flakes, and fully an inch on the ground. When Tiptons first made their appearance, the Sullivan men mistook them for a part of Sevier's troops and came near fining on them, and would have done so but for the active exertions of Maxwell, Scott and Robertson, who on horseback, waved their hats and bid them desist, as they were friends.

Appendix II. Initial suggested dates for the farmhouse core samples provided by COFECHA.

```
[]  Dendrochronology Program Library                                        Run TCTNM  Program COF  20:59  Thu 13 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                          Version 6.06P    27255
----------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           TCTNM

 File of DATED series:   TNMaster.txt

 File of UNDATED series: TiptonCabinFinal.txt

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics
    Part 8:  Undated series - adjustments for highest correlations

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                             12345678
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Text in file: NORRISAA NORRIS DAM STATE PARK                   0526AA01    QUAL

 Text in file: NORRISAA TENNESSEE    WHITE OAK         0220M 03613-08405          1633 1980

 Text in file: NORRISAA DANIEL N. DUVICK                                               APR1981

 Text in file: combined.rwl Std R Chron                                         [14Sep07-0917]
```

```
Time span of Master dating series is  1633 to  1980   348 years
Continuous time span is               1633 to  1980   348 years
Portion with two or more series is    1667 to  1829   163 years

                                       ****************************************
                                       *C* Number of dated series        2 *C*
                                       *O* Master series 1633 1980  348 yrs *O*
                                       *F* Total rings in all series    511 *F*
                                       *E* Total dated rings checked    326 *E*
                                       *C* Series intercorrelation     .314 *C*
                                       *H* Average mean sensitivity    .152 *H*
                                       *A* Segments, possible problems   22 *A*
                                       *** Mean length of series      255.5 ***
                                       ****************************************

ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value
```

```
PART 2:  TIME PLOT OF TREE-RING SERIES: TCTNM                                                   20:59  Thu 13 Aug 2009  Page   2
-----------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .  <===================================> .    . NORRIS     1 1633 1980  348
   .    .    .    .    .    .    .    .    .    .    .    .    .<================> .    .    .    .    . TEST S     2 1667 1829  163
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

PART 3: Master Dating Series: TCTNM   20:59 Thu 13 Aug 2009 Page   3

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1650	.153	1	1700	-.588	2	1750	.395	2	1800	.969	2	1850	-.773	1
			1651	-3.012	1	1701	-.210	2	1751	-.225	2	1801	.323	2	1851	-2.740	1
			1652	-3.154	1	1702	-.599	2	1752	-.444	2	1802	1.317	2	1852	.341	1
			1653	-.298	1	1703	-.790	2	1753	-.537	2	1803	.513	2	1853	-1.531	1
			1654	-1.445	1	1704	.187	2	1754	-1.501	2	1804	-.549	2	1854	-.091	1
			1655	.128	1	1705	1.013	2	1755	-2.046	2	1805	.603	2	1855	1.243	1
			1656	-.714	1	1706	-.483	2	1756	.408	2	1806	-.242	2	1856	.201	1
			1657	1.576	1	1707	.640	2	1757	.471	2	1807	-1.647	2	1857	1.633	1
			1658	-.226	1	1708	-1.643	2	1758	1.564	2	1808	.699	2	1858	.063	1
			1659	.534	1	1709	-.336	2	1759	1.003	2	1809	.745	2	1859	-1.300	1
			1660	-1.022	1	1710	1.138	2	1760	-.009	2	1810	.023	2	1860	1.574	1
			1661	.761	1	1711	.688	2	1761	.821	2	1811	.814	2	1861	-.674	1

			1662	.023	1	1712	-.228	2	1762	-1.091	2	1812	-1.715	2	1862	.410	1
			1663	-.016	1	1713	-.825	2	1763	.702	2	1813	-1.524	2	1863	.569	1
			1664	.507	1	1714	.122	2	1764	.113	2	1814	-.287	2	1864	-.674	1
			1665	1.467	1	1715	-1.272	2	1765	.294	2	1815	-.074	2	1865	-.654	1
			1666	.947	1	1716	.370	2	1766	-.547	2	1816	.010	2	1866	.393	1
			1667	.175	2	1717	1.474	2	1767	-.661	2	1817	1.442	2	1867	.543	1
			1668	-1.724	2	1718	-.125	2	1768	.978	2	1818	.586	2	1868	.594	1
			1669	1.338	2	1719	1.498	2	1769	.811	2	1819	-.455	2	1869	2.384	1
			1670	-.140	2	1720	-.671	2	1770	1.126	2	1820	.991	2	1870	.323	1
			1671	-.562	2	1721	-.632	2	1771	.050	2	1821	-.868	2	1871	-.466	1
			1672	-.775	2	1722	-.061	2	1772	-.221	2	1822	-.002	2	1872	-1.789	1
			1673	1.079	2	1723	-.581	2	1773	-.642	2	1823	.328	2	1873	.099	1
			1674	.071	2	1724	-1.877	2	1774	-2.521	2	1824	1.179	2	1874	-1.244	1
			1675	1.034	2	1725	-.467	2	1775	-1.314	2	1825	-.663	2	1875	-.591	1
			1676	-.634	2	1726	-.812	2	1776	-.164	2	1826	-1.219	2	1876	.553	1
			1677	1.380	2	1727	1.079	2	1777	-.424	2	1827	-.197	2	1877	.023	1
			1678	.808	2	1728	.540	2	1778	.731	2	1828	-.243	2	1878	.729	1
			1679	-.291	2	1729	.813	2	1779	-.138	2	1829	.107	2	1879	-2.341	1
			1680	.165	2	1730	-.298	2	1780	.701	2	1830	.657	1	1880	-2.082	1
			1681	-1.455	2	1731	.167	2	1781	.993	2	1831	.461	1	1881	.082	1
			1682	-.680	2	1732	.159	2	1782	1.485	2	1832	.530	1	1882	1.736	1
1633	-.195	1	1683	.057	2	1733	1.126	2	1783	.673	2	1833	-1.231	1	1883	1.306	1
1634	.109	1	1684	-.136	2	1734	1.210	2	1784	-.347	2	1834	-.110	1	1884	1.057	1
1635	-1.636	1	1685	-.952	2	1735	-.530	2	1785	-.339	2	1835	.316	1	1885	-.090	1
1636	-.650	1	1686	-1.296	2	1736	-1.288	2	1786	.055	2	1836	.571	1	1886	-.112	1
1637	-1.130	1	1687	-.636	2	1737	-.751	2	1787	.701	2	1837	.325	1	1887	-.535	1
1638	.740	1	1688	.428	2	1738	-.148	2	1788	.463	2	1838	.641	1	1888	-.659	1
1639	1.208	1	1689	.524	2	1739	.998	2	1789	.224	2	1839	-3.191	1	1889	.794	1
1640	.589	1	1690	.383	2	1740	.839	2	1790	-1.387	2	1840	1.366	1	1890	.031	1
1641	2.693	1	1691	.821	2	1741	.954	2	1791	-1.430	2	1841	.044	1	1891	.660	1
1642	.526	1	1692	1.267	2	1742	1.223	2	1792	-.853	2	1842	1.292	1	1892	1.674	1
1643	.545	1	1693	-1.222	2	1743	-1.013	2	1793	.656	2	1843	2.039	1	1893	.745	1
1644	-.421	1	1694	.696	2	1744	-.675	2	1794	.465	2	1844	-1.316	1	1894	-2.041	1
1645	-.794	1	1695	1.009	2	1745	1.312	2	1795	-.537	2	1845	.437	1	1895	-.237	1
1646	.177	1	1696	.768	2	1746	-.463	2	1796	-.261	2	1846	.073	1	1896	-1.038	1
1647	.238	1	1697	.762	2	1747	.597	2	1797	.310	2	1847	.195	1	1897	1.439	1
1648	.578	1	1698	.085	2	1748	-.929	2	1798	.040	2	1848	-.852	1	1898	-1.144	1
1649	.749	1	1699	-1.023	2	1749	-.758	2	1799	-.767	2	1849	.447	1	1899	.001	1

PART 3: Master Dating Series: TCTNM 20:59 Thu 13 Aug 2009 Page 4

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
1900	-1.523	1	1950	-.485	1												
1901	.100	1	1951	1.352	1												
1902	-.150	1	1952	-1.214	1												
1903	1.600	1	1953	-.045	1												

1904	.942	1
1905	.537	1
1906	.484	1
1907	-.697	1
1908	-.257	1
1909	.114	1
1910	1.095	1
1911	-3.704	1
1912	-.491	1
1913	-.633	1
1914	-.908	1
1915	.514	1
1916	1.133	1
1917	2.641	1
1918	-.363	1
1919	.309	1
1920	.122	1
1921	-.855	1
1922	.995	1
1923	.308	1
1924	.542	1
1925	-1.643	1
1926	.206	1
1927	-.560	1
1928	.786	1
1929	-.681	1
1930	-1.367	1
1931	.010	1
1932	1.000	1
1933	-.902	1
1934	-.047	1
1935	1.296	1
1936	-1.730	1
1937	1.272	1
1938	1.246	1
1939	-.608	1
1940	.636	1
1941	-.386	1
1942	.349	1
1943	-.566	1
1944	-1.803	1
1945	1.882	1
1946	.800	1
1947	-.141	1
1948	-1.318	1
1949	-.664	1
1954	.587	1
1955	1.311	1
1956	-.239	1
1957	-.050	1
1958	1.314	1
1959	-.814	1
1960	-.112	1
1961	.573	1
1962	.657	1
1963	.130	1
1964	-2.574	1
1965	.958	1
1966	-1.724	1
1967	1.431	1
1968	.609	1
1969	-1.486	1
1970	-.443	1
1971	.339	1
1972	.148	1
1973	-.288	1
1974	-.740	1
1975	1.158	1
1976	2.077	1
1977	.549	1
1978	.277	1
1979	-1.085	1
1980	-.927	1

```
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1650-----A      1700--b         1750------B     1800---------D  1850--c         1900f           1950---b
                   1651l           1701----a       1751----a       1801------A     1851k           1901-----@      1951----------E
                   1652m           1702--b         1752---b        1802----------E 1852------A     1902----a       1952-e
                   1653----a       1703--c         1753---b        1803-------B    1853f           1903----------F 1953----@
                   1654f           1704-----A      1754f           1804---b        1854----@       1904---------D  1954-------B
                   1655-----A      1705---------D  1755h           1805-------B    1855---------E  1905-------B    1955----------E
                   1656--c         1706---b        1756------B     1806----a       1856------A     1906-------B    1956----a
                   1657----------F 1707-------C    1757-------B    1807g           1857----------G 1907--c         1957----@
                   1658----a       1708g           1758----------F 1808--------C   1858-----@      1908----a       1958----------E
                   1659-------B    1709---a        1759---------D  1809--------C   1859-e          1909-----@      1959--c
                   1660-d          1710---------E  1760-----@      1810-----@      1860----------F 1910---------D  1960----@
                   1661--------C   1711--------C   1761--------C   1811--------C   1861--c         1911o           1961-------B
                   1662-----@      1712----a       1762-d          1812g           1862------B     1912---b        1962--------C
                   1663-----@      1713--c         1763--------C   1813f           1863-------B    1913--c         1963-----A
                   1664-------B    1714-----@      1764-----@      1814----a       1864--c         1914-d          1964j
                   1665----------F 1715-e          1765------A     1815----@       1865--c         1915-------B    1965---------D
                   1666---------D  1716------A     1766---b        1816-----@      1866------B     1916---------E  1966g
                   1667-----A      1717----------F 1767--c         1817----------F 1867-------B    1917----------K 1967----------F
                   1668g           1718----@       1768---------D  1818-------B    1868-------B    1918---a        1968-------B
                   1669----------E 1719----------F 1769--------C   1819---b        1869----------J 1919------A     1969f
                   1670----a       1720--c         1770---------E  1820---------D  1870------A     1920-----@      1970---b
                   1671---b        1721--c         1771-----@      1821--c         1871---b        1921--c         1971------A
                   1672--c         1722----@       1772----a       1822-----@      1872g           1922---------D  1972-----A
                   1673---------D  1723--b         1773--c         1823------A     1873-----@      1923------A     1973----a
                   1674-----@      1724h           1774j           1824---------E  1874-e          1924-------B    1974--c
                   1675---------D  1725---b        1775-e          1825--c         1875--b         1925g           1975---------E
                   1676--c         1726--c         1776----a       1826-e          1876-------B    1926------A     1976----------H
                   1677----------F 1727---------D  1777---b        1827----a       1877-----@      1927---b        1977-------B
                   1678--------C   1728-------B    1778--------C   1828----a       1878--------C   1928--------C   1978------A
                   1679----a       1729--------C   1779----a       1829-----@      1879i           1929--c         1979-d
                   1680-----A      1730----a       1780--------C   1830--------C   1880h           1930-e          1980-d
                   1681f           1731-----A      1781---------D  1831-------B    1881-----@      1931-----@
                   1682--c         1732-----A      1782----------F 1832-------B    1882----------G 1932---------D
   1633----a       1683-----@      1733---------E  1783--------C   1833-e          1883----------E 1933-d
   1634-----@      1684----a       1734---------E  1784---a        1834----@       1884---------D  1934----@
   1635g           1685-d          1735---b        1785---a        1835------A     1885----@       1935----------E
   1636--c         1686-e          1736-e          1786-----@      1836-------B    1886----@       1936g
   1637-e          1687--c         1737--c         1787--------C   1837------A     1887---b        1937---------E
   1638--------C   1688------B     1738----a       1788-------B    1838-------C    1888--c         1938---------E
   1639---------E  1689-------B    1739---------D  1789------A     1839m           1889--------C   1939--b
   1640-------B    1690------B     1740--------C   1790-f          1840----------E 1890-----@      1940-------C
   1641----------K 1691--------C   1741---------D  1791f           1841-----@      1891--------C   1941---b
   1642-------B    1692---------E  1742---------E  1792--c         1842----------E 1892----------G 1942------A
   1643-------B    1693-e          1743-d          1793--------C   1843----------H 1893--------C   1943--b
   1644---b        1694--------C   1744--c         1794-------B    1844-e          1894h           1944g
   1645--c         1695---------D  1745----------E 1795---b        1845-------B    1895----a       1945----------H
```

```
  1646-----A      1696--------C   1746---b        1796----a       1846-----@      1896-d          1946--------C
  1647------A     1697--------C   1747-------B    1797------A     1847-----A      1897----------F 1947----a
  1648-------B    1698-----@      1748-d          1798-----@      1848--c         1898-e          1948-e
  1649--------C   1699-d          1749--c         1799--c         1849-------B    1899-----@      1949--c


PART 5:  CORRELATION OF SERIES BY SEGMENTS: TCTNM                                                  20:59  Thu 13 Aug 2009  Page   5
-------------------------------------------------------------------------------------------------------------------------------------
 Correlations of  40-year dated segments, lagged  10 years
 Flags:  A = correlation under   .3665 but highest as dated;  B = correlation higher at other than dated position

 Seq Series  Time_span   1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790
                         1699 1709 1719 1729 1739 1749 1759 1769 1779 1789 1799 1809 1819 1829
 --- -------- ---------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
   1 NORRIS   1633 1980   .37A .34A .29B .42  .31A .24B .33A .30A .38  .45  .34A .31A .25B .21B
   2 TEST S   1667 1829   .37A .34B .29A .42  .31B .24A .33A .30A .38  .45  .34A .31A .25A .21B
 Av segment correlation   .37  .34  .29  .42  .31  .24  .33  .30  .38  .45  .34  .31  .25  .21


PART 6:  POTENTIAL PROBLEMS: TCTNM                                                                 20:59  Thu 13 Aug 2009  Page   6
-------------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
=====================================================================================================================================

 NORRIS    1633 to  1980     348 years                                                                                    Series   1

 [*] Early part of series cannot be checked from 1633 to 1666 -- not matched by another series

 [*] Later part of series cannot be checked from 1830 to 1980 -- not matched by another series

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
     --------- ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1667 1706    0   -.05 -.27  .15  .04 -.17 -.05  .25 -.24  .03  .11  .37*-.03  .07 -.13  .06  .07 -.05 -.31  .12  .00 -.10
    1670 1709    0   -.05 -.13  .05  .11 -.15 -.08  .23 -.29  .09  .22  .34*-.07  .00 -.02  .02  .13 -.06 -.21 -.02 -.02 -.05
    1680 1719   -7   -.05 -.08 -.29  .41*-.14 -.08  .14 -.37  .08  .30  .29|-.10 -.01  .04 -.26  .16  .01 -.34  .14 -.03 -.20
     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    1700 1739    0    .03 -.02 -.30  .12  .07 -.16  .04 -.39 -.05  .13  .31* .06 -.01  .02 -.38  .24 -.02 -.03  .14 -.22 -.19
```

```
   1710 1749    5   -.04  .01 -.20  .07  .22 -.11 -.15 -.14 -.09  .16  .24| .03  .09 -.17 -.30  .25*-.09 -.13  .18 -.22 -.18
   1720 1759    0   -.03 -.02 -.15  .05  .27 -.02 -.27 -.05 -.15  .21  .33* .17  .13 -.19 -.16  .20 -.07 -.02  .04 -.18 -.19
   1730 1769    0   -.08 -.14 -.06  .23  .16  .03 -.30 -.04 -.21  .14  .30* .18  .13 -.25 -.22  .12 -.16  .08  .16 -.04 -.15
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1760 1799    0   -.04 -.30  .07  .02 -.28 -.03 -.16  .10  .14  .21  .34* .01 -.21 -.28 -.02  .09  .11  .16 -.03  .04 -.18
   1770 1809    0   -.07 -.24  .09 -.09 -.27  .08 -.19  .07  .03  .11  .31* .09 -.16 -.01 -.14 -.02  .22 -.11  .19 -.01 -.28
   1780 1819    6   -.28 -.08 -.04  .06 -.03 -.14 -.15 -.02 -.01  .22  .25|-.04 -.02  .06 -.13  .08  .31*-.05  .17 -.10 -.29
   1790 1829    8   -.17  .19 -.05  .18  .06 -.17 -.20  .01  .02  .04  .21|-.03 -.06 -.06 -.09  .11  .13 -.14  .27*-.03 -.26

[B] Entire series, effect on correlation (  .314) is:
      Lower   1796> -.019   1748> -.018   1680> -.013   1771> -.013   1736< -.012   1753< -.011  Higher   1774  .027   1724  .013
    1667 to 1706 segment:
      Lower   1680> -.073   1686> -.043   1676< -.030   1690< -.024   1703< -.019   1704> -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680> -.080   1686> -.054   1676< -.029   1690< -.025   1704> -.020   1703< -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680> -.061   1711> -.050   1710< -.047   1690< -.026   1686> -.025   1714> -.022  Higher   1708  .068   1719  .036
    1700 to 1739 segment:
      Lower   1711> -.055   1736< -.052   1710< -.039   1729> -.035   1737> -.031   1714> -.025  Higher   1724  .064   1708  .060
    1710 to 1749 segment:
      Lower   1748> -.063   1736< -.049   1711> -.040   1710< -.031   1729> -.026   1714> -.018  Higher   1724  .062   1719  .030
    1720 to 1759 segment:
      Lower   1748> -.081   1736< -.056   1753< -.045   1729> -.028   1737> -.022   1735< -.017  Higher   1724  .047   1755  .044
    1730 to 1769 segment:
      Lower   1748> -.082   1736< -.046   1753< -.041   1737> -.022   1735< -.014   1760> -.013  Higher   1755  .052   1754  .032
    1760 to 1799 segment:
      Lower   1796> -.106   1771> -.068   1779< -.058   1773> -.024   1783> -.017   1760> -.015  Higher   1774  .159   1790  .047
    1770 to 1809 segment:
      Lower   1796> -.077   1779< -.051   1771> -.050   1807> -.038   1804< -.036   1773> -.014  Higher   1774  .132   1790  .041
    1780 to 1819 segment:
      Lower   1796> -.070   1804< -.030   1810< -.024   1814< -.018   1807> -.015   1816< -.015  Higher   1790  .042   1812  .028
    1790 to 1829 segment:
      Lower   1796> -.061   1828< -.037   1804< -.029   1810< -.022   1827> -.019   1814< -.017  Higher   1790  .035   1817  .029

[E] Outliers    48   3.0 SD above or -4.5 SD below mean for year
      1668 +3.4 SD;    1676 -6.8 SD;    1680 +9.1 SD;    1683 +4.5 SD;    1686 +7.9 SD;    1690 -6.3 SD;    1692 +4.6 SD;
      1701 +4.4 SD;    1704 +5.2 SD;    1707 +3.0 SD;    1710-10.3 SD;    1711 +5.8 SD;    1714 +6.8 SD;    1715 +4.7 SD;
      1729 +7.5 SD;    1731 +3.1 SD;    1735 -6.8 SD;    1736 -9.2 SD;    1737 +5.9 SD;    1741 +5.1 SD;    1743 +4.9 SD;
      1744 +3.4 SD;    1748 +8.6 SD;    1753 -7.9 SD;    1755 +3.8 SD;    1759 +4.4 SD;    1760 +4.4 SD;    1762 -5.6 SD;
      1771 +7.7 SD;    1773 +5.8 SD;    1779 -8.7 SD;    1783 +5.2 SD;    1789 -4.6 SD;    1794 +4.3 SD;    1796+11.6 SD;
      1797 +6.1 SD;    1804 -7.3 SD;    1807 +8.8 SD;    1808 +4.4 SD;    1810 -6.9 SD;    1812 +6.4 SD;    1814 -4.9 SD;
      1816 -4.9 SD;    1823 +4.8 SD;    1826 +5.7 SD;    1827 +8.4 SD;    1828 -7.0 SD;    1829 -5.8 SD
==================================================================================================================================

TEST S    1667 to  1829     163 years                                                                                    Series   2

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1667 1706    0    .07 -.14  .18 -.22 -.11 -.09  .16 -.14 -.03 -.02  .37* .10  .10 -.29  .24 -.09 -.07  .12 -.02 -.15 -.14
   1670 1709    7    .04 -.03  .12 -.21 -.12 -.02  .10 -.13  .07 -.04  .34| .24  .11 -.35  .11  .06 -.17  .35*-.25 -.16 -.05
```

```
   1680 1719    0   -.05 -.03  .05 -.21 -.02  .24 -.16  .02  .03 -.04  .29* .25  .04 -.42  .15 -.11 -.07  .29 -.21  .07  .05
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1700 1739   -5   -.18 -.03 -.02 -.28  .00  .32*-.32  .00  .01  .04  .31| .12  .03 -.36 -.06 -.14  .18  .15 -.20  .03 -.04
   1710 1749    0   -.19 -.21  .05 -.09 -.07  .23 -.29 -.08  .00  .02  .24* .17 -.13 -.04 -.13  .00  .23  .10 -.20  .02 -.03
   1720 1759    0   -.18 -.21  .14 -.13 -.11  .10 -.23 -.23  .10  .17  .33* .24 -.12 -.02 -.27 -.02  .14  .21 -.09 -.16 -.08
   1730 1769    0   -.19 -.18  .07  .02 -.13  .22 -.15 -.21  .15  .16  .30* .13 -.16 -.01 -.33  .03  .02  .25  .08 -.06 -.01
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1760 1799    0   -.02  .13 -.18  .13  .03  .10 -.05 -.28 -.18  .00  .34* .18  .13  .05 -.16  .04 -.28 -.10  .07 -.27 -.07
   1770 1809    0   -.18  .06 -.04  .06  .20 -.10 -.06 -.02 -.20  .11  .31* .08  .00  .12 -.25  .06  .06 -.03  .03 -.11 -.28
   1780 1819    0   -.28 -.02  .14 -.13  .23  .03 -.09  .02 -.04 -.06  .25* .20 -.01 -.05 -.23 -.17  .09  .16 -.04  .19 -.17
   1790 1829    7   -.29 -.08  .14 -.16  .21  .12 -.11 -.06 -.02 -.01  .21| .09  .10  .10 -.19 -.23  .08  .22*-.03  .14 -.19

[B] Entire series, effect on correlation (  .314) is:
      Lower   1796< -.019   1748< -.018   1680< -.013   1771< -.013   1736> -.012   1753> -.011  Higher   1774  .027   1724  .013
    1667 to 1706 segment:
      Lower   1680< -.073   1686< -.043   1676> -.030   1690> -.024   1703> -.019   1704< -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680< -.080   1686< -.054   1676> -.029   1690> -.025   1704< -.020   1703> -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680< -.061   1711< -.050   1710> -.047   1690> -.026   1686< -.025   1714< -.022  Higher   1708  .068   1719  .036
    1700 to 1739 segment:
      Lower   1711< -.055   1736> -.052   1710> -.039   1729< -.035   1737< -.031   1714< -.025  Higher   1724  .064   1708  .060
    1710 to 1749 segment:
      Lower   1748< -.063   1736> -.049   1711< -.040   1710> -.031   1729< -.026   1714< -.018  Higher   1724  .062   1719  .030
    1720 to 1759 segment:
      Lower   1748< -.081   1736> -.056   1753> -.045   1729< -.028   1737< -.022   1735> -.017  Higher   1724  .047   1755  .044
    1730 to 1769 segment:
      Lower   1748< -.082   1736> -.046   1753> -.041   1737< -.022   1735> -.014   1760< -.013  Higher   1755  .052   1754  .032
    1760 to 1799 segment:
      Lower   1796< -.106   1771< -.068   1779> -.058   1773< -.024   1783< -.017   1760< -.015  Higher   1774  .159   1790  .047
    1770 to 1809 segment:
      Lower   1796< -.077   1779> -.051   1771< -.050   1807< -.038   1804> -.036   1773< -.014  Higher   1774  .132   1790  .041
    1780 to 1819 segment:
      Lower   1796< -.070   1804> -.030   1810> -.024   1814> -.018   1807< -.015   1816> -.015  Higher   1790  .042   1812  .028
    1790 to 1829 segment:
      Lower   1796< -.061   1828> -.037   1804> -.029   1810> -.022   1827< -.019   1814> -.017  Higher   1790  .035   1817  .029

[E] Outliers    54   3.0 SD above or -4.5 SD below mean for year
      1672 +3.7 SD;    1676 +6.8 SD;    1679 +4.4 SD;    1680 -9.1 SD;    1683 -4.5 SD;    1686 -7.9 SD;    1690 +6.3 SD;
      1691 +3.9 SD;    1692 -4.6 SD;    1693 +4.5 SD;    1698 +3.3 SD;    1703 +4.4 SD;    1704 -5.2 SD;    1710+10.3 SD;
      1711 -5.8 SD;    1714 -6.8 SD;    1715 -4.7 SD;    1727 +3.7 SD;    1728 +3.2 SD;    1729 -7.5 SD;    1735 +6.8 SD;
      1736 +9.1 SD;    1737 -5.9 SD;    1741 -5.1 SD;    1743 -4.9 SD;    1746 +4.4 SD;    1748 -8.6 SD;    1753 +7.9 SD;
      1762 +5.6 SD;    1766 +3.1 SD;    1771 -7.7 SD;    1773 -5.8 SD;    1779 +8.7 SD;    1783 -5.2 SD;    1784 +3.3 SD;
      1788 +4.4 SD;    1789 +4.6 SD;    1792 +3.4 SD;    1796-11.6 SD;    1797 -6.1 SD;    1801 +3.6 SD;    1804 +7.3 SD;
      1807 -8.8 SD;    1810 +6.9 SD;    1812 -6.4 SD;    1813 +4.1 SD;    1814 +4.9 SD;    1816 +4.9 SD;    1823 -4.8 SD;
      1825 +3.1 SD;    1826 -5.7 SD;    1827 -8.4 SD;    1828 +7.0 SD;    1829 +5.8 SD
==================================================================================================================================
```

```
PART 7:  DESCRIPTIVE STATISTICS: TCTNM                                                         20:59  Thu 13 Aug 2009  Page   7
-----------------------------------------------------------------------------------------------------------------------------------

                                                        Corr   //-------- Unfiltered --------\\  //---- Filtered -----\\
                                  No.    No.    No.    with   Mean   Max     Std   Auto   Mean   Max     Std   Auto  AR
 Seq Series   Interval   Years  Segmt  Flags  Master  msmt   msmt    dev   corr   sens  value    dev   corr  ()
 --- -------- ---------  -----  -----  -----  ------ -----  -----  -----  -----  -----  -----  -----  -----  --
   1 NORRIS   1633 1980    348     14     11    .314   .99   1.60   .139   .187   .143   2.58   .344   .000   1
   2 TEST S   1667 1829    163     14     11    .314  1.00   1.62   .204   .492   .170   2.73   .434   .024   1
 --- -------- ---------  -----  -----  -----  ------ -----  -----  -----  -----  -----  -----  -----  -----  --
 Total or mean:            511     28     22    .314  1.00   1.62   .160   .284   .152   2.73   .373   .007
PART 8:  ADJUSTMENTS FOR UNDATED SERIES: TCTNM                                                 20:59  Thu 13 Aug 2009  Page   8
-----------------------------------------------------------------------------------------------------------------------------------

 Time span  1633  1980   348 years, best matches for  40-year segments lagged  10 years
 Listed in order from highest correlation

           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP03A       1   40  1750 .59  1658 .47  1802 .41  1901 .40  1851 .39  1870 .37  1827 .37  1788 .36  1940 .36  1909 .35  1696 .35
 BP03A       9   48  1750 .55  1627 .52  1696 .45  1827 .43  1901 .41  1815 .41  1887 .37  1644 .36  1920 .34  1658 .33  1628 .33
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP03B       1   40  1753 .58  1830 .47  1661 .40  1741 .39  1765 .37  1904 .37  1842 .35  1902 .35  1818 .33  1672 .33  1699 .31
 BP03B       6   45  1753 .52  1830 .48  1818 .42  1647 .42  1649 .38  1661 .36  1902 .36  1699 .35  1904 .32  1715 .31  1667 .29
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP04A       1   40  1897 .62  1825 .50  1938 .42  1738 .41  1694 .39  1710 .38  1866 .37  1657 .37  1646 .36  1760 .35  1798 .33
 BP04A      11   50  1897 .62  1825 .61  1760 .47  1740 .43  1738 .41  1672 .36  1866 .36  1638 .36  1646 .35  1798 .35  1689 .33
 BP04A      21   60  1738 .60  1634 .48  1859 .40  1652 .38  1616 .37  1825 .33  1684 .33  1719 .32  1700 .31  1846 .30  1739 .30
      3 segments -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1738  3  .48 +1825  3  .48
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP05A       1   40  1819 .53  1891 .49  1792 .48  1723 .46  1679 .39  1742 .38  1661 .37  1754 .37  1706 .30  1865 .30  1632 .29
 BP05A       5   44  Lag from prior segment   4 years; insufficient
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP05B       1   40  1749 .63  1814 .50  1737 .49  1854 .47  1787 .42  1718 .39  1886 .37  1683 .37  1730 .36  1869 .36  1668 .36
```

```
 BP05B      10   49  1626 .60  1749 .52  1737 .51  1854 .49  1814 .49  1869 .38  1787 .36  1886 .36  1718 .35  1643 .33  1765 .32
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP06A       1   40  1740 .67  1721 .53  1845 .39  1805 .38  1891 .38  1659 .37  1817 .37  1792 .36  1877 .35  1778 .35  1728 .33
 BP06A      11   50  1740 .71  1845 .45  1805 .44  1877 .44  1721 .43  1778 .43  1817 .39  1930 .37  1659 .34  1741 .33  1728 .33
 BP06A      19   58  1740 .65  1617 .56  1778 .53  1845 .51  1877 .48  1817 .43  1805 .39  1728 .39  1909 .38  1638 .35  1634 .33
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1728  3  .35 +1740  3  .68 +1778  3  .43 +1805  3  .40 +1817  3  .40 +1845  3  .45 +1877  3  .42
 Chronological order
       Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
     +1728  3 +1740  3 +1778  3 +1805  3 +1817  3 +1845  3 +1877  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 BP06B       1   40  1784 .58  1866 .44  1883 .40  1936 .38  1680 .38  1678 .36  1727 .36  1720 .34  1746 .33  1938 .33  1715 .32
 BP06B      11   50  1732 .58  1784 .54  1883 .51  1720 .46  1811 .43  1852 .42  1922 .42  1902 .39  1797 .38  1644 .36  1678 .34
 BP06B      21   60  1883 .53  1732 .52  1811 .48  1720 .45  1640 .42  1784 .39  1671 .39  1702 .36  1797 .36  1837 .36  1902 .32
 BP06B      24   63  Lag from prior segment   3 years; insufficient
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1720  3  .41 +1784  3  .50 +1883  3  .48
 Chronological order
       Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
     +1720  3 +1784  3 +1883  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 UPB01       1   40  1906 .56  1834 .50  1646 .45  1738 .45  1769 .43  1647 .37  1688 .37  1931 .37  1663 .35  1846 .35  1719 .35
 UPB01      11   50  1738 .42  1677 .34  1753 .30  1790 .30  1912 .30  1650 .29  1708 .29  1638 .28  1866 .27  1690 .26  1862 .26
 UPB01      21   60  1738 .42  1616 .39  1615 .37  1718 .34  1687 .33  1667 .31  1823 .30  1908 .29  1843 .28  1728 .28  1739 .28
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1738  3  .43
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 UPB02       1   40  1774 .49  1713 .48  1914 .46  1773 .43  1809 .41  1736 .39  1669 .39  1663 .38  1633 .38  1855 .37  1814 .34
 UPB02      11   50  1774 .45  1809 .45  1713 .45  1669 .39  1841 .37  1690 .37  1855 .37  1773 .37  1833 .33  1634 .32  1914 .32
 UPB02      21   60  1713 .47  1849 .44  1774 .41  1809 .39  1872 .38  1841 .36  1732 .36  1690 .34  1826 .33  1621 .33  1613 .33
 UPB02      31   70  1713 .59  1850 .44  1872 .44  1647 .39  1751 .37  1883 .34  1905 .34  1833 .34  1746 .34  1800 .33  1701 .31
 UPB02      41   80  1713 .60  1850 .40  1883 .36  1792 .34  1701 .31  1621 .30  1872 .30  1767 .29  1690 .28  1887 .28  1787 .28
```

```
UPB02      46   85  1713 .65  1590 .52  1607 .46  1850 .45  1609 .39  1591 .37  1818 .37  1792 .34  1872 .32  1751 .29  1887 .29
     6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1713  6  .54 +1872  4  .36 +1774  3  .45 +1809  3  .42 +1850  3  .43 +1690  3  .33
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1690  3 +1713  6 +1774  3 +1809  3 +1850  3 +1872  4
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
PC01E       1   40  1734 .55  1703 .45  1830 .44  1715 .37  1890 .37  1795 .36  1722 .36  1862 .32  1781 .31  1757 .29  1927 .29
PC01E      11   50  1734 .40  1890 .38  1926 .38  1832 .38  1818 .36  1834 .36  1668 .35  1833 .34  1774 .34  1722 .34  1854 .33
PC01E      21   60  1832 .57  1833 .48  1734 .44  1818 .42  1639 .36  1630 .36  1722 .34  1668 .32  1854 .31  1614 .30  1682 .30
PC01E      26   65  1832 .41  1833 .40  1847 .39  1668 .37  1854 .36  1611 .33  1839 .31  1639 .31  1612 .30  1743 .30  1734 .30
     4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1734  4  .42 +1722  3  .35 +1668  3  .35 +1832  3  .45 +1833  3  .41 +1854  3  .34
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1668  3 +1722  3 +1734  4 +1832  3 +1833  3 +1854  3
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
PC03E       1   40  1902 .75  1830 .50  1798 .48  1659 .47  1715 .38  1803 .37  1916 .35  1739 .34  1765 .34  1762 .34  1920 .34
PC03E       9   48  1902 .63  1715 .43  1659 .43  1830 .40  1916 .39  1727 .34  1842 .34  1642 .33  1803 .32  1628 .32  1751 .32
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
PC04E       1   40  1903 .62  1831 .45  1817 .44  1752 .42  1740 .38  1660 .38  1917 .38  1693 .35  1677 .35  1922 .35  1716 .35
PC04E       8   47  1629 .53  1903 .53  1752 .50  1817 .43  1716 .40  1768 .39  1740 .37  1831 .37  1654 .34  1872 .34  1660 .34
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
PC01W       1   40  1840 .44  1868 .42  1932 .42  1732 .40  1780 .39  1640 .39  1900 .38  1828 .36  1937 .33  1704 .32  1763 .32
PC01W      11   50  1840 .45  1780 .44  1879 .44  1848 .42  1744 .42  1805 .38  1828 .36  1793 .35  1640 .34  1674 .33  1775 .32
PC01W      21   60  1879 .54  1918 .45  1728 .43  1636 .42  1805 .41  1775 .38  1674 .37  1902 .34  1865 .33  1793 .33  1893 .33
PC01W      31   70  1728 .56  1605 .52  1879 .49  1674 .46  1744 .43  1805 .40  1893 .37  1865 .36  1793 .36  1653 .34  1902 .34
     4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1674  3  .39 +1793  3  .34 +1805  3  .40 +1879  3  .49
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1674  3 +1793  3 +1805  3 +1879  3
```

```
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 PC02W       1   40  1932 .49  1647 .45  1758 .42  1879 .41  1720 .40  1716 .35  1807 .34  1791 .34  1732 .33  1780 .31  1775 .31
 PC02W      11   50  1879 .55  1728 .46  1793 .44  1805 .43  1865 .41  1775 .41  1716 .40  1647 .36  1780 .35  1653 .35  1920 .34
 PC02W      21   60  1879 .51  1728 .48  1918 .46  1805 .42  1793 .42  1865 .42  1902 .37  1636 .37  1647 .36  1775 .35  1761 .34
 PC02W      31   70  1728 .59  1605 .54  1879 .44  1674 .44  1865 .42  1793 .40  1805 .39  1902 .37  1636 .35  1606 .34  1893 .33
 PC02W      32   71  Lag from prior segment   1 years; insufficient
      4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1879  4  .48 +1728  3  .51 +1775  3  .36 +1793  3  .42 +1805  3  .41 +1865  3  .42 +1647  3  .39
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1647  3 +1728  3 +1775  3 +1793  3 +1805  3 +1865  3 +1879  4
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 PC03W       1   40  1933 .56  1880 .53  1721 .38  1637 .37  1776 .37  1759 .35  1892 .34  1808 .34  1717 .32  1648 .31  1682 .30
 PC03W      11   50  1880 .57  1776 .47  1794 .47  1729 .45  1806 .41  1717 .40  1866 .37  1849 .37  1919 .37  1781 .36  1648 .31
 PC03W      21   60  1880 .50  1729 .46  1919 .46  1866 .45  1806 .42  1794 .41  1776 .40  1849 .38  1637 .35  1781 .35  1903 .33
 PC03W      31   70  1729 .59  1606 .51  1866 .48  1880 .45  1794 .40  1675 .38  1623 .38  1745 .37  1903 .35  1806 .35  1607 .35
      4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1880  4  .51 +1776  3  .41 +1794  3  .43 +1806  3  .40 +1866  3  .44 +1729  3  .50
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1729  3 +1776  3 +1794  3 +1806  3 +1866  3 +1880  4
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 FLOOR04     1   40  1894 .61  1634 .55  1757 .47  1862 .46  1795 .46  1635 .41  1734 .36  1703 .35  1691 .34  1772 .34  1668 .32
 FLOOR04    11   50  1894 .58  1757 .50  1634 .50  1703 .36  1635 .35  1731 .35  1822 .33  1795 .32  1734 .31  1834 .30  1908 .30
 FLOOR04    21   60  1680 .48  1853 .47  1734 .43  1666 .42  1908 .37  1772 .36  1832 .35  1830 .32  1838 .31  1681 .30  1818 .29
 FLOOR04    25   64  Lag from prior segment   4 years; insufficient
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1734  3  .36
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 FLOOR05     1   40  1741 .45  1644 .39  1904 .38  1766 .36  1846 .34  1873 .34  1729 .34  1643 .33  1674 .32  1806 .32  1736 .30
 FLOOR05    11   50  1774 .51  1806 .48  1710 .47  1675 .45  1873 .42  1781 .41  1841 .40  1788 .37  1648 .34  1670 .34  1813 .32
 FLOOR05    18   57  1710 .55  1774 .48  1873 .48  1618 .47  1781 .44  1806 .43  1668 .39  1842 .37  1846 .33  1722 .33  1862 .32
```

```
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1806  3  .41 +1873  3  .41
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
       17 undated series

                                                            - = [  COFECHA TCTNMCOF  ] = -
```

Appendix III. Results from master chronology of dated cores [>0.4 (p<0.01)] for the farmhouse run against undated core samples [<0.4 (p<0.01)] in COFECHA.

```
[]  Dendrochronology Program Library                                        Run TCD    Program COF  20:44  Thu 13 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                        Version 6.06P    27255
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           TCD

 File of DATED series:   TNTCDated.txt

 File of UNDATED series: TCUndated

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics
    Part 8:  Undated series - adjustments for highest correlations

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                             12345678
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Text in file: NORRISAA NORRIS DAM STATE PARK                  0526AA01    QUAL

 Text in file: NORRISAA TENNESSEE    WHITE OAK         0220M 03613-08405          1633 1980

 Text in file: NORRISAA DANIEL N. DUVICK                                               APR1981

 Text in file: combined.rwl Std R Chron                                          [14Sep07-0917]
```

```
Time span of Master dating series is  1633 to  1980   348 years
Continuous time span is               1633 to  1980   348 years
Portion with two or more series is    1667 to  1829   163 years

                                       ****************************************
                                       *C* Number of dated series        13 *C*
                                       *O* Master series 1633 1980  348 yrs *O*
                                       *F* Total rings in all series   1169 *F*
                                       *E* Total dated rings checked    984 *E*
                                       *C* Series intercorrelation     .582 *C*
                                       *H* Average mean sensitivity    .167 *H*
                                       *A* Segments, possible problems   14 *A*
                                       *** Mean length of series       89.9 ***
                                       ****************************************

ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value
```

```
PART 2:  TIME PLOT OF TREE-RING SERIES: TCD                                                      20:44  Thu 13 Aug 2009  Page   2
-------------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :   -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .  <====================================> .    . NORRIS     1 1633 1980  348
   .    .    .    .    .    .    .    .    .    .    .    .    .<=================>  .    .    .    .    . TEST S     2 1667 1829  163
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03A      3 1751 1798   48
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03B      4 1754 1798   45
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . BP04A      5 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP05B      6 1750 1798   49
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    .    .    . BP06A      7 1741 1798   58
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . UPB01      8 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .<=======>.    .    .    .    .    . UPB02      9 1714 1798   85
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC01E     10 1735 1799   65
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . PC04E     11 1753 1799   47
   .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    .    . PC02W     12 1729 1799   71
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC03W     13 1730 1799   70
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1650	.157	1	1700	-.605	2	1750	.788	10	1800	.996	2	1850	-.795	1
			1651	-3.097	1	1701	-.216	2	1751	-.319	11	1801	.332	2	1851	-2.818	1
			1652	-3.244	1	1702	-.616	2	1752	-1.370	11	1802	1.354	2	1852	.350	1
			1653	-.307	1	1703	-.813	2	1753	.143	12	1803	.527	2	1853	-1.575	1
			1654	-1.487	1	1704	.192	2	1754	.473	13	1804	-.565	2	1854	-.094	1
			1655	.131	1	1705	1.041	2	1755	-1.096	13	1805	.620	2	1855	1.278	1
			1656	-.735	1	1706	-.497	2	1756	-.041	13	1806	-.249	2	1856	.206	1
			1657	1.621	1	1707	.657	2	1757	.674	13	1807	-1.694	2	1857	1.679	1
			1658	-.233	1	1708	-1.690	2	1758	.687	13	1808	.718	2	1858	.065	1
			1659	.548	1	1709	-.346	2	1759	.448	13	1809	.766	2	1859	-1.337	1
			1660	-1.052	1	1710	1.170	2	1760	-1.242	13	1810	.024	2	1860	1.619	1
			1661	.782	1	1711	.707	2	1761	.694	13	1811	.836	2	1861	-.694	1
			1662	.023	1	1712	-.235	2	1762	-.502	13	1812	-1.764	2	1862	.421	1
			1663	-.017	1	1713	-.849	2	1763	.077	13	1813	-1.567	2	1863	.585	1
			1664	.521	1	1714	-.242	3	1764	.340	13	1814	-.295	2	1864	-.694	1
			1665	1.508	1	1715	-1.123	3	1765	.200	13	1815	-.077	2	1865	-.673	1
			1666	.973	1	1716	.762	3	1766	-.342	13	1816	.010	2	1866	.404	1
			1667	.179	2	1717	1.172	3	1767	-.069	13	1817	1.483	2	1867	.558	1
			1668	-1.773	2	1718	-.234	3	1768	.928	13	1818	.602	2	1868	.611	1
			1669	1.375	2	1719	1.260	3	1769	.829	13	1819	-.469	2	1869	2.451	1
			1670	-.144	2	1720	-.693	3	1770	.850	13	1820	1.018	2	1870	.332	1
			1671	-.578	2	1721	.097	3	1771	.735	13	1821	-.894	2	1871	-.479	1
			1672	-.798	2	1722	.244	3	1772	-.232	13	1822	-.002	2	1872	-1.841	1
			1673	1.109	2	1723	-.230	3	1773	-.359	13	1823	.337	2	1873	.101	1
			1674	.073	2	1724	-1.617	3	1774	-3.156	13	1824	1.212	2	1874	-1.279	1
			1675	1.063	2	1725	-.509	3	1775	-1.120	13	1825	-.682	2	1875	-.608	1
			1676	-.653	2	1726	-.621	3	1776	.156	13	1826	-1.254	2	1876	.568	1
			1677	1.419	2	1727	1.151	3	1777	.371	13	1827	-.203	2	1877	.023	1
			1678	.830	2	1728	.743	3	1778	.021	13	1828	-.250	2	1878	.749	1
			1679	-.300	2	1729	.651	4	1779	-.718	13	1829	.110	2	1879	-2.407	1
			1680	.169	2	1730	-.114	5	1780	.648	13	1830	.675	1	1880	-2.141	1
			1681	-1.496	2	1731	-.324	5	1781	.623	13	1831	.474	1	1881	.084	1
			1682	-.700	2	1732	-.863	5	1782	1.061	13	1832	.545	1	1882	1.784	1
1633	-.201	1	1683	.058	2	1733	-.064	5	1783	.254	13	1833	-1.266	1	1883	1.342	1
1634	.111	1	1684	-.140	2	1734	.745	5	1784	-.050	13	1834	-.114	1	1884	1.087	1
1635	-1.683	1	1685	-.979	2	1735	-.236	6	1785	-.712	13	1835	.324	1	1885	-.093	1
1636	-.669	1	1686	-1.334	2	1736	-.739	6	1786	.174	13	1836	.587	1	1886	-.115	1
1637	-1.162	1	1687	-.655	2	1737	-.406	6	1787	.061	13	1837	.334	1	1887	-.551	1
1638	.760	1	1688	.440	2	1738	.215	6	1788	.579	13	1838	.658	1	1888	-.679	1
1639	1.242	1	1689	.538	2	1739	.605	8	1789	.106	13	1839	-3.281	1	1889	.817	1
1640	.606	1	1690	.394	2	1740	.450	8	1790	-.705	13	1840	1.404	1	1890	.031	1
1641	2.769	1	1691	.844	2	1741	.678	9	1791	-.994	13	1841	.045	1	1891	.679	1

1642	.541	1	1692	1.302	2	1742	1.381	9	1792	.075	13	1842	1.328	1	1892	1.721	1
1643	.560	1	1693	-1.257	2	1743	-1.612	9	1793	.900	13	1843	2.096	1	1893	.766	1
1644	-.433	1	1694	.715	2	1744	-.567	9	1794	-.042	13	1844	-1.353	1	1894	-2.099	1
1645	-.817	1	1695	1.037	2	1745	.232	9	1795	-.147	13	1845	.449	1	1895	-.244	1
1646	.181	1	1696	.790	2	1746	.454	9	1796	.915	13	1846	.074	1	1896	-1.068	1
1647	.244	1	1697	.783	2	1747	.478	9	1797	-.181	13	1847	.200	1	1897	1.480	1
1648	.594	1	1698	.087	2	1748	-.906	9	1798	-.281	13	1848	-.877	1	1898	-1.177	1
1649	.769	1	1699	-1.053	2	1749	-.326	9	1799	-.975	6	1849	.459	1	1899	.001	1

PART 3: Master Dating Series: TCD 20:44 Thu 13 Aug 2009 Page 4

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
1900	-1.567	1	1950	-.499	1												
1901	.102	1	1951	1.389	1												
1902	-.154	1	1952	-1.249	1												
1903	1.645	1	1953	-.047	1												
1904	.968	1	1954	.603	1												
1905	.552	1	1955	1.348	1												
1906	.497	1	1956	-.247	1												
1907	-.717	1	1957	-.052	1												
1908	-.264	1	1958	1.351	1												
1909	.117	1	1959	-.837	1												
1910	1.125	1	1960	-.115	1												
1911	-3.810	1	1961	.589	1												
1912	-.506	1	1962	.675	1												
1913	-.652	1	1963	.134	1												
1914	-.934	1	1964	-2.647	1												
1915	.528	1	1965	.985	1												
1916	1.165	1	1966	-1.773	1												
1917	2.716	1	1967	1.471	1												
1918	-.374	1	1968	.626	1												
1919	.317	1	1969	-1.528	1												
1920	.125	1	1970	-.456	1												
1921	-.879	1	1971	.349	1												
1922	1.023	1	1972	.152	1												
1923	.317	1	1973	-.297	1												
1924	.557	1	1974	-.761	1												
1925	-1.690	1	1975	1.190	1												
1926	.211	1	1976	2.135	1												
1927	-.576	1	1977	.564	1												
1928	.808	1	1978	.285	1												
1929	-.700	1	1979	-1.116	1												
1930	-1.406	1	1980	-.954	1												
1931	.009	1															
1932	1.028	1															

```
  1933  -.928   1
  1934  -.049   1
  1935  1.332   1
  1936 -1.779   1
  1937  1.307   1
  1938  1.281   1
  1939  -.625   1

  1940   .654   1
  1941  -.397   1
  1942   .358   1
  1943  -.583   1
  1944 -1.854   1
  1945  1.935   1
  1946   .822   1
  1947  -.146   1
  1948 -1.356   1
  1949  -.684   1
```

```
PART 4:  Master Bar Plot: TCD                                                                  20:44  Thu 13 Aug 2009  Page   5
```

```
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1650-----A      1700--b         1750--------C   1800---------D  1850--c         1900f           1950---b
                   1651l           1701----a       1751---a        1801------A     1851k           1901-----@      1951----------F
                   1652m           1702--b         1752-e          1802----------E 1852------A     1902----a       1952-e
                   1653---a        1703--c         1753-----A      1803-------B    1853f           1903----------G 1953----@
                   1654f           1704-----A      1754-------B    1804--b         1854----@       1904---------D  1954-------B
                   1655-----A      1705---------D  1755-d          1805-------B    1855----------E 1905-------B    1955----------E
                   1656--c         1706---b        1756----@       1806---a        1856------A     1906-------B    1956---a
                   1657----------F 1707--------C   1757--------C   1807g           1857----------G 1907--c         1957----@
                   1658---a        1708g           1758--------C   1808--------C   1858-----@      1908---a        1958----------E
                   1659-------B    1709---a        1759-------B    1809--------C   1859-e          1909-----@      1959--c
                   1660-d          1710---------E  1760-e          1810-----@      1860----------F 1910---------E  1960----@
                   1661--------C   1711--------C   1761--------C   1811--------C   1861--c         1911o           1961-------B
                   1662-----@      1712---a        1762---b        1812g           1862------B     1912---b        1962--------C
                   1663----@       1713--c         1763-----@      1813f           1863-------B    1913--c         1963-----A
                   1664-------B    1714---a        1764------A     1814---a        1864--c         1914-d          1964k
                   1665----------F 1715-d          1765-----A      1815----@       1865--c         1915-------B    1965---------D
                   1666---------D  1716--------C   1766---a        1816-----@      1866------B     1916---------E  1966g
                   1667-----A      1717---------E  1767----@       1817----------F 1867-------B    1917----------K 1967----------F
                   1668g           1718---a        1768---------D  1818-------B    1868-------B    1918---a        1968-------C
                   1669----------F 1719----------E 1769--------C   1819---b        1869----------J 1919------A     1969f
                   1670----a       1720--c         1770--------C   1820---------D  1870------A     1920-----@      1970---b
                   1671--b         1721-----@      1771--------C   1821-d          1871---b        1921-d          1971------A
                   1672--c         1722------A     1772---a        1822-----@      1872g           1922---------D  1972-----A
                   1673---------D  1723---a        1773---a        1823------A     1873-----@      1923------A     1973---a
                   1674-----@      1724f           1774m           1824---------E  1874-e          1924-------B    1974--c
                   1675---------D  1725---b        1775-d          1825--c         1875--b         1925g           1975---------E
                   1676--c         1726--b         1776-----A      1826-e          1876-------B    1926------A     1976----------I
                   1677----------F 1727---------E  1777------A     1827----a       1877-----@      1927--b         1977-------B
```

```
               1678--------C  1728--------C  1778-----@      1828---a       1878--------C  1928--------C  1978------A
               1679---a       1729--------C  1779--c         1829-----@     1879j          1929--c        1979-d
               1680-----A     1730----@      1780--------C   1830--------C  1880i          1930f          1980-d
               1681f          1731---a       1781-------B    1831-------B   1881-----@     1931-----@
               1682--c        1732--c        1782---------D  1832-------B   1882----------G 1932---------D
1633----a      1683-----@     1733----@      1783------A     1833-e         1883----------E 1933-d
1634-----@     1684----a      1734--------C  1784----@       1834----@      1884---------D 1934----@
1635g          1685-d         1735---a       1785--c         1835------A    1885----@      1935----------E
1636--c        1686-e         1736--c        1786-----A      1836-------B   1886----@      1936g
1637-e         1687--c        1737---b       1787-----@      1837------A    1887--b        1937----------E
1638--------C  1688-------B   1738------A    1788-------B    1838--------C  1888--c        1938----------E
1639---------E 1689-------B   1739-------B   1789-----@      1839m          1889--------C  1939--c
1640-------B   1690------B    1740-------B   1790--c         1840----------F 1890-----@    1940--------C
1641----------K 1691--------C 1741--------C  1791-d          1841-----@     1891--------C  1941---b
1642-------B   1692----------E 1742----------F 1792-----@    1842----------E 1892----------G 1942------A
1643-------B   1693-e         1743f          1793---------D  1843----------H 1893--------C 1943--b
1644---b       1694--------C  1744--b        1794----@       1844-e         1894h          1944g
1645--c        1695---------D 1745------A    1795----a       1845-------B   1895---a       1945----------H
1646-----A     1696--------C  1746-------B   1796---------D  1846-----@     1896-d         1946--------C
1647------A    1697--------C  1747-------B   1797----a       1847-----A     1897----------F 1947----a
1648-------B   1698-----@     1748-d         1798---a        1848-d         1898-e         1948-e
1649--------C  1699-d         1749---a       1799-d          1849-------B   1899-----@     1949--c
```

PART 5: CORRELATION OF SERIES BY SEGMENTS: TCD   20:44 Thu 13 Aug 2009 Page   5

Correlations of 40-year dated segments, lagged 10 years

Flags: A = correlation under   .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1660 1699	1670 1709	1680 1719	1690 1729	1700 1739	1710 1749	1720 1759	1730 1769	1740 1779	1750 1789	1760 1799	1770 1809	1780 1819	1790 1829
1	NORRIS	1633 1980	.37A	.34A	.27B	.40	.31A	.24A	.31A	.27A	.53	.61	.61	.52	.27B	.22B
2	TEST S	1667 1829	.37A	.34B	.29A	.44	.37	.53	.57	.56	.57	.53	.51	.41	.30A	.21B
3	BP03A	1751 1798										.90	.87			
4	BP03B	1754 1798										.78	.74			
5	BP04A	1739 1798								.57	.57	.53	.62			
6	BP05B	1750 1798										.82	.77			
7	BP06A	1741 1798									.78	.77	.82			
8	UPB01	1739 1798								.58	.56	.56	.47			
9	UPB02	1714 1798						.56	.56	.64	.87	.83	.77			
10	PC01E	1735 1799								.60	.63	.46	.44			
11	PC04E	1753 1799										.81	.77			
12	PC02W	1729 1799							.59	.59	.80	.84	.86			
13	PC03W	1730 1799								.62	.81	.83	.84			
Av segment correlation			.37	.34	.28	.42	.34	.44	.51	.55	.68	.71	.70	.47	.28	.22

```
-----------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
===================================================================================================================================

 NORRIS    1633 to  1980     348 years                                                                                    Series   1

 [*] Early part of series cannot be checked from 1633 to 1666 -- not matched by another series

 [*] Later part of series cannot be checked from 1830 to 1980 -- not matched by another series

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
     ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
     1667 1706    0   -.05 -.27  .15  .04 -.17 -.05  .25 -.24  .03  .11  .37*-.03  .07 -.13  .06  .07 -.05 -.31  .12 -.01 -.10
     1670 1709    0   -.05 -.13  .05  .11 -.15 -.08  .23 -.29  .09  .22  .34*-.07  .00 -.02  .02  .14 -.06 -.26 -.02  .00 -.06
     1680 1719   -7   -.05 -.08 -.29  .41*-.14 -.09  .16 -.36  .08  .34  .27|-.09  .01  .01 -.17  .22 -.01 -.36  .12 -.01 -.17
     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     1700 1739    0    .05 -.03 -.30  .09  .08 -.16  .18 -.33  .03  .14  .31*-.11 -.05 -.06 -.32  .25 -.06  .01  .19 -.05 -.16
     1710 1749    0   -.06 -.16 -.29 -.01  .23 -.13  .05 -.08 -.06  .17  .24*-.07  .03 -.21 -.32  .20 -.09  .01  .22  .01 -.19
     1720 1759    0    .05 -.18 -.19 -.21  .24 -.05 -.02  .11 -.04  .17  .31*-.04 -.08 -.24 -.29  .16 -.05  .17  .13  .10 -.20
     1730 1769    0    .13 -.33 -.28 -.03  .16  .02  .02  .14 -.02  .07  .27* .01 -.04 -.18 -.30 -.02 -.16  .20  .22  .06 -.17
     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     1780 1819   -1   -.14 -.11 -.22  .08  .12 -.08 -.11 -.02 -.03  .29* .27|-.08  .03  .09 -.27 -.03  .17 -.09  .21 -.04 -.30
     1790 1829    8   -.17  .20 -.18  .23  .19 -.15 -.11  .07  .06  .11  .22|-.07  .00 -.04 -.18  .06  .06 -.13  .27*-.04 -.26

 [B] Entire series, effect on correlation (  .355) is:
       Lower   1680> -.015   1807> -.014   1711> -.013   1828< -.012   1753< -.010   1710< -.010  Higher   1774  .051   1708  .013
     1667 to 1706 segment:
       Lower   1680> -.073   1686> -.043   1676< -.030   1690< -.024   1703< -.019   1704> -.018  Higher   1668  .050   1669  .034
     1670 to 1709 segment:
       Lower   1680> -.080   1686> -.054   1676< -.029   1690< -.025   1704> -.020   1703< -.018  Higher   1708  .068   1681  .033
     1680 to 1719 segment:
       Lower   1680> -.062   1711> -.051   1710< -.048   1714> -.027   1690< -.027   1686> -.025  Higher   1708  .074   1681  .037
     1700 to 1739 segment:
       Lower   1711> -.066   1710< -.056   1714> -.036   1736< -.023   1704> -.019   1703< -.017  Higher   1708  .072   1724  .057
     1710 to 1749 segment:
       Lower   1711> -.056   1710< -.050   1714> -.030   1746< -.028   1748> -.021   1736< -.014  Higher   1724  .067   1719  .031
```

```
    1720 to 1759 segment:
      Lower   1753< -.048   1743> -.037   1748> -.032   1746< -.029   1736< -.020   1754< -.015  Higher   1724  .058   1755  .038
    1730 to 1769 segment:
      Lower   1760> -.050   1753< -.048   1746< -.030   1748> -.028   1743> -.026   1754< -.016  Higher   1755  .043   1762  .037
    1780 to 1819 segment:
      Lower   1804< -.031   1807> -.027   1810< -.025   1814< -.018   1797> -.018   1792< -.017  Higher   1817  .025   1802  .021
    1790 to 1829 segment:
      Lower   1828< -.036   1804< -.026   1827> -.023   1810< -.021   1807> -.019   1814< -.015  Higher   1817  .027   1802  .023

[E] Outliers    43   3.0 SD above or -4.5 SD below mean for year
      1668 +3.0 SD;    1676 -6.1 SD;    1680 +8.1 SD;    1683 +4.1 SD;    1686 +7.1 SD;    1690 -5.7 SD;    1692 +4.2 SD;
      1701 +3.9 SD;    1704 +4.7 SD;    1710 -9.3 SD;    1711 +5.2 SD;    1714 +6.2 SD;    1729 +5.2 SD;    1731 +3.5 SD;
      1732 +3.0 SD;    1733 +3.6 SD;    1735 -4.7 SD;    1736 -7.0 SD;    1741 +3.5 SD;    1743 +4.3 SD;    1745 +3.7 SD;
      1746 -5.2 SD;    1748 +4.2 SD;    1753 -6.1 SD;    1754 -5.0 SD;    1758 +3.2 SD;    1759 +4.0 SD;    1760 +6.0 SD;
      1762 -4.7 SD;    1783 +3.9 SD;    1792 -4.6 SD;    1794 +3.7 SD;    1797 +4.5 SD;    1804 -6.5 SD;    1807 +7.9 SD;
      1808 +3.9 SD;    1810 -6.2 SD;    1812 +5.8 SD;    1823 +4.3 SD;    1826 +5.1 SD;    1827 +7.5 SD;    1828 -6.2 SD;
      1829 -5.2 SD
==================================================================================================================================

TEST S    1667 to  1829     163 years                                                                                Series   2

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1667 1706    0    .07 -.14  .18 -.22 -.11 -.09  .16 -.14 -.03 -.02  .37* .10  .10 -.29  .24 -.09 -.07  .12 -.01 -.18 -.13
   1670 1709    7    .04 -.03  .12 -.21 -.12 -.02  .10 -.13  .07 -.04  .34| .24  .11 -.35  .11  .05 -.12  .35*-.27 -.17 -.04
   1680 1719    0   -.05 -.03  .05 -.21 -.02  .21 -.15  .00 -.02  .02  .29* .24  .10 -.40  .16 -.10 -.02  .29 -.26  .06  .00
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1780 1819    0   -.17  .10  .16 -.22  .06 -.02 -.29  .00  .01 -.07  .30* .19  .00  .05 -.16 -.19  .17  .21 -.02  .20 -.19
   1790 1829    7   -.20  .02  .21 -.25  .10  .08 -.25 -.11  .02 -.02  .21| .07  .08  .15 -.20 -.25  .13  .28*-.01  .14 -.19

[B] Entire series, effect on correlation (  .396) is:
      Lower   1796< -.017   1680< -.016   1754< -.014   1711< -.014   1828> -.012   1807< -.012  Higher   1774  .031   1743  .022
    1667 to 1706 segment:
      Lower   1680< -.073   1686< -.043   1676> -.030   1690> -.024   1703> -.019   1704< -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680< -.080   1686< -.054   1676> -.029   1690> -.025   1704< -.020   1703> -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680< -.065   1711< -.054   1710> -.045   1686< -.028   1690> -.025   1703> -.021  Higher   1708  .069   1681  .034
    1780 to 1819 segment:
      Lower   1796< -.063   1804> -.045   1810> -.031   1813> -.030   1814> -.023   1807< -.020  Higher   1812  .033   1817  .027
    1790 to 1829 segment:
      Lower   1796< -.048   1828> -.042   1804> -.034   1810> -.025   1827< -.022   1814> -.019  Higher   1812  .033   1817  .031

[E] Outliers    35   3.0 SD above or -4.5 SD below mean for year
      1672 +3.3 SD;    1676 +6.1 SD;    1679 +4.0 SD;    1680 -8.1 SD;    1686 -7.1 SD;    1690 +5.7 SD;    1691 +3.5 SD;
      1693 +4.0 SD;    1703 +4.0 SD;    1704 -4.7 SD;    1710 +9.3 SD;    1711 -5.2 SD;    1732 +4.4 SD;    1733 +5.2 SD;
      1734 +3.5 SD;    1745 +3.6 SD;    1748 -4.5 SD;    1752 +3.4 SD;    1754 -7.6 SD;    1755 -5.0 SD;    1771 -5.9 SD;
      1779 +6.0 SD;    1796 -9.3 SD;    1801 +3.2 SD;    1804 +6.5 SD;    1807 -7.9 SD;    1810 +6.2 SD;    1812 -5.8 SD;
      1813 +3.7 SD;    1814 +4.4 SD;    1816 +4.4 SD;    1826 -5.1 SD;    1827 -7.5 SD;    1828 +6.2 SD;    1829 +5.2 SD
==================================================================================================================================
```

```
BP03A     1751 to  1798      48 years                                                                                    Series   3

[B] Entire series, effect on correlation (  .865) is:
      Lower   1794< -.023   1751> -.012   1761< -.011   1778< -.008   1766> -.004   1769< -.004  Higher   1774  .087   1760  .007

[E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
      1765 +3.2 SD;    1794 -5.4 SD;    1796 +3.1 SD
====================================================================================================================================

BP03B     1754 to  1798      45 years                                                                                    Series   4

[B] Entire series, effect on correlation (  .754) is:
      Lower   1762< -.035   1794< -.022   1764< -.020   1788< -.014   1790> -.007   1786< -.006  Higher   1774  .074   1760  .018

[E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
      1776 +4.9 SD;    1794 -4.9 SD;    1796 +5.3 SD
====================================================================================================================================

BP04A     1739 to  1798      60 years                                                                                    Series   5

[B] Entire series, effect on correlation (  .574) is:
      Lower   1752< -.060   1760> -.019   1764< -.011   1742< -.010   1739< -.008   1786< -.007  Higher   1743  .046   1761  .009

[E] Outliers     7   3.0 SD above or -4.5 SD below mean for year
      1740 +3.3 SD;    1752 -7.6 SD;    1756 +4.2 SD;    1760 +4.2 SD;    1761 +4.8 SD;    1780 +3.3 SD;    1796 +4.6 SD
====================================================================================================================================

BP05B     1750 to  1798      49 years                                                                                    Series   6

[B] Entire series, effect on correlation (  .749) is:
      Lower   1762> -.034   1790> -.033   1797< -.018   1751> -.012   1791< -.011   1767< -.011  Higher   1774  .231   1760  .011

[E] Outliers     5   3.0 SD above or -4.5 SD below mean for year
      1762 +4.4 SD;    1780 +3.1 SD;    1790 +5.9 SD;    1792 +3.4 SD;    1797 -5.7 SD
====================================================================================================================================

BP06A     1741 to  1798      58 years                                                                                    Series   7

[B] Entire series, effect on correlation (  .724) is:
      Lower   1741< -.025   1754< -.019   1798> -.017   1752> -.016   1788< -.012   1795< -.010  Higher   1774  .183   1743  .014

[E] Outliers     8   3.0 SD above or -4.5 SD below mean for year
      1741 -5.5 SD;    1752 +3.7 SD;    1754 -5.7 SD;    1758 +5.1 SD;    1759 +5.8 SD;    1779 +3.5 SD;    1780 +3.4 SD;
      1798 +5.8 SD
====================================================================================================================================

UPB01     1739 to  1798      60 years                                                                                    Series   8

[B] Entire series, effect on correlation (  .534) is:
```

```
      Lower   1776< -.013   1759< -.012   1779> -.010   1770< -.009   1778> -.008   1790> -.007  Higher   1743  .031   1774  .019

 [E] Outliers     8   3.0 SD above or -4.5 SD below mean for year
      1743-11.5 SD;    1747 +3.2 SD;    1753 +3.4 SD;    1770 -5.2 SD;    1774 +3.1 SD;    1778 +4.6 SD;    1779 +5.0 SD;
      1788 +6.2 SD
==================================================================================================================================

 UPB02     1714 to  1798      85 years                                                                                    Series   9

 [B] Entire series, effect on correlation (  .677) is:
      Lower   1730< -.024   1738< -.019   1759< -.018   1721> -.017   1731< -.017   1793< -.014  Higher   1774  .114   1743  .025

 [E] Outliers    14   3.0 SD above or -4.5 SD below mean for year
      1716 +3.3 SD;    1721 +6.5 SD;    1723 +3.2 SD;    1730 -6.8 SD;    1731 -7.1 SD;    1736 +3.2 SD;    1738 -5.6 SD;
      1759 -5.9 SD;    1767 +3.2 SD;    1768 +3.7 SD;    1781 +4.6 SD;    1788 +3.9 SD;    1793 -5.7 SD;    1798 +4.0 SD
==================================================================================================================================

 PC01E     1735 to  1799      65 years                                                                                    Series  10

 [B] Entire series, effect on correlation (  .475) is:
      Lower   1781< -.054   1780< -.030   1762> -.025   1740< -.024   1751< -.022   1784> -.014  Higher   1774  .097   1743  .037

 [E] Outliers    12   3.0 SD above or -4.5 SD below mean for year
      1735 +4.1 SD;    1740 -6.4 SD;    1745 +3.8 SD;    1751 -4.7 SD;    1761 +3.9 SD;    1762 +5.8 SD;    1767 -4.5 SD;
      1774 +3.4 SD;    1780 -6.7 SD;    1781 -9.6 SD;    1784 +8.7 SD;    1794 +3.4 SD
==================================================================================================================================

 PC04E     1753 to  1799      47 years                                                                                    Series  11

 [B] Entire series, effect on correlation (  .765) is:
      Lower   1796< -.019   1799> -.014   1779< -.013   1760< -.010   1762> -.007   1758< -.006  Higher   1774  .178   1770  .005

 [E] Outliers     6   3.0 SD above or -4.5 SD below mean for year
      1753 +3.2 SD;    1760 -4.8 SD;    1764 +3.4 SD;    1779 -5.1 SD;    1793 +5.0 SD;    1794 +3.3 SD
==================================================================================================================================

 PC02W     1729 to  1799      71 years                                                                                    Series  12

 [B] Entire series, effect on correlation (  .748) is:
      Lower   1743> -.017   1733< -.017   1779< -.010   1747< -.010   1745< -.009   1789> -.008  Higher   1774  .149   1760  .012

 [E] Outliers    11   3.0 SD above or -4.5 SD below mean for year
      1730 +3.3 SD;    1733 -6.1 SD;    1743 +3.4 SD;    1745 -4.9 SD;    1754 +4.5 SD;    1755 +3.3 SD;    1771 +3.4 SD;
      1779 -5.7 SD;    1786 +3.8 SD;    1789 +4.6 SD;    1793 +4.5 SD
==================================================================================================================================

 PC03W     1730 to  1799      70 years                                                                                    Series  13

 [B] Entire series, effect on correlation (  .745) is:
      Lower   1745< -.017   1730> -.016   1743> -.015   1789> -.010   1776< -.009   1796< -.008  Higher   1774  .159   1760  .011
```

[E] Outliers 10 3.0 SD above or -4.5 SD below mean for year
1730 +4.9 SD; 1738 +3.8 SD; 1743 +3.0 SD; 1745 -5.9 SD; 1753 +3.2 SD; 1754 +4.5 SD; 1779 -4.8 SD;
1786 +3.7 SD; 1789 +5.1 SD; 1793 +3.3 SD

PART 7: DESCRIPTIVE STATISTICS: TCD

20:44 Thu 13 Aug 2009 Page 7

Seq	Series	Interval	No. Years	No. Segmt	No. Flags	Corr with Master	Unfiltered Mean msmt	Unfiltered Max msmt	Unfiltered Std dev	Unfiltered Auto corr	Filtered Mean sens	Filtered Max value	Filtered Std dev	Filtered Auto corr	AR ()
1	NORRIS	1633 1980	348	14	9	.355	.99	1.60	.139	.187	.143	2.58	.344	.000	1
2	TEST S	1667 1829	163	14	5	.396	1.00	1.62	.204	.492	.170	2.73	.434	.024	1
3	BP03A	1751 1798	48	2	0	.865	2.29	3.27	.392	.419	.158	2.45	.456	-.014	2
4	BP03B	1754 1798	45	2	0	.754	2.14	3.33	.358	.432	.140	2.66	.573	-.092	2
5	BP04A	1739 1798	60	4	0	.574	1.77	2.97	.394	.584	.162	2.58	.383	.039	1
6	BP05B	1750 1798	49	2	0	.749	1.84	2.71	.386	.362	.197	2.38	.402	.013	1
7	BP06A	1741 1798	58	3	0	.724	1.77	3.47	.483	.605	.156	2.59	.392	.039	1
8	UPB01	1739 1798	60	4	0	.534	1.73	3.96	.505	.351	.218	2.70	.357	-.050	2
9	UPB02	1714 1798	85	6	0	.677	1.91	3.26	.415	.363	.200	2.55	.421	.012	1
10	PC01E	1735 1799	65	4	0	.475	1.95	3.58	.635	.672	.219	2.88	.627	-.036	1
11	PC04E	1753 1799	47	2	0	.765	2.16	3.27	.545	.569	.180	2.62	.456	-.018	1
12	PC02W	1729 1799	71	5	0	.748	1.88	3.58	.503	.680	.154	2.54	.366	.036	1
13	PC03W	1730 1799	70	4	0	.745	1.85	3.31	.459	.615	.164	2.41	.352	-.025	2
Total or mean:			1169	66	14	.582	1.52	3.96	.331	.416	.167	2.88	.405	.000	

PART 8: ADJUSTMENTS FOR UNDATED SERIES: TCD

20:44 Thu 13 Aug 2009 Page 8

Time span 1633 1980 348 years, best matches for 40-year segments lagged 10 years
Listed in order from highest correlation

Series	Counted Segment	Add Corr # 1	Add Corr # 2	Add Corr # 3	Add Corr # 4	Add Corr # 5	Add Corr # 6	Add Corr # 7	Add Corr # 8	Add Corr # 9	Add Corr #10	Add Corr #11
BP05A	1755 1794	65 .53	-31 .53	137 .49	0 .49	38 .46	-93 .37	-75 .36	-53 .31	111 .30	-12 .29	-122 .29
BP05A	1759 1798	Lag from prior segment 4 years; insufficient										

Series	Counted Segment	Add Corr # 1	Add Corr # 2	Add Corr # 3	Add Corr # 4	Add Corr # 5	Add Corr # 6	Add Corr # 7	Add Corr # 8	Add Corr # 9	Add Corr #10	Add Corr #11
BP06B	1733 1772	0 .50	52 .45	134 .44	14 .42	151 .40	-52 .39	204 .38	59 .35	-17 .35	-54 .35	47 .34
BP06B	1743 1782	0 .80	151 .51	52 .50	79 .43	120 .42	-12 .42	190 .42	170 .39	65 .38	-88 .36	38 .36
BP06B	1753 1792	0 .81	151 .53	79 .48	-61 .42	-92 .42	52 .39	65 .36	105 .36	-52 .32	170 .32	14 .30
BP06B	1756 1795	Lag from prior segment 3 years; insufficient										

3 segments

```
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  3  .71   +52  3  .45  +151  3  .48
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
       +0  3   +52  3  +151  3
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 PC03E    1752 1791   151 .75     0 .60    14 .57    79 .50    47 .48   -92 .47   -36 .38    52 .37   165 .35   169 .34   -79 .33
 PC03E    1760 1799   151 .63     0 .62   -36 .44   -92 .43    14 .42    79 .40   165 .39    91 .34    -5 .33  -109 .33    52 .32
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 PC01W    1729 1768    35 .60     4 .58   112 .44   140 .42   204 .42   -88 .39   172 .38   100 .36    52 .36     0 .33   209 .33
 PC01W    1739 1778     0 .57   -31 .45   112 .45   151 .44   120 .42    52 .39    77 .38   100 .36    65 .35    35 .34   -88 .34
 PC01W    1749 1788     0 .84   151 .54   190 .45   -92 .42    77 .41    47 .36    14 .35   -54 .35   174 .34   -31 .33   137 .33
 PC01W    1759 1798     0 .83  -123 .52   151 .49   -54 .45    77 .40   -42 .38   165 .37    16 .36   137 .36    65 .36   174 .34
      4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  4  .64   +77  3  .40  +151  3  .49
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
       +0  4   +77  3  +151  3
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 FLOOR04  1758 1797     0 .74   137 .61  -123 .55    38 .52   105 .46   -66 .41  -122 .41   -23 .36    15 .34   -89 .32   -54 .32
 FLOOR04  1768 1807     0 .73   137 .58  -123 .50   -23 .35  -122 .35   -66 .33    65 .33   -54 .32    38 .32    77 .30   151 .30
 FLOOR04  1778 1817    96 .47   -91 .40   151 .37    75 .35    15 .35   -77 .34    73 .32     0 .31    81 .31   -25 .31   -89 .30
 FLOOR04  1782 1821  Lag from prior segment   4 years; insufficient
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  3  .59
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 FLOOR05  1742 1781     0 .52    -5 .46   -97 .39   163 .38    25 .35   105 .34   132 .34   -98 .33    33 .33   -67 .32    65 .32
 FLOOR05  1752 1791    33 .55     0 .50    65 .48   -66 .47   132 .42   -31 .41   100 .40    40 .40    47 .37   -43 .36   -93 .34
 FLOOR05  1759 1798    33 .50   -31 .49   132 .48  -123 .47    40 .44    65 .43     0 .42   -73 .41   -19 .41   101 .37   -50 .36
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  3  .48   +33  3  .46   +65  3  .41  +132  3  .41
```

```
 Chronological order
       Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
        +0  3   +33  3   +65  3  +132  3
==================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
        6 undated series
```

- = [COFECHA TCD COF] = -

Appendix IV. Final interseries correlation for farmhouse provided by COFECHA.

```
[]  Dendrochronology Program Library                                        Run TCMTR  Program COF  20:48  Thu 13 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                        Version 6.06P    27255
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           TCMTR

 File of DATED series:   TCFinal

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                               1234567
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Time span of Master dating series is  1714 to  1821   108 years
 Continuous time span is               1714 to  1821   108 years
 Portion with two or more series is    1729 to  1799    71 years
```

```
                                        ****************************************
                                        *C* Number of dated series        17 *C*
                                        *O* Master series 1714 1821  108 yrs *O*
                                        *F* Total rings in all series   1004 *F*
                                        *E* Total dated rings checked    967 *E*
                                        *C* Series intercorrelation     .654 *C*
                                        *H* Average mean sensitivity    .181 *H*
                                        *A* Segments, possible problems    2 *A*
                                        *** Mean length of series       59.1 ***
                                        ****************************************

 ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value

PART 2:  TIME PLOT OF TREE-RING SERIES: TCMTR                                                     20:48  Thu 13 Aug 2009  Page   2
-------------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03A      1 1751 1798   48
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03B      2 1754 1798   45
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . BP04A      3 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP05A      4 1755 1798   44
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP05B      5 1750 1798   49
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    .    .    . BP06A      6 1741 1798   58
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . BP06B      7 1733 1795   63
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . UPB01      8 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .<=======>.    .    .    .    .    . UPB02      9 1714 1798   85
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC01E     10 1735 1799   65
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . PC03E     11 1752 1799   48
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . PC04E     12 1753 1799   47
   .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    .    . PC01W     13 1729 1798   70
   .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    .    . PC02W     14 1729 1799   71
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC03W     15 1730 1799   70
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <======>   .    .    .    .    . FLOOR04   16 1758 1821   64
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    .    .    . FLOOR05   17 1742 1798   57
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1750	.889	11	1800	-2.943	1									
			1751	-.252	12	1801	-1.613	1									
			1752	-1.496	13	1802	-.416	1									
			1753	.448	14	1803	-.870	1									
			1754	.961	15	1804	-1.256	1									
			1755	-.911	16	1805	-.293	1									
			1756	-.208	16	1806	-.261	1									
			1757	.701	16	1807	-.611	1									
			1758	.504	17	1808	1.111	1									
			1759	.387	17	1809	1.149	1									
			1760	-1.721	17	1810	1.994	1									
			1761	.491	17	1811	.334	1									
			1762	-.292	17	1812	.283	1									
			1763	.082	17	1813	-1.889	1									
1714	-1.171	1	1764	.544	17	1814	.734	1									
1715	-.901	1	1765	.276	17	1815	-1.136	1									
1716	1.833	1	1766	-.149	17	1816	.629	1									
1717	.584	1	1767	-.011	17	1817	.707	1									
1718	-.533	1	1768	.873	17	1818	1.325	1									
1719	.840	1	1769	.812	17	1819	.084	1									
1720	-.837	1	1770	1.063	17	1820	-.867	1									
1721	1.909	1	1771	1.129	17	1821	2.138	1									
1722	1.030	1	1772	-.136	17												
1723	.608	1	1773	-.263	17												
1724	-1.187	1	1774	-3.832	17												
1725	-.677	1	1775	-1.495	17												
1726	-.232	1	1776	.081	17												
1727	1.482	1	1777	.540	17												
1728	1.343	1	1778	-.147	17												
1729	.811	3	1779	-1.178	17												
1730	.118	4	1780	.666	17												
1731	-.818	4	1781	.590	17												
1732	-1.712	4	1782	1.074	17												
1733	-.450	5	1783	.174	17												
1734	.652	5	1784	-.080	17												
1735	.008	6	1785	-.982	17												
1736	-.277	6	1786	.232	17												
1737	.044	6	1787	.032	17												
1738	.149	6	1788	.706	17												
1739	-.252	8	1789	.380	17												
1740	.086	8	1790	-.461	17												
1741	.483	9	1791	-.783	17												

```
 1742  1.454  10       1792   .436  17
 1743 -1.686  10       1793  1.177  17
 1744  -.488  10       1794  -.080  17
 1745  -.049  10       1795   .034  17
 1746   .770  10       1796  1.219  16
 1747   .573  10       1797  -.534  16
 1748 -1.101  10       1798  -.435  16
 1749  -.365  10       1799 -1.429   6
```

```
------------------------------------------------------------------------------------------------------------------------------------
PART 4:  Master Bar Plot: TCMTR                                                                           20:48  Thu 13 Aug 2009  Page   4
------------------------------------------------------------------------------------------------------------------------------------
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1750---------D  1800l
                   1751---a        1801f
                   1752f           1802---b
                   1753------B     1803-c
                   1754---------D  1804-e
                   1755-d          1805---a
                   1756----a       1806---a
                   1757--------C   1807--b
                   1758-------B    1808---------D
                   1759------B     1809---------E
                   1760g           1810----------H
                   1761-------B    1811------A
                   1762---a        1812------A
                   1763-----@      1813h
   1714-e          1764-------B    1814--------C
   1715-d          1765------A     1815-e
   1716----------G 1766----a       1816-------C
   1717-------B    1767-----@      1817--------C
   1718--b         1768--------C   1818----------E
   1719--------C   1769--------C   1819-----@
   1720--c         1770---------D  1820-c
   1721----------H 1771---------E  1821----------I
   1722---------D  1772----a
   1723-------B    1773---a
   1724-e          1774o
   1725--c         1775f
   1726---a        1776-----@
   1727----------F 1777-------B
   1728----------E 1778----a
   1729--------C   1779-e
   1730-----@      1780--------C
   1731--c         1781-------B
   1732g           1782---------D
   1733---b        1783-----A
   1734--------C   1784----@
   1735-----@      1785-d
   1736---a        1786------A
   1737-----@      1787-----@
```

```
  1738-----A      1788--------C
  1739---a        1789------B
  1740-----@      1790--b
  1741-------B    1791--c
  1742----------F 1792------B
  1743g           1793---------E
  1744--b         1794----@
  1745----@       1795-----@
  1746--------C   1796---------E
  1747-------B    1797--b
  1748-d          1798---b
  1749---a        1799f
```

PART 5: CORRELATION OF SERIES BY SEGMENTS: TCMTR 20:48 Thu 13 Aug 2009 Page 5

Correlations of 40-year dated segments, lagged 10 years
Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1720 1759	1730 1769	1740 1779	1750 1789	1760 1799
1	BP03A	1751 1798				.90	.90
2	BP03B	1754 1798				.75	.73
3	BP04A	1739 1798		.53	.52	.49	.56
4	BP05A	1755 1798				.47	.49
5	BP05B	1750 1798				.84	.81
6	BP06A	1741 1798			.77	.75	.80
7	BP06B	1733 1795		.44	.72	.82	.82
8	UPB01	1739 1798		.53	.52	.54	.45
9	UPB02	1714 1798	.56	.59	.84	.82	.75
10	PC01E	1735 1799		.58	.62	.46	.47
11	PC03E	1752 1799				.63	.62
12	PC04E	1753 1799				.89	.83
13	PC01W	1729 1798	.37B	.37B	.81	.86	.83
14	PC02W	1729 1799	.66	.66	.87	.91	.90
15	PC03W	1730 1799		.67	.88	.90	.87
16	FLOOR04	1758 1821				.74	.79
17	FLOOR05	1742 1798			.48	.48	.41
Av segment correlation			.53	.55	.71	.72	.71

```
-----------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
===================================================================================================================================

 BP03A     1751 to  1798      48 years                                                                                    Series   1

 [B] Entire series, effect on correlation (  .886) is:
       Lower   1794< -.019   1751> -.009   1756> -.008   1789< -.007   1762< -.006   1761< -.005  Higher   1774  .065   1760  .011

===================================================================================================================================

 BP03B     1754 to  1798      45 years                                                                                    Series   2

 [B] Entire series, effect on correlation (  .739) is:
       Lower   1762< -.060   1764< -.023   1794< -.018   1788< -.013   1779> -.007   1786< -.006  Higher   1774  .081   1760  .027

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1776 +3.2 SD;    1796 +3.1 SD
===================================================================================================================================

 BP04A     1739 to  1798      60 years                                                                                    Series   3

 [B] Entire series, effect on correlation (  .537) is:
       Lower   1752< -.057   1760> -.026   1764< -.013   1740> -.009   1742< -.008   1786< -.008  Higher   1743  .042   1774  .013

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1752 -5.0 SD;    1761 +3.5 SD
===================================================================================================================================

 BP05A     1755 to  1798      44 years                                                                                    Series   4

 [B] Entire series, effect on correlation (  .483) is:
       Lower   1761< -.107   1760> -.085   1762> -.032   1768< -.015   1779> -.012   1772> -.011  Higher   1774  .414   1796  .013

 [C] Year-to-year changes diverging by over 4.0 std deviations:
       1760 1761  -5.1 SD
```

```
 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1760 +5.3 SD;    1761 -5.7 SD
==================================================================================================================================

 BP05B     1750 to  1798      49 years                                                                                    Series   5

 [B] Entire series, effect on correlation (  .785) is:
       Lower   1791< -.027   1790> -.020   1762> -.019   1753< -.014   1767< -.010   1789< -.009  Higher   1774  .213   1760  .009

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1790 +3.0 SD
==================================================================================================================================

 BP06A     1741 to  1798      58 years                                                                                    Series   6

 [B] Entire series, effect on correlation (  .720) is:
       Lower   1754< -.031   1798> -.018   1741< -.018   1779> -.016   1795< -.014   1752> -.013  Higher   1774  .206   1743  .016

 [E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
       1758 +3.7 SD;    1759 +3.8 SD;    1798 +3.8 SD
==================================================================================================================================

 BP06B     1733 to  1795      63 years                                                                                    Series   7

 [B] Entire series, effect on correlation (  .635) is:
       Lower   1738< -.035   1790> -.020   1740< -.019   1754< -.018   1748> -.016   1753< -.012  Higher   1774  .181   1760  .031

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1749 +3.3 SD;    1790 +3.6 SD
==================================================================================================================================

 UPB01     1739 to  1798      60 years                                                                                    Series   8

 [B] Entire series, effect on correlation (  .493) is:
       Lower   1779> -.015   1776< -.011   1778> -.011   1770< -.009   1759< -.009   1760> -.008  Higher   1774  .027   1752  .009

 [E] Outliers     4   3.0 SD above or -4.5 SD below mean for year
       1743 -7.6 SD;    1778 +3.1 SD;    1779 +3.6 SD;    1788 +3.8 SD
==================================================================================================================================

 UPB02     1714 to  1798      85 years                                                                                    Series   9

 [*] Early part of series cannot be checked from 1714 to 1728 -- not matched by another series

 [B] Entire series, effect on correlation (  .674) is:
       Lower   1730< -.041   1759< -.015   1793< -.014   1738< -.014   1729< -.012   1731< -.010  Higher   1774  .148   1743  .025

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1730 -5.1 SD;    1781 +3.1 SD
```

```
==================================================================================================================================

 PC01E     1735 to  1799      65 years                                                                                    Series  10

 [B] Entire series, effect on correlation (  .463) is:
       Lower   1781< -.046   1780< -.028   1751< -.025   1737< -.022   1740< -.016   1762> -.014  Higher   1774  .103   1743  .033

 [E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
       1762 +3.1 SD;    1781 -5.7 SD;    1784 +5.4 SD
==================================================================================================================================

 PC03E     1752 to  1799      48 years                                                                                    Series  11

 [B] Entire series, effect on correlation (  .610) is:
       Lower   1774> -.068   1760< -.015   1798< -.011   1752> -.009   1758< -.007   1763< -.007  Higher   1770  .009   1779  .007

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1793 +3.4 SD
==================================================================================================================================

 PC04E     1753 to  1799      47 years                                                                                    Series  12

 [B] Entire series, effect on correlation (  .828) is:
       Lower   1796< -.023   1799> -.018   1776> -.005   1797> -.005   1779< -.004   1794> -.004  Higher   1774  .122   1770  .003

==================================================================================================================================

 PC01W     1729 to  1798      70 years                                                                                    Series  13

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1729 1768    4   -.09  .01  .21  .22 -.15 -.20 -.02  .06 -.01 -.03  .37|-.12 -.12 -.23  .55* .00 -.20 -.18 -.07  .10 -.17
    1730 1769    4   -.11  .00  .19  .20 -.16 -.16 -.01  .06 -.04 -.04  .37|-.10 -.09 -.21  .56*-.08 -.21 -.17 -.06  .10 -.19

 [B] Entire series, effect on correlation (  .592) is:
       Lower   1739< -.150   1743> -.025   1796< -.024   1776< -.007   1734< -.006   1737> -.004  Higher   1774  .155   1760  .030
     1729 to 1768 segment:
       Lower   1739< -.257   1743> -.037   1734< -.011   1747< -.007   1736> -.006   1738> -.005  Higher   1760  .103   1742  .027
     1730 to 1769 segment:
       Lower   1739< -.258   1743> -.037   1734< -.010   1747< -.007   1736> -.006   1738> -.005  Higher   1760  .103   1742  .027

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1739 -7.5 SD
==================================================================================================================================

 PC02W     1729 to  1799      71 years                                                                                    Series  14

 [B] Entire series, effect on correlation (  .810) is:
       Lower   1739> -.013   1743> -.011   1733< -.011   1747< -.009   1744< -.007   1768< -.006  Higher   1774  .126   1760  .013
```

```
=================================================================================================================================
 PC03W     1730 to  1799      70 years                                                                                Series  15

 [B] Entire series, effect on correlation (  .789) is:
      Lower   1730> -.013   1739> -.013   1796< -.011   1745< -.011   1731> -.009   1776< -.008  Higher   1774  .148   1760  .015

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1739 +3.3 SD
=================================================================================================================================
 FLOOR04   1758 to  1821      64 years                                                                                Series  16

 [*] Later part of series cannot be checked from 1800 to 1821 -- not matched by another series

 [B] Entire series, effect on correlation (  .742) is:
      Lower   1759< -.050   1760> -.026   1787> -.015   1771< -.012   1789< -.012   1761< -.011  Higher   1774  .350   1796  .007

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1787 +3.4 SD
=================================================================================================================================
 FLOOR05   1742 to  1798      57 years                                                                                Series  17

 [B] Entire series, effect on correlation (  .390) is:
      Lower   1793< -.058   1760> -.025   1762> -.024   1749< -.019   1786< -.018   1750< -.013  Higher   1774  .179   1796  .014

 [E] Outliers     4   3.0 SD above or -4.5 SD below mean for year
      1749 -4.8 SD;    1760 +3.3 SD;    1762 +4.6 SD;    1792 +3.5 SD
=================================================================================================================================
```

						Corr	//-------- Unfiltered --------\\					//---- Filtered -----\\			
Seq	Series	Interval	No. Years	No. Segmt	No. Flags	with Master	Mean msmt	Max msmt	Std dev	Auto corr	Mean sens	Max value	Std dev	Auto corr	AR ()
1	BP03A	1751 1798	48	2	0	.886	2.29	3.27	.392	.419	.158	2.45	.456	-.014	2
2	BP03B	1754 1798	45	2	0	.739	2.14	3.33	.358	.432	.140	2.66	.573	-.092	2
3	BP04A	1739 1798	60	4	0	.537	1.77	2.97	.394	.584	.162	2.58	.383	.039	1
4	BP05A	1755 1798	44	2	0	.483	1.88	2.41	.362	.269	.191	2.43	.486	-.106	2
5	BP05B	1750 1798	49	2	0	.785	1.84	2.71	.386	.362	.197	2.38	.402	.013	1
6	BP06A	1741 1798	58	3	0	.720	1.77	3.47	.483	.605	.156	2.59	.392	.039	1
7	BP06B	1733 1795	63	4	0	.635	1.51	2.46	.330	.582	.176	2.46	.460	.016	1
8	UPB01	1739 1798	60	4	0	.493	1.73	3.96	.505	.351	.218	2.70	.357	-.050	2
9	UPB02	1714 1798	85	5	0	.674	1.91	3.26	.415	.363	.200	2.55	.421	.012	1
10	PC01E	1735 1799	65	4	0	.463	1.95	3.58	.635	.672	.219	2.88	.627	-.036	1
11	PC03E	1752 1799	48	2	0	.610	2.03	3.16	.507	.598	.170	2.64	.402	-.062	1
12	PC04E	1753 1799	47	2	0	.828	2.16	3.27	.545	.569	.180	2.62	.456	-.018	1
13	PC01W	1729 1798	70	5	2	.592	1.87	3.05	.488	.333	.210	2.44	.425	-.059	2
14	PC02W	1729 1799	71	5	0	.810	1.88	3.58	.503	.680	.154	2.54	.366	.036	1
15	PC03W	1730 1799	70	4	0	.789	1.85	3.31	.459	.615	.164	2.41	.352	-.025	2
16	FLOOR04	1758 1821	64	2	0	.742	1.32	3.40	.773	.866	.181	2.51	.365	.027	1
17	FLOOR05	1742 1798	57	3	0	.390	1.24	2.66	.615	.786	.174	2.59	.511	.001	1
Total or mean:			1004	55	2	.654	1.82	3.96	.484	.540	.181	2.88	.433	-.013	

- = [COFECHA TCMTRCOF] = -

Appendix V. Initial suggested dates for the corn crib core samples provided by COFECHA.

```
[]  Dendrochronology Program Library                                        Run CCTNM  Program COF  20:55  Tue 11 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                          Version 6.06P    27253
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           CCTNM

 File of DATED series:   TNMaster.txt

 File of UNDATED series: CornCribFinal.txt

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics
    Part 8:  Undated series - adjustments for highest correlations

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                              12345678
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Text in file: NORRISAA NORRIS DAM STATE PARK                   0526AA01    QUAL

 Text in file: NORRISAA TENNESSEE    WHITE OAK         0220M 03613-08405          1633 1980

 Text in file: NORRISAA DANIEL N. DUVICK                                              APR1981

 Text in file: combined.rwl Std R Chron                                        [14Sep07-0917]
```

```
Time span of Master dating series is  1633 to  1980   348 years
Continuous time span is               1633 to  1980   348 years
Portion with two or more series is    1667 to  1829   163 years

                                      ****************************************
                                      *C* Number of dated series         2 *C*
                                      *O* Master series 1633 1980  348 yrs *O*
                                      *F* Total rings in all series    511 *F*
                                      *E* Total dated rings checked    326 *E*
                                      *C* Series intercorrelation     .314 *C*
                                      *H* Average mean sensitivity    .152 *H*
                                      *A* Segments, possible problems   22 *A*
                                      *** Mean length of series      255.5 ***
                                      ****************************************

ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value
```

```
PART 2:  TIME PLOT OF TREE-RING SERIES: CCTNM                                                     20:55  Tue 11 Aug 2009  Page   2
-----------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .  <====================================> .    . NORRIS     1 1633 1980  348
   .    .    .    .    .    .    .    .    .    .    .    .    .<================>  .    .    .    .    . TEST S     2 1667 1829  163
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

PART 3: Master Dating Series: CCTNM   20:55 Tue 11 Aug 2009 Page   3

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1650	.153	1	1700	-.588	2	1750	.395	2	1800	.969	2	1850	-.773	1
			1651	-3.012	1	1701	-.210	2	1751	-.225	2	1801	.323	2	1851	-2.740	1
			1652	-3.154	1	1702	-.599	2	1752	-.444	2	1802	1.317	2	1852	.341	1
			1653	-.298	1	1703	-.790	2	1753	-.537	2	1803	.513	2	1853	-1.531	1
			1654	-1.445	1	1704	.187	2	1754	-1.501	2	1804	-.549	2	1854	-.091	1
			1655	.128	1	1705	1.013	2	1755	-2.046	2	1805	.603	2	1855	1.243	1
			1656	-.714	1	1706	-.483	2	1756	.408	2	1806	-.242	2	1856	.201	1
			1657	1.576	1	1707	.640	2	1757	.471	2	1807	-1.647	2	1857	1.633	1
			1658	-.226	1	1708	-1.643	2	1758	1.564	2	1808	.699	2	1858	.063	1
			1659	.534	1	1709	-.336	2	1759	1.003	2	1809	.745	2	1859	-1.300	1
			1660	-1.022	1	1710	1.138	2	1760	-.009	2	1810	.023	2	1860	1.574	1
			1661	.761	1	1711	.688	2	1761	.821	2	1811	.814	2	1861	-.674	1
			1662	.023	1	1712	-.228	2	1762	-1.091	2	1812	-1.715	2	1862	.410	1

			1663	-.016	1	1713	-.825	2	1763	.702	2	1813	-1.524	2	1863	.569	1
			1664	.507	1	1714	.122	2	1764	.113	2	1814	-.287	2	1864	-.674	1
			1665	1.467	1	1715	-1.272	2	1765	.294	2	1815	-.074	2	1865	-.654	1
			1666	.947	1	1716	.370	2	1766	-.547	2	1816	.010	2	1866	.393	1
			1667	.175	2	1717	1.474	2	1767	-.661	2	1817	1.442	2	1867	.543	1
			1668	-1.724	2	1718	-.125	2	1768	.978	2	1818	.586	2	1868	.594	1
			1669	1.338	2	1719	1.498	2	1769	.811	2	1819	-.455	2	1869	2.384	1
			1670	-.140	2	1720	-.671	2	1770	1.126	2	1820	.991	2	1870	.323	1
			1671	-.562	2	1721	-.632	2	1771	.050	2	1821	-.868	2	1871	-.466	1
			1672	-.775	2	1722	-.061	2	1772	-.221	2	1822	-.002	2	1872	-1.789	1
			1673	1.079	2	1723	-.581	2	1773	-.642	2	1823	.328	2	1873	.099	1
			1674	.071	2	1724	-1.877	2	1774	-2.521	2	1824	1.179	2	1874	-1.244	1
			1675	1.034	2	1725	-.467	2	1775	-1.314	2	1825	-.663	2	1875	-.591	1
			1676	-.634	2	1726	-.812	2	1776	-.164	2	1826	-1.219	2	1876	.553	1
			1677	1.380	2	1727	1.079	2	1777	-.424	2	1827	-.197	2	1877	.023	1
			1678	.808	2	1728	.540	2	1778	.731	2	1828	-.243	2	1878	.729	1
			1679	-.291	2	1729	.813	2	1779	-.138	2	1829	.107	2	1879	-2.341	1
			1680	.165	2	1730	-.298	2	1780	.701	2	1830	.657	1	1880	-2.082	1
			1681	-1.455	2	1731	.167	2	1781	.993	2	1831	.461	1	1881	.082	1
			1682	-.680	2	1732	.159	2	1782	1.485	2	1832	.530	1	1882	1.736	1
1633	-.195	1	1683	.057	2	1733	1.126	2	1783	.673	2	1833	-1.231	1	1883	1.306	1
1634	.109	1	1684	-.136	2	1734	1.210	2	1784	-.347	2	1834	-.110	1	1884	1.057	1
1635	-1.636	1	1685	-.952	2	1735	-.530	2	1785	-.339	2	1835	.316	1	1885	-.090	1
1636	-.650	1	1686	-1.296	2	1736	-1.288	2	1786	.055	2	1836	.571	1	1886	-.112	1
1637	-1.130	1	1687	-.636	2	1737	-.751	2	1787	.701	2	1837	.325	1	1887	-.535	1
1638	.740	1	1688	.428	2	1738	-.148	2	1788	.463	2	1838	.641	1	1888	-.659	1
1639	1.208	1	1689	.524	2	1739	.998	2	1789	.224	2	1839	-3.191	1	1889	.794	1
1640	.589	1	1690	.383	2	1740	.839	2	1790	-1.387	2	1840	1.366	1	1890	.031	1
1641	2.693	1	1691	.821	2	1741	.954	2	1791	-1.430	2	1841	.044	1	1891	.660	1
1642	.526	1	1692	1.267	2	1742	1.223	2	1792	-.853	2	1842	1.292	1	1892	1.674	1
1643	.545	1	1693	-1.222	2	1743	-1.013	2	1793	.656	2	1843	2.039	1	1893	.745	1
1644	-.421	1	1694	.696	2	1744	-.675	2	1794	.465	2	1844	-1.316	1	1894	-2.041	1
1645	-.794	1	1695	1.009	2	1745	1.312	2	1795	-.537	2	1845	.437	1	1895	-.237	1
1646	.177	1	1696	.768	2	1746	-.463	2	1796	-.261	2	1846	.073	1	1896	-1.038	1
1647	.238	1	1697	.762	2	1747	.597	2	1797	.310	2	1847	.195	1	1897	1.439	1
1648	.578	1	1698	.085	2	1748	-.929	2	1798	.040	2	1848	-.852	1	1898	-1.144	1
1649	.749	1	1699	-1.023	2	1749	-.758	2	1799	-.767	2	1849	.447	1	1899	.001	1

PART 3: Master Dating Series: CCTNM 20:55 Tue 11 Aug 2009 Page 4

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
1900	-1.523	1	1950	-.485	1												
1901	.100	1	1951	1.352	1												
1902	-.150	1	1952	-1.214	1												
1903	1.600	1	1953	-.045	1												
1904	.942	1	1954	.587	1												

1905	.537	1	1955	1.311	1
1906	.484	1	1956	-.239	1
1907	-.697	1	1957	-.050	1
1908	-.257	1	1958	1.314	1
1909	.114	1	1959	-.814	1
1910	1.095	1	1960	-.112	1
1911	-3.704	1	1961	.573	1
1912	-.491	1	1962	.657	1
1913	-.633	1	1963	.130	1
1914	-.908	1	1964	-2.574	1
1915	.514	1	1965	.958	1
1916	1.133	1	1966	-1.724	1
1917	2.641	1	1967	1.431	1
1918	-.363	1	1968	.609	1
1919	.309	1	1969	-1.486	1
1920	.122	1	1970	-.443	1
1921	-.855	1	1971	.339	1
1922	.995	1	1972	.148	1
1923	.308	1	1973	-.288	1
1924	.542	1	1974	-.740	1
1925	-1.643	1	1975	1.158	1
1926	.206	1	1976	2.077	1
1927	-.560	1	1977	.549	1
1928	.786	1	1978	.277	1
1929	-.681	1	1979	-1.085	1
1930	-1.367	1	1980	-.927	1
1931	.010	1			
1932	1.000	1			
1933	-.902	1			
1934	-.047	1			
1935	1.296	1			
1936	-1.730	1			
1937	1.272	1			
1938	1.246	1			
1939	-.608	1			
1940	.636	1			
1941	-.386	1			
1942	.349	1			
1943	-.566	1			
1944	-1.803	1			
1945	1.882	1			
1946	.800	1			
1947	-.141	1			
1948	-1.318	1			
1949	-.664	1			

```
------------------------------------------------------------------------------------------------------------------------------------
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1650-----A      1700--b         1750------B     1800---------D  1850--c         1900f           1950---b
                   1651l           1701----a       1751----a       1801------A     1851k           1901-----@      1951----------E
                   1652m           1702--b         1752---b        1802----------E 1852------A     1902----a       1952-e
                   1653----a       1703--c         1753---b        1803-------B    1853f           1903----------F 1953----@
                   1654f           1704-----A      1754f           1804---b        1854----@       1904---------D  1954-------B
                   1655-----A      1705---------D  1755h           1805-------B    1855---------E  1905-------B    1955----------E
                   1656--c         1706---b        1756------B     1806----a       1856------A     1906-------B    1956----a
                   1657----------F 1707-------C    1757-------B    1807g           1857----------G 1907--c         1957----@
                   1658----a       1708g           1758----------F 1808--------C   1858-----@      1908----a       1958----------E
                   1659-------B    1709---a        1759---------D  1809--------C   1859-e          1909-----@      1959--c
                   1660-d          1710---------E  1760-----@      1810-----@      1860----------F 1910---------D  1960----@
                   1661--------C   1711--------C   1761--------C   1811--------C   1861--c         1911o           1961-------B
                   1662-----@      1712----a       1762-d          1812g           1862------B     1912---b        1962--------C
                   1663-----@      1713--c         1763--------C   1813f           1863-------B    1913--c         1963-----A
                   1664-------B    1714-----@      1764-----@      1814----a       1864--c         1914-d          1964j
                   1665----------F 1715-e          1765------A     1815----@       1865--c         1915-------B    1965---------D
                   1666---------D  1716------A     1766---b        1816-----@      1866------B     1916---------E  1966g
                   1667-----A      1717----------F 1767--c         1817----------F 1867-------B    1917----------K 1967----------F
                   1668g           1718----@       1768---------D  1818-------B    1868-------B    1918---a        1968-------B
                   1669----------E 1719----------F 1769--------C   1819---b        1869----------J 1919------A     1969f
                   1670----a       1720--c         1770---------E  1820---------D  1870------A     1920-----@      1970---b
                   1671---b        1721--c         1771-----@      1821--c         1871---b        1921--c         1971------A
                   1672--c         1722----@       1772----a       1822-----@      1872g           1922---------D  1972-----A
                   1673---------D  1723--b         1773--c         1823------A     1873-----@      1923------A     1973----a
                   1674-----@      1724h           1774j           1824---------E  1874-e          1924-------B    1974--c
                   1675---------D  1725---b        1775-e          1825--c         1875--b         1925g           1975---------E
                   1676--c         1726--c         1776----a       1826-e          1876-------B    1926------A     1976----------H
                   1677----------F 1727---------D  1777---b        1827----a       1877-----@      1927---b        1977-------B
                   1678--------C   1728-------B    1778--------C   1828----a       1878--------C   1928--------C   1978------A
                   1679----a       1729--------C   1779----a       1829-----@      1879i           1929--c         1979-d
                   1680-----A      1730----a       1780--------C   1830--------C   1880h           1930-e          1980-d
                   1681f           1731-----A      1781---------D  1831-------B    1881-----@      1931-----@
                   1682--c         1732-----A      1782----------F 1832-------B    1882----------G 1932---------D
   1633----a       1683-----@      1733---------E  1783--------C   1833-e          1883----------E 1933-d
   1634-----@      1684----a       1734---------E  1784---a        1834----@       1884---------D  1934----@
   1635g           1685-d          1735---b        1785---a        1835------A     1885----@       1935----------E
   1636--c         1686-e          1736-e          1786-----@      1836-------B    1886----@       1936g
   1637-e          1687--c         1737--c         1787--------C   1837------A     1887---b        1937---------E
   1638--------C   1688------B     1738----a       1788-------B    1838-------C    1888--c         1938---------E
   1639---------E  1689-------B    1739---------D  1789------A     1839m           1889--------C   1939--b
   1640-------B    1690------B     1740--------C   1790-f          1840----------E 1890-----@      1940-------C
   1641----------K 1691--------C   1741---------D  1791f           1841-----@      1891--------C   1941---b
   1642-------B    1692---------E  1742---------E  1792--c         1842----------E 1892----------G 1942------A
   1643-------B    1693-e          1743-d          1793--------C   1843----------H 1893--------C   1943--b
   1644---b        1694--------C   1744--c         1794-------B    1844-e          1894h           1944g
   1645--c         1695---------D  1745----------E 1795---b        1845-------B    1895----a       1945----------H
   1646-----A      1696--------C   1746---b        1796----a       1846-----@      1896-d          1946--------C
```

```
   1647------A     1697--------C   1747-------B    1797------A     1847-----A      1897----------F 1947----a
   1648-------B    1698-----@      1748-d          1798-----@      1848--c         1898-e          1948-e
   1649--------C   1699-d          1749--c         1799--c         1849-------B    1899-----@      1949--c

PART 5:  CORRELATION OF SERIES BY SEGMENTS: CCTNM                                                  20:55  Tue 11 Aug 2009  Page   5
-------------------------------------------------------------------------------------------------------------------------------------
 Correlations of  40-year dated segments, lagged  10 years
 Flags:  A = correlation under   .3665 but highest as dated;  B = correlation higher at other than dated position

 Seq Series  Time_span   1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790
                         1699 1709 1719 1729 1739 1749 1759 1769 1779 1789 1799 1809 1819 1829
 --- -------- ---------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
   1 NORRIS   1633 1980   .37A .34A .29B .42  .31A .24B .33A .30A .38  .45  .34A .31A .25B .21B
   2 TEST S   1667 1829   .37A .34B .29A .42  .31B .24A .33A .30A .38  .45  .34A .31A .25A .21B
 Av segment correlation   .37  .34  .29  .42  .31  .24  .33  .30  .38  .45  .34  .31  .25  .21

PART 6:  POTENTIAL PROBLEMS: CCTNM                                                                 20:55  Tue 11 Aug 2009  Page   6
-------------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
=====================================================================================================================================

 NORRIS    1633 to  1980     348 years                                                                                    Series   1

 [*] Early part of series cannot be checked from 1633 to 1666 -- not matched by another series

 [*] Later part of series cannot be checked from 1830 to 1980 -- not matched by another series

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
     --------- ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1667 1706    0   -.05 -.27  .15  .04 -.17 -.05  .25 -.24  .03  .11  .37*-.03  .07 -.13  .06  .07 -.05 -.31  .12  .00 -.10
    1670 1709    0   -.05 -.13  .05  .11 -.15 -.08  .23 -.29  .09  .22  .34*-.07  .00 -.02  .02  .13 -.06 -.21 -.02 -.02 -.05
    1680 1719   -7   -.05 -.08 -.29  .41*-.14 -.08  .14 -.37  .08  .30  .29|-.10 -.01  .04 -.26  .16  .01 -.34  .14 -.03 -.20
     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    1700 1739    0    .03 -.02 -.30  .12  .07 -.16  .04 -.39 -.05  .13  .31* .06 -.01  .02 -.38  .24 -.02 -.03  .14 -.22 -.19
    1710 1749    5   -.04  .01 -.20  .07  .22 -.11 -.15 -.14 -.09  .16  .24| .03  .09 -.17 -.30  .25*-.09 -.13  .18 -.22 -.18
```

```
   1720 1759    0   -.03 -.02 -.15  .05  .27 -.02 -.27 -.05 -.15  .21  .33* .17  .13 -.19 -.16  .20 -.07 -.02  .04 -.18 -.19
   1730 1769    0   -.08 -.14 -.06  .23  .16  .03 -.30 -.04 -.21  .14  .30* .18  .13 -.25 -.22  .12 -.16  .08  .16 -.04 -.15
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1760 1799    0   -.04 -.30  .07  .02 -.28 -.03 -.16  .10  .14  .21  .34* .01 -.21 -.28 -.02  .09  .11  .16 -.03  .04 -.18
   1770 1809    0   -.07 -.24  .09 -.09 -.27  .08 -.19  .07  .03  .11  .31* .09 -.16 -.01 -.14 -.02  .22 -.11  .19 -.01 -.28
   1780 1819    6   -.28 -.08 -.04  .06 -.03 -.14 -.15 -.02 -.01  .22  .25|-.04 -.02  .06 -.13  .08  .31*-.05  .17 -.10 -.29
   1790 1829    8   -.17  .19 -.05  .18  .06 -.17 -.20  .01  .02  .04  .21|-.03 -.06 -.06 -.09  .11  .13 -.14  .27*-.03 -.26

[B] Entire series, effect on correlation (  .314) is:
      Lower   1796> -.019   1748> -.018   1680> -.013   1771> -.013   1736< -.012   1753< -.011  Higher   1774  .027   1724  .013
    1667 to 1706 segment:
      Lower   1680> -.073   1686> -.043   1676< -.030   1690< -.024   1703< -.019   1704> -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680> -.080   1686> -.054   1676< -.029   1690< -.025   1704> -.020   1703< -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680> -.061   1711> -.050   1710< -.047   1690< -.026   1686> -.025   1714> -.022  Higher   1708  .068   1719  .036
    1700 to 1739 segment:
      Lower   1711> -.055   1736< -.052   1710< -.039   1729> -.035   1737> -.031   1714> -.025  Higher   1724  .064   1708  .060
    1710 to 1749 segment:
      Lower   1748> -.063   1736< -.049   1711> -.040   1710< -.031   1729> -.026   1714> -.018  Higher   1724  .062   1719  .030
    1720 to 1759 segment:
      Lower   1748> -.081   1736< -.056   1753< -.045   1729> -.028   1737> -.022   1735< -.017  Higher   1724  .047   1755  .044
    1730 to 1769 segment:
      Lower   1748> -.082   1736< -.046   1753< -.041   1737> -.022   1735< -.014   1760> -.013  Higher   1755  .052   1754  .032
    1760 to 1799 segment:
      Lower   1796> -.106   1771> -.068   1779< -.058   1773> -.024   1783> -.017   1760> -.015  Higher   1774  .159   1790  .047
    1770 to 1809 segment:
      Lower   1796> -.077   1779< -.051   1771> -.050   1807> -.038   1804< -.036   1773> -.014  Higher   1774  .132   1790  .041
    1780 to 1819 segment:
      Lower   1796> -.070   1804< -.030   1810< -.024   1814< -.018   1807> -.015   1816< -.015  Higher   1790  .042   1812  .028
    1790 to 1829 segment:
      Lower   1796> -.061   1828< -.037   1804< -.029   1810< -.022   1827> -.019   1814< -.017  Higher   1790  .035   1817  .029

[E] Outliers    48   3.0 SD above or -4.5 SD below mean for year
      1668 +3.4 SD;    1676 -6.8 SD;    1680 +9.1 SD;    1683 +4.5 SD;    1686 +7.9 SD;    1690 -6.3 SD;    1692 +4.6 SD;
      1701 +4.4 SD;    1704 +5.2 SD;    1707 +3.0 SD;    1710-10.3 SD;    1711 +5.8 SD;    1714 +6.8 SD;    1715 +4.7 SD;
      1729 +7.5 SD;    1731 +3.1 SD;    1735 -6.8 SD;    1736 -9.2 SD;    1737 +5.9 SD;    1741 +5.1 SD;    1743 +4.9 SD;
      1744 +3.4 SD;    1748 +8.6 SD;    1753 -7.9 SD;    1755 +3.8 SD;    1759 +4.4 SD;    1760 +4.4 SD;    1762 -5.6 SD;
      1771 +7.7 SD;    1773 +5.8 SD;    1779 -8.7 SD;    1783 +5.2 SD;    1789 -4.6 SD;    1794 +4.3 SD;    1796+11.6 SD;
      1797 +6.1 SD;    1804 -7.3 SD;    1807 +8.8 SD;    1808 +4.4 SD;    1810 -6.9 SD;    1812 +6.4 SD;    1814 -4.9 SD;
      1816 -4.9 SD;    1823 +4.8 SD;    1826 +5.7 SD;    1827 +8.4 SD;    1828 -7.0 SD;    1829 -5.8 SD
=====================================================================================================================================

 TEST S    1667 to  1829     163 years                                                                                    Series   2

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------   ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1667 1706    0    .07 -.14  .18 -.22 -.11 -.09  .16 -.14 -.03 -.02  .37* .10  .10 -.29  .24 -.09 -.07  .12 -.02 -.15 -.14
   1670 1709    7    .04 -.03  .12 -.21 -.12 -.02  .10 -.13  .07 -.04  .34| .24  .11 -.35  .11  .06 -.17  .35*-.25 -.16 -.05
   1680 1719    0   -.05 -.03  .05 -.21 -.02  .24 -.16  .02  .03 -.04  .29* .25  .04 -.42  .15 -.11 -.07  .29 -.21  .07  .05
```

```
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 1700 1739   -5   -.18 -.03 -.02 -.28  .00  .32*-.32  .00  .01  .04  .31| .12  .03 -.36 -.06 -.14  .18  .15 -.20  .03 -.04
 1710 1749    0   -.19 -.21  .05 -.09 -.07  .23 -.29 -.08  .00  .02  .24* .17 -.13 -.04 -.13  .00  .23  .10 -.20  .02 -.03
 1720 1759    0   -.18 -.21  .14 -.13 -.11  .10 -.23 -.23  .10  .17  .33* .24 -.12 -.02 -.27 -.02  .14  .21 -.09 -.16 -.08
 1730 1769    0   -.19 -.18  .07  .02 -.13  .22 -.15 -.21  .15  .16  .30* .13 -.16 -.01 -.33  .03  .02  .25  .08 -.06 -.01
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 1760 1799    0   -.02  .13 -.18  .13  .03  .10 -.05 -.28 -.18  .00  .34* .18  .13  .05 -.16  .04 -.28 -.10  .07 -.27 -.07
 1770 1809    0   -.18  .06 -.04  .06  .20 -.10 -.06 -.02 -.20  .11  .31* .08  .00  .12 -.25  .06  .06 -.03  .03 -.11 -.28
 1780 1819    0   -.28 -.02  .14 -.13  .23  .03 -.09  .02 -.04 -.06  .25* .20 -.01 -.05 -.23 -.17  .09  .16 -.04  .19 -.17
 1790 1829    7   -.29 -.08  .14 -.16  .21  .12 -.11 -.06 -.02 -.01  .21| .09  .10  .10 -.19 -.23  .08  .22*-.03  .14 -.19

[B] Entire series, effect on correlation (  .314) is:
      Lower   1796< -.019   1748< -.018   1680< -.013   1771< -.013   1736> -.012   1753> -.011  Higher   1774  .027   1724  .013
    1667 to 1706 segment:
      Lower   1680< -.073   1686< -.043   1676> -.030   1690> -.024   1703> -.019   1704< -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680< -.080   1686< -.054   1676> -.029   1690> -.025   1704< -.020   1703> -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680< -.061   1711< -.050   1710> -.047   1690> -.026   1686< -.025   1714< -.022  Higher   1708  .068   1719  .036
    1700 to 1739 segment:
      Lower   1711< -.055   1736> -.052   1710> -.039   1729< -.035   1737< -.031   1714< -.025  Higher   1724  .064   1708  .060
    1710 to 1749 segment:
      Lower   1748< -.063   1736> -.049   1711< -.040   1710> -.031   1729< -.026   1714< -.018  Higher   1724  .062   1719  .030
    1720 to 1759 segment:
      Lower   1748< -.081   1736> -.056   1753> -.045   1729< -.028   1737< -.022   1735> -.017  Higher   1724  .047   1755  .044
    1730 to 1769 segment:
      Lower   1748< -.082   1736> -.046   1753> -.041   1737< -.022   1735> -.014   1760< -.013  Higher   1755  .052   1754  .032
    1760 to 1799 segment:
      Lower   1796< -.106   1771< -.068   1779> -.058   1773< -.024   1783< -.017   1760< -.015  Higher   1774  .159   1790  .047
    1770 to 1809 segment:
      Lower   1796< -.077   1779> -.051   1771< -.050   1807< -.038   1804> -.036   1773< -.014  Higher   1774  .132   1790  .041
    1780 to 1819 segment:
      Lower   1796< -.070   1804> -.030   1810> -.024   1814> -.018   1807< -.015   1816> -.015  Higher   1790  .042   1812  .028
    1790 to 1829 segment:
      Lower   1796< -.061   1828> -.037   1804> -.029   1810> -.022   1827< -.019   1814> -.017  Higher   1790  .035   1817  .029

[E] Outliers    54   3.0 SD above or -4.5 SD below mean for year
      1672 +3.7 SD;    1676 +6.8 SD;    1679 +4.4 SD;    1680 -9.1 SD;    1683 -4.5 SD;    1686 -7.9 SD;    1690 +6.3 SD;
      1691 +3.9 SD;    1692 -4.6 SD;    1693 +4.5 SD;    1698 +3.3 SD;    1703 +4.4 SD;    1704 -5.2 SD;    1710+10.3 SD;
      1711 -5.8 SD;    1714 -6.8 SD;    1715 -4.7 SD;    1727 +3.7 SD;    1728 +3.2 SD;    1729 -7.5 SD;    1735 +6.8 SD;
      1736 +9.1 SD;    1737 -5.9 SD;    1741 -5.1 SD;    1743 -4.9 SD;    1746 +4.4 SD;    1748 -8.6 SD;    1753 +7.9 SD;
      1762 +5.6 SD;    1766 +3.1 SD;    1771 -7.7 SD;    1773 -5.8 SD;    1779 +8.7 SD;    1783 -5.2 SD;    1784 +3.3 SD;
      1788 +4.4 SD;    1789 +4.6 SD;    1792 +3.4 SD;    1796-11.6 SD;    1797 -6.1 SD;    1801 +3.6 SD;    1804 +7.3 SD;
      1807 -8.8 SD;    1810 +6.9 SD;    1812 -6.4 SD;    1813 +4.1 SD;    1814 +4.9 SD;    1816 +4.9 SD;    1823 -4.8 SD;
      1825 +3.1 SD;    1826 -5.7 SD;    1827 -8.4 SD;    1828 +7.0 SD;    1829 +5.8 SD
==================================================================================================================================
```

```
PART 7:  DESCRIPTIVE STATISTICS: CCTNM                                                          20:55  Tue 11 Aug 2009  Page   7
-----------------------------------------------------------------------------------------------------------------------------------

                                                      Corr   //-------- Unfiltered --------\\  //---- Filtered -----\\
                                No.    No.    No.     with   Mean   Max     Std   Auto   Mean   Max    Std   Auto  AR
 Seq Series   Interval   Years  Segmt  Flags   Master  msmt   msmt    dev   corr   sens  value    dev   corr  ()
 --- -------- ---------  -----  -----  -----   ------ -----  -----  -----  -----  -----  -----  -----  -----  --
   1 NORRIS   1633 1980    348     14     11     .314   .99   1.60   .139   .187   .143   2.58   .344   .000   1
   2 TEST S   1667 1829    163     14     11     .314  1.00   1.62   .204   .492   .170   2.73   .434   .024   1
 --- -------- ---------  -----  -----  -----   ------ -----  -----  -----  -----  -----  -----  -----  -----  --
 Total or mean:            511     28     22     .314  1.00   1.62   .160   .284   .152   2.73   .373   .007


PART 8:  ADJUSTMENTS FOR UNDATED SERIES: CCTNM                                                  20:55  Tue 11 Aug 2009  Page   8
-----------------------------------------------------------------------------------------------------------------------------------

 Time span  1633  1980   348 years, best matches for  40-year segments lagged  10 years
 Listed in order from highest correlation

           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1N02A     1   40  1885 .42  1764 .40  1729 .38  1900 .38  1938 .34  1786 .34  1818 .32  1853 .32  1844 .31  1673 .31  1868 .30
 CC1N02A    11   50  1885 .48  1625 .45  1626 .37  1786 .37  1729 .35  1915 .34  1900 .33  1660 .32  1764 .32  1818 .31  1853 .30
 CC1N02A    18   57  1727 .44  1885 .42  1625 .39  1854 .37  1813 .37  1729 .36  1687 .34  1764 .33  1728 .32  1746 .32  1818 .29
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1729  3  .36 +1764  3  .35 +1818  3  .31 +1885  3  .44
 Chronological order
       Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
     +1729  3 +1764  3 +1818  3 +1885  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1N03A     1   40  1686 .43  1857 .39  1775 .38  1762 .36  1810 .35  1874 .34  1737 .33  1927 .32  1699 .32  1824 .31  1837 .31
 CC1N03A    11   50  1850 .41  1802 .40  1835 .37  1842 .35  1709 .35  1874 .35  1664 .34  1761 .34  1777 .33  1686 .33  1770 .32
 CC1N03A    21   60  1614 .55  1842 .43  1706 .40  1802 .39  1664 .37  1770 .37  1850 .37  1777 .36  1615 .33  1725 .33  1662 .31
 CC1N03A    31   70  1614 .56  1607 .36  1777 .36  1662 .34  1874 .34  1899 .33  1687 .33  1814 .33  1835 .32  1725 .32  1728 .32
 CC1N03A    35   74  Lag from prior segment   4 years; insufficient
      4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1777  3  .35 +1874  3  .34
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1N04A     1   40  1704 .37  1854 .36  1796 .36  1880 .35  1878 .34  1765 .34  1910 .34  1735 .33  1682 .33  1900 .33  1754 .31
```

```
 CC1N04A    11   50  1854 .39  1774 .39  1704 .38  1919 .38  1792 .36  1682 .34  1880 .34  1855 .33  1781 .31  1765 .31  1668 .31
 CC1N04A    21   60  1668 .42  1759 .41  1841 .38  1691 .35  1627 .34  1792 .34  1754 .34  1820 .33  1854 .33  1646 .30  1765 .29
 CC1N04A    31   70  1792 .45  1646 .40  1759 .39  1627 .38  1820 .37  1754 .34  1695 .33  1715 .33  1854 .32  1819 .31  1897 .31
 CC1N04A    41   80  1759 .65  1792 .47  1814 .41  1732 .41  1646 .41  1628 .39  1820 .37  1831 .33  1668 .33  1799 .32  1754 .32
 CC1N04A    51   90  1759 .65  1732 .52  1831 .49  1626 .37  1695 .37  1694 .36  1628 .36  1733 .31  1779 .31  1644 .31  1792 .30
 CC1N04A    53   92  Lag from prior segment   2 years; insufficient
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1792  5  .38 +1754  4  .33 +1759  4  .52 +1854  4  .35 +1765  3  .32 +1646  3  .37 +1820  3  .36 +1668  3  .35
 Chronological order
       Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
     +1646  3 +1668  3 +1754  4 +1759  4 +1765  3 +1792  5 +1820  3 +1854  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S01A     1   40  1834 .48  1939 .45  1647 .43  1821 .42  1854 .41  1786 .35  1663 .32  1744 .32  1683 .31  1703 .31  1704 .30
 CC1S01A    11   50  1767 .49  1866 .44  1745 .44  1661 .41  1834 .40  1794 .37  1919 .37  1904 .35  1855 .33  1833 .33  1891 .32
 CC1S01A    12   51  Lag from prior segment   1 years; insufficient
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S03A     1   40  1764 .62  1642 .57  1885 .40  1672 .39  1641 .38  1765 .38  1901 .37  1824 .35  1797 .32  1727 .32  1745 .30
 CC1S03A    11   50  1860 .47  1673 .47  1824 .42  1764 .42  1859 .39  1688 .37  1846 .37  1885 .36  1786 .35  1687 .34  1759 .34
 CC1S03A    21   60  1651 .46  1673 .44  1845 .38  1824 .38  1735 .38  1757 .37  1764 .35  1756 .33  1894 .33  1909 .31  1872 .30
 CC1S03A    31   70  1651 .59  1891 .44  1872 .42  1735 .42  1757 .38  1909 .36  1603 .35  1856 .34  1756 .33  1824 .32  1719 .30
 CC1S03A    41   80  1764 .59  1651 .45  1891 .40  1737 .36  1836 .35  1784 .34  1699 .34  1856 .34  1628 .32  1735 .32  1819 .31
 CC1S03A    48   87  1764 .57  1836 .46  1651 .42  1699 .40  1624 .37  1737 .37  1889 .35  1875 .32  1784 .30  1628 .30  1856 .30
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     +1764  5  .51 +1651  4  .48 +1824  4  .37 +1735  3  .37 +1856  3  .33
 Chronological order
       Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
     +1651  4 +1735  3 +1764  5 +1824  4 +1856  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S03B     1   40  1763 .57  1641 .56  1732 .41  1744 .38  1764 .37  1869 .36  1884 .36  1727 .35  1733 .35  1709 .34  1640 .33
 CC1S03B    11   50  1763 .46  1859 .42  1641 .41  1764 .37  1714 .36  1900 .36  1810 .36  1796 .35  1909 .35  1785 .32  1884 .32
 CC1S03B    21   60  1756 .41  1734 .40  1650 .40  1890 .35  1631 .34  1824 .32  1908 .32  1672 .31  1633 .31  1733 .30  1823 .30
 CC1S03B    31   70  1650 .42  1890 .41  1734 .40  1855 .38  1695 .35  1823 .34  1625 .34  1756 .33  1908 .33  1871 .32  1755 .32
 CC1S03B    41   80  1650 .50  1763 .48  1890 .47  1736 .40  1698 .39  1855 .38  1596 .36  1594 .36  1716 .36  1777 .34  1625 .34
 CC1S03B    49   88  1763 .50  1650 .46  1698 .43  1736 .39  1623 .37  1754 .35  1874 .35  1716 .34  1835 .34  1826 .33  1718 .32
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
```

```
    +1650  4  .44 +1763  4  .50 +1890  3  .41
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1650  4 +1763  4 +1890  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S05A     1   40  1679 .49  1650 .49  1851 .47  1859 .41  1923 .40  1810 .37  1723 .34  1753 .33  1778 .32  1865 .31  1722 .30
 CC1S05A    11   50  1770 .46  1830 .45  1631 .42  1679 .42  1623 .38  1915 .38  1695 .37  1867 .36  1723 .36  1843 .36  1859 .33
 CC1S05A    21   60  1770 .47  1843 .46  1830 .45  1664 .43  1915 .41  1631 .39  1639 .36  1869 .34  1679 .32  1882 .32  1695 .32
 CC1S05A    31   70  1777 .49  1718 .44  1651 .42  1693 .39  1802 .37  1817 .37  1664 .36  1869 .36  1797 .33  1695 .31  1908 .29
 CC1S05A    35   74  Lag from prior segment   4 years; insufficient
      4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1679  3  .41 +1695  3  .33
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S06A     1   40  1721 .43  1914 .41  1791 .38  1823 .38  1797 .36  1671 .33  1817 .33  1846 .32  1895 .31  1693 .31  1733 .31
 CC1S06A    11   50  1823 .46  1791 .41  1817 .41  1758 .39  1914 .39  1858 .38  1878 .36  1687 .36  1797 .34  1693 .33  1671 .33
 CC1S06A    21   60  1650 .41  1817 .39  1651 .39  1822 .39  1831 .35  1878 .35  1899 .33  1718 .32  1741 .31  1782 .31  1776 .30
 CC1S06A    31   70  1651 .45  1603 .43  1742 .38  1823 .38  1822 .38  1764 .34  1650 .33  1899 .32  1863 .32  1797 .30  1717 .30
 CC1S06A    41   80  1737 .53  1764 .53  1823 .48  1836 .44  1631 .40  1673 .39  1797 .39  1651 .37  1891 .36  1603 .32  1597 .29
 CC1S06A    48   87  1836 .53  1737 .50  1823 .49  1889 .39  1764 .36  1699 .33  1631 .32  1651 .32  1891 .31  1697 .30  1797 .30
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1797  5  .34 +1823  5  .44 +1651  4  .38 +1817  3  .38 +1764  3  .41
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1651  4 +1764  3 +1797  5 +1817  3 +1823  5
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1E03A     1   40  1808 .50  1880 .43  1776 .39  1917 .38  1717 .38  1759 .38  1693 .38  1632 .37  1677 .31  1770 .30  1671 .30
 CC1E03A    11   50  1693 .60  1808 .45  1671 .42  1754 .38  1723 .37  1880 .37  1776 .36  1770 .31  1858 .30  1712 .30  1735 .28
 CC1E03A    21   60  1637 .42  1880 .41  1808 .41  1693 .41  1869 .39  1650 .37  1620 .34  1671 .34  1844 .34  1723 .32  1712 .31
 CC1E03A    31   70  1808 .42  1637 .41  1620 .38  1724 .37  1671 .35  1760 .35  1883 .34  1900 .32  1602 .32  1809 .30  1795 .29
 CC1E03A    41   80  1741 .51  1637 .45  1773 .45  1682 .39  1809 .36  1610 .35  1616 .33  1900 .32  1845 .31  1643 .30  1829 .30
 CC1E03A    51   90  1741 .53  1637 .49  1773 .46  1708 .44  1616 .41  1585 .39  1615 .38  1677 .36  1682 .34  1859 .33  1701 .29
 CC1E03A    61  100  1615 .53  1585 .44  1859 .39  1637 .37  1811 .37  1741 .36  1739 .36  1773 .35  1677 .34  1581 .32  1689 .31
 CC1E03A    64  103  Lag from prior segment   3 years; insufficient
      7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1637  5  .43 +1671  4  .35 +1808  4  .44 +1693  3  .46 +1741  3  .46 +1773  3  .42 +1677  3  .34 +1880  3  .40
```

```
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1637  5 +1671  4 +1677  3 +1693  3 +1741  3 +1773  3 +1808  4 +1880  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series   Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1E03B    1   40   1804 .51  1876 .45  1827 .41  1664 .36  1712 .34  1750 .34  1809 .34  1901 .33  1917 .33  1836 .32  1700 .30
 CC1E03B   11   50   1750 .49  1804 .42  1766 .42  1827 .42  1918 .40  1689 .38  1708 .34  1865 .33  1839 .31  1884 .30  1780 .30
 CC1E03B   21   60   1766 .52  1865 .52  1750 .40  1689 .39  1728 .38  1804 .36  1708 .31  1918 .31  1824 .31  1625 .30  1688 .29
 CC1E03B   31   70   1865 .49  1766 .39  1804 .38  1824 .36  1616 .33  1904 .32  1791 .30  1851 .29  1666 .29  1667 .28  1769 .28
 CC1E03B   41   80   1612 .46  1766 .43  1865 .42  1805 .40  1838 .39  1825 .35  1804 .33  1606 .32  1653 .31  1874 .31  1737 .30
 CC1E03B   51   90   1612 .53  1838 .41  1737 .39  1823 .39  1851 .34  1611 .33  1717 .32  1751 .32  1704 .32  1810 .31  1791 .30
 CC1E03B   61  100   1737 .38  1823 .37  1866 .36  1638 .35  1741 .35  1838 .34  1841 .32  1810 .31  1802 .31  1715 .31  1813 .31
 CC1E03B   67  106   1611 .39  1866 .37  1823 .35  1737 .34  1813 .34  1638 .33  1714 .33  1741 .33  1751 .31  1763 .29  1651 .28
     8 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av
    +1804  5  .40 +1766  4  .44 +1737  4  .35 +1865  4  .44 +1823  3  .37 +1838  3  .38 +1750  3  .41
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1737  4 +1750  3 +1766  4 +1804  5 +1823  3 +1838  3 +1865  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series   Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2N03A    1   40   1755 .56  1718 .43  1906 .43  1701 .42  1802 .40  1820 .39  1662 .39  1814 .38  1689 .35  1674 .34  1633 .32
 CC2N03A   11   50   1755 .56  1802 .50  1876 .49  1718 .45  1689 .42  1633 .41  1701 .38  1814 .37  1788 .37  1815 .37  1777 .34
 CC2N03A   21   60   1802 .48  1815 .46  1862 .39  1876 .38  1777 .35  1835 .34  1814 .32  1863 .30  1678 .30  1718 .29  1901 .28
 CC2N03A   31   70   1687 .44  1623 .43  1815 .38  1664 .36  1748 .35  1863 .34  1816 .34  1615 .33  1814 .33  1755 .33  1802 .32
 CC2N03A   41   80   1623 .40  1748 .39  1863 .38  1746 .37  1687 .34  1620 .34  1813 .33  1726 .32  1862 .32  1815 .32  1821 .32
 CC2N03A   51   90   1877 .49  1752 .48  1687 .46  1746 .41  1813 .40  1725 .40  1838 .39  1863 .37  1726 .37  1739 .36  1792 .35
 CC2N03A   57   96   1752 .53  1877 .52  1687 .46  1824 .42  1838 .40  1857 .38  1725 .36  1852 .35  1813 .35  1807 .35  1739 .33
     7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av    Add No R_av
    +1687  4  .43 +1802  4  .43 +1814  4  .35 +1815  4  .38 +1863  4  .35 +1755  3  .48 +1718  3  .39 +1813  3  .36
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1687  4 +1718  3 +1755  3 +1802  4 +1813  3 +1814  4 +1815  4 +1863  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series   Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2N04A    1   40   1728 .49  1910 .40  1896 .38  1860 .37  1824 .37  1756 .36  1709 .36  1636 .36  1740 .34  1792 .32  1664 .32
 CC2N04A   11   50   1740 .45  1910 .40  1636 .40  1728 .39  1914 .36  1686 .35  1824 .35  1709 .34  1896 .32  1674 .32  1801 .32
 CC2N04A   21   60   1686 .59  1861 .47  1740 .46  1674 .41  1862 .40  1636 .37  1642 .35  1617 .33  1762 .33  1891 .31  1801 .31
 CC2N04A   31   70   1686 .54  1891 .48  1861 .41  1845 .37  1642 .37  1862 .36  1647 .36  1703 .35  1762 .34  1773 .33  1739 .31
 CC2N04A   41   80   1675 .45  1801 .41  1862 .38  1828 .37  1602 .36  1733 .36  1741 .35  1658 .35  1686 .34  1664 .33  1642 .32
 CC2N04A   51   90   1733 .59  1773 .40  1780 .36  1642 .36  1675 .36  1747 .36  1870 .35  1868 .35  1806 .34  1760 .34  1862 .32
```

```
CC2N04A    61  100  1773 .52  1675 .46  1733 .46  1747 .42  1780 .40  1806 .34  1760 .34  1693 .33  1711 .31  1865 .30  1656 .30
CC2N04A    71  110  1607 .58  1711 .51  1810 .50  1773 .38  1693 .36  1622 .35  1851 .34  1647 .34  1862 .31  1673 .31  1601 .30
CC2N04A    72  111  Lag from prior segment   1 years; insufficient
     8 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1862  5  .36 +1642  4  .35 +1686  4  .46 +1773  4  .41 +1733  3  .47 +1740  3  .42 +1675  3  .42 +1801  3  .34
    +1636  3  .37
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1636  3 +1642  4 +1675  3 +1686  4 +1733  3 +1740  3 +1773  4 +1801  3 +1862  5
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2N05A     1   40  1667 .48  1717 .38  1754 .38  1793 .37  1729 .37  1853 .35  1818 .34  1892 .34  1879 .32  1917 .32  1771 .31
CC2N05A    11   50  1742 .47  1916 .39  1888 .38  1667 .38  1831 .38  1649 .35  1771 .34  1892 .32  1741 .31  1631 .29  1846 .28
CC2N05A    21   60  1742 .56  1863 .53  1764 .45  1879 .42  1916 .39  1741 .37  1703 .36  1829 .36  1619 .36  1704 .33  1723 .32
CC2N05A    31   70  1742 .53  1764 .51  1863 .50  1603 .44  1704 .42  1879 .40  1705 .37  1829 .37  1723 .35  1703 .35  1762 .34
CC2N05A    41   80  1863 .46  1763 .42  1723 .40  1860 .38  1803 .37  1835 .34  1705 .33  1686 .33  1632 .33  1667 .32  1603 .32
     5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1667  3  .39 +1723  3  .36 +1742  3  .52 +1863  3  .50 +1879  3  .38
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1667  3 +1723  3 +1742  3 +1863  3 +1879  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2E04B     1   40  1751 .45  1647 .45  1907 .43  1697 .43  1768 .42  1720 .37  1645 .34  1921 .33  1739 .33  1925 .32  1675 .31
CC2E04B    11   50  1751 .49  1629 .47  1697 .43  1872 .40  1925 .38  1798 .34  1812 .33  1810 .33  1645 .30  1721 .30  1851 .29
CC2E04B    21   60  1812 .42  1851 .38  1751 .37  1852 .36  1726 .36  1847 .36  1714 .32  1779 .31  1888 .31  1884 .31  1702 .30
CC2E04B    31   70  1812 .49  1766 .40  1660 .38  1714 .38  1638 .37  1751 .36  1713 .34  1851 .33  1619 .32  1687 .31  1847 .30
CC2E04B    41   80  1812 .49  1638 .44  1889 .41  1714 .40  1751 .38  1744 .37  1713 .36  1687 .35  1660 .35  1764 .33  1836 .33
CC2E04B    51   90  1729 .41  1660 .40  1638 .39  1819 .39  1889 .39  1776 .39  1751 .37  1713 .37  1850 .36  1593 .36  1866 .35
CC2E04B    61  100  1873 .54  1820 .47  1748 .47  1699 .43  1645 .43  1577 .37  1721 .36  1735 .34  1803 .32  1850 .31  1593 .31
     7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1751  6  .41 +1812  4  .43 +1660  3  .38 +1713  3  .36 +1714  3  .37 +1638  3  .40 +1645  3  .35 +1851  3  .33
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1638  3 +1645  3 +1660  3 +1713  3 +1714  3 +1751  6 +1812  4 +1851  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2W03A     1   40  1923 .42  1859 .41  1723 .41  1874 .41  1753 .40  1770 .40  1754 .34  1890 .34  1927 .32  1661 .32  1786 .30
```

```
 CC2W03A    11   50  1631 .75  1753 .53  1754 .52  1723 .44  1859 .42  1891 .36  1734 .36  1874 .35  1890 .31  1630 .29  1927 .29
 CC2W03A    21   60  1631 .52  1890 .48  1753 .45  1754 .44  1849 .43  1725 .35  1685 .34  1835 .32  1786 .32  1800 .32  1614 .31
 CC2W03A    31   70  1662 .47  1640 .44  1843 .43  1631 .38  1706 .36  1753 .33  1888 .33  1687 .31  1754 .31  1849 .29  1723 .28
 CC2W03A    41   80  1640 .49  1686 .45  1843 .42  1745 .39  1888 .37  1592 .34  1898 .34  1811 .33  1662 .32  1813 .32  1812 .30
 CC2W03A    51   90  1640 .59  1868 .50  1812 .47  1843 .40  1617 .39  1584 .39  1592 .39  1753 .36  1745 .36  1586 .35  1662 .35
 CC2W03A    59   98  1843 .45  1812 .45  1818 .45  1592 .43  1640 .40  1880 .36  1771 .36  1868 .33  1600 .32  1660 .32  1745 .30
      7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1753  5  .42 +1640  4  .48 +1754  4  .40 +1843  4  .42 +1723  3  .38 +1745  3  .35 +1592  3  .39 +1631  3  .55
    +1812  3  .41 +1662  3  .38 +1890  3  .38
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1592  3 +1631  3 +1640  4 +1662  3 +1723  3 +1745  3 +1753  5 +1754  4 +1812  3 +1843  4 +1890  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2W04A     1   40  1894 .52  1845 .41  1748 .41  1736 .39  1820 .39  1832 .37  1633 .36  1913 .36  1917 .34  1717 .34  1853 .33
 CC2W04A    11   50  1798 .49  1667 .46  1633 .41  1853 .38  1870 .37  1833 .36  1923 .34  1766 .33  1772 .33  1689 .31  1635 .31
 CC2W04A    21   60  1798 .55  1766 .43  1641 .40  1780 .39  1870 .38  1640 .36  1884 .35  1667 .34  1695 .33  1733 .32  1852 .32
 CC2W04A    31   70  1798 .57  1870 .52  1766 .48  1640 .41  1895 .38  1733 .38  1677 .37  1852 .34  1667 .32  1792 .32  1627 .31
 CC2W04A    39   78  1870 .47  1798 .46  1640 .46  1667 .40  1780 .40  1895 .39  1610 .37  1733 .37  1884 .34  1766 .32  1714 .32
      5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1667  4  .38 +1766  4  .39 +1798  4  .52 +1870  4  .44 +1733  3  .36 +1640  3  .41
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1640  3 +1667  4 +1733  3 +1766  4 +1798  4 +1870  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2W04B     1   40  1728 .52  1766 .44  1700 .43  1746 .42  1765 .42  1798 .41  1825 .40  1903 .40  1643 .39  1644 .39  1673 .38
 CC2W04B    11   50  1825 .42  1694 .40  1625 .40  1915 .40  1748 .39  1853 .39  1728 .39  1650 .33  1798 .32  1885 .32  1764 .31
 CC2W04B    21   60  1625 .48  1825 .47  1915 .44  1758 .41  1885 .41  1823 .37  1764 .36  1728 .36  1790 .35  1657 .35  1862 .33
 CC2W04B    31   70  1657 .49  1758 .45  1823 .41  1725 .41  1630 .38  1790 .38  1697 .35  1633 .34  1862 .34  1810 .31  1831 .30
 CC2W04B    41   80  1862 .49  1758 .49  1725 .42  1697 .37  1857 .35  1887 .35  1602 .33  1823 .33  1860 .32  1657 .31  1756 .31
 CC2W04B    46   85  1862 .45  1802 .40  1657 .35  1602 .34  1823 .34  1669 .33  1697 .32  1632 .32  1857 .32  1860 .32  1630 .31
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1657  4  .37 +1823  4  .36 +1862  4  .40 +1758  3  .45 +1697  3  .35 +1825  3  .43 +1728  3  .43
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1657  4 +1697  3 +1728  3 +1758  3 +1823  4 +1825  3 +1862  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
```

```
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2W05A     1   40  1873 .47  1739 .45  1769 .44  1926 .44  1698 .40  1699 .40  1677 .36  1875 .36  1835 .34  1710 .33  1921 .32
CC2W05A    11   50  1873 .63  1739 .46  1699 .45  1698 .45  1686 .43  1752 .39  1710 .38  1776 .36  1926 .34  1685 .33  1928 .33
CC2W05A    21   60  1787 .52  1859 .51  1873 .50  1799 .48  1710 .42  1912 .40  1827 .39  1739 .37  1774 .37  1634 .36  1616 .34
CC2W05A    31   70  1873 .56  1859 .52  1799 .46  1616 .40  1760 .39  1634 .39  1787 .38  1630 .35  1699 .35  1738 .34  1736 .34
CC2W05A    36   75  1599 .50  1760 .48  1722 .47  1859 .47  1799 .46  1616 .46  1873 .44  1739 .42  1600 .42  1630 .36  1647 .35
     5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1873  5  .52 +1739  4  .43 +1710  3  .38 +1699  3  .40 +1799  3  .47 +1859  3  .50 +1616  3  .40
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1616  3 +1699  3 +1710  3 +1739  4 +1799  3 +1859  3 +1873  5
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
         Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series   Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2W05B     1   40  1668 .51  1831 .43  1782 .39  1886 .37  1877 .37  1919 .35  1864 .34  1796 .33  1713 .33  1690 .32  1691 .29
CC2W05B    11   50  1690 .52  1668 .50  1914 .41  1919 .40  1814 .35  1782 .35  1828 .34  1896 .33  1774 .33  1866 .32  1691 .30
CC2W05B    21   60  1690 .57  1866 .47  1668 .42  1919 .40  1814 .37  1841 .36  1905 .35  1794 .35  1767 .35  1678 .33  1886 .32
CC2W05B    31   70  1842 .45  1805 .42  1679 .42  1895 .40  1827 .39  1668 .37  1745 .35  1782 .34  1654 .33  1806 .32  1792 .30
CC2W05B    41   80  1842 .55  1679 .47  1654 .42  1745 .41  1827 .40  1655 .40  1668 .35  1782 .35  1667 .35  1897 .34  1708 .33
CC2W05B    51   90  1842 .50  1679 .48  1743 .43  1705 .42  1804 .35  1782 .33  1768 .32  1803 .31  1585 .30  1708 .29  1831 .27
CC2W05B    61  100  1743 .54  1842 .52  1804 .44  1705 .41  1612 .39  1679 .39  1856 .38  1745 .36  1585 .36  1668 .34  1630 .34
CC2W05B    66  105  1743 .55  1842 .45  1804 .43  1856 .39  1679 .39  1745 .39  1768 .36  1603 .34  1630 .34  1568 .34  1668 .34
     8 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1668  7  .40 +1679  5  .43 +1782  5  .35 +1842  5  .50 +1745  4  .38 +1690  3  .47 +1804  3  .41 +1743  3  .51
    +1919  3  .38
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1668  7 +1679  5 +1690  3 +1743  3 +1745  4 +1782  5 +1804  3 +1842  5 +1919  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
         Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series   Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC2W06A     1   40  1891 .45  1936 .44  1648 .43  1792 .39  1851 .39  1715 .34  1805 .34  1679 .33  1664 .31  1831 .31  1751 .31
CC2W06A    11   50  1866 .65  1703 .44  1891 .43  1767 .43  1679 .42  1648 .41  1806 .41  1851 .39  1805 .38  1919 .38  1745 .37
CC2W06A    21   60  1866 .65  1663 .45  1794 .43  1691 .41  1648 .39  1891 .37  1806 .35  1675 .34  1919 .34  1851 .32  1767 .32
CC2W06A    31   70  1866 .63  1663 .43  1794 .42  1729 .41  1648 .36  1675 .34  1606 .33  1691 .32  1728 .31  1851 .29  1891 .28
CC2W06A    41   80  1866 .59  1663 .45  1794 .40  1729 .40  1623 .37  1744 .37  1631 .37  1636 .34  1606 .33  1834 .32  1717 .31
CC2W06A    51   90  1784 .58  1771 .41  1722 .39  1876 .38  1817 .38  1744 .37  1613 .37  1758 .36  1804 .35  1889 .35  1658 .33
CC2W06A    61  100  1722 .50  1645 .50  1821 .40  1685 .34  1704 .32  1633 .32  1656 .31  1663 .31  1862 .31  1784 .30  1618 .30
     7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1648  4  .40 +1663  4  .41 +1851  4  .35 +1866  4  .63 +1891  4  .38 +1794  3  .42
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
```

```
    +1648  4 +1663  4 +1794  3 +1851  4 +1866  4 +1891  4
==================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
         Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2W06B     1   40  1870 .46  1719 .45  1815 .44  1876 .42  1877 .41  1835 .40  1907 .38  1720 .38  1756 .37  1634 .37  1803 .36
 CC2W06B    11   50  1719 .59  1756 .50  1815 .48  1789 .42  1663 .42  1700 .40  1634 .39  1877 .39  1731 .36  1816 .34  1628 .32
 CC2W06B    21   60  1719 .50  1656 .40  1827 .40  1738 .37  1755 .37  1628 .36  1760 .35  1815 .35  1700 .34  1783 .34  1844 .33
 CC2W06B    31   70  1650 .52  1616 .42  1816 .38  1719 .37  1776 .36  1624 .35  1801 .35  1749 .34  1796 .33  1836 .33  1678 .31
 CC2W06B    41   80  1650 .48  1796 .47  1763 .44  1822 .40  1668 .39  1624 .39  1789 .33  1868 .31  1776 .31  1878 .30  1801 .29
 CC2W06B    51   90  1650 .45  1623 .43  1727 .43  1763 .42  1878 .37  1789 .36  1691 .36  1826 .34  1722 .33  1881 .33  1668 .31
 CC2W06B    56   95  1623 .60  1826 .44  1727 .42  1763 .40  1789 .36  1650 .33  1638 .33  1878 .32  1796 .31  1709 .31  1867 .30
      7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
    +1650  4  .44 +1719  4  .48 +1789  4  .37 +1763  3  .42 +1796  3  .37 +1815  3  .42 +1878  3  .33
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
    +1650  4 +1719  4 +1763  3 +1789  4 +1796  3 +1815  3 +1878  3
==================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
      21 undated series

                                          - = [  COFECHA CCTNMCOF  ] = -
```

Appendix VI. Results from master chronology of dated cores [>0.4 (p<0.01)] for the corn crib run against undated core samples [<0.4 (p<0.01)] in COFECHA.

```
[]  Dendrochronology Program Library                                       Run CCD    Program COF  21:43  Tue 11 Aug 2009  Page   1
[]
[]  P R O G R A M     C O F E C H A                                                                          Version 6.06P    27253
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           CCD

 File of DATED series:   TNCCDated.txt

 File of UNDATED series: CCUndated

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics
    Part 8:  Undated series - adjustments for highest correlations

 RUN CONTROL OPTIONS SELECTED                            VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                           32 years
         2  Segments examined are                          40 years lagged successively by  10 years
         3  Autoregressive model applied                    A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                      N
         7  Ring measurements listed                        N
         8  Parts printed                             12345678
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Text in file: NORRISAA NORRIS DAM STATE PARK                   0526AA01    QUAL

 Text in file: NORRISAA TENNESSEE    WHITE OAK         0220M 03613-08405         1633 1980

 Text in file: NORRISAA DANIEL N. DUVICK                                              APR1981

 Text in file: combined.rwl Std R Chron                                        [14Sep07-0917]
```

```
Time span of Master dating series is  1633 to  1980   348 years
Continuous time span is               1633 to  1980   348 years
Portion with two or more series is    1667 to  1851   185 years

                                       ****************************************
                                       *C* Number of dated series        12 *C*
                                       *O* Master series 1633 1980  348 yrs *O*
                                       *F* Total rings in all series   1449 *F*
                                       *E* Total dated rings checked   1286 *E*
                                       *C* Series intercorrelation     .511 *C*
                                       *H* Average mean sensitivity    .251 *H*
                                       *A* Segments, possible problems   26 *A*
                                       *** Mean length of series      120.8 ***
                                       ****************************************

ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value

PART 2:  TIME PLOT OF TREE-RING SERIES: CCD                                                      21:43  Tue 11 Aug 2009  Page   2
-----------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .  <===================================> .    . NORRIS     1 1633 1980  348
   .    .    .    .    .    .    .    .    .    .    .    .    .<================>  .    .    .    .    . TEST S     2 1667 1829  163
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC1N03A    3 1778 1851   74
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1N04A    4 1760 1851   92
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03A    5 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03B    6 1764 1851   88
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S06A    7 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2N03A    8 1756 1851   96
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2N04A    9 1741 1851  111
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2E04B   10 1752 1851  100
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W03A   11 1754 1851   98
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2W05B   12 1746 1850  105
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1650	.159	1	1700	-.639	2	1750	.641	4	1800	-.315	12	1850	-.050	11
			1651	-3.248	1	1701	-.231	2	1751	-.092	4	1801	.251	12	1851	.167	10
			1652	-3.402	1	1702	-.650	2	1752	.285	5	1802	.613	12	1852	.361	1
			1653	-.326	1	1703	-.856	2	1753	.076	5	1803	-.118	12	1853	-1.654	1
			1654	-1.562	1	1704	.196	2	1754	-.117	6	1804	-.774	12	1854	-.104	1
			1655	.132	1	1705	1.085	2	1755	-1.567	6	1805	1.037	12	1855	1.333	1
			1656	-.775	1	1706	-.525	2	1756	-.076	7	1806	-.157	12	1856	.210	1
			1657	1.692	1	1707	.683	2	1757	-.162	7	1807	.245	12	1857	1.753	1
			1658	-.249	1	1708	-1.774	2	1758	.073	7	1808	.900	12	1858	.063	1
			1659	.569	1	1709	-.368	2	1759	.502	7	1809	1.030	12	1859	-1.405	1
			1660	-1.106	1	1710	1.219	2	1760	-.670	8	1810	.938	12	1860	1.689	1
			1661	.814	1	1711	.735	2	1761	.189	8	1811	.269	12	1861	-.732	1
			1662	.019	1	1712	-.251	2	1762	.034	8	1812	-1.004	12	1862	.436	1
			1663	-.023	1	1713	-.894	2	1763	.734	8	1813	-.909	12	1863	.607	1
			1664	.540	1	1714	.126	2	1764	.371	9	1814	-1.590	12	1864	-.731	1
			1665	1.573	1	1715	-1.375	2	1765	.434	11	1815	-.669	12	1865	-.710	1
			1666	1.014	1	1716	.392	2	1766	-.123	11	1816	-.195	12	1866	.417	1
			1667	.182	2	1717	1.581	2	1767	-.515	11	1817	.040	12	1867	.579	1
			1668	-1.862	2	1718	-.140	2	1768	.374	11	1818	-.015	12	1868	.634	1
			1669	1.435	2	1719	1.608	2	1769	.021	11	1819	-1.160	12	1869	2.561	1
			1670	-.156	2	1720	-.728	2	1770	.708	11	1820	.128	12	1870	.342	1
			1671	-.611	2	1721	-.686	2	1771	1.061	11	1821	-1.259	12	1871	-.507	1
			1672	-.840	2	1722	-.071	2	1772	.748	11	1822	-.274	12	1872	-1.932	1
			1673	1.156	2	1723	-.631	2	1773	-.211	11	1823	.447	12	1873	.101	1
			1674	.071	2	1724	-2.027	2	1774	-2.439	11	1824	1.134	12	1874	-1.345	1
			1675	1.108	2	1725	-.509	2	1775	-.632	11	1825	.331	12	1875	-.642	1
			1676	-.689	2	1726	-.879	2	1776	-.263	11	1826	-.087	12	1876	.589	1
			1677	1.480	2	1727	1.156	2	1777	.184	11	1827	1.153	12	1877	.019	1
			1678	.864	2	1728	.576	2	1778	.046	12	1828	-.072	12	1878	.779	1
			1679	-.319	2	1729	.870	2	1779	-1.328	12	1829	-.036	12	1879	-2.526	1
			1680	.172	2	1730	-.326	2	1780	-.602	12	1830	.586	11	1880	-2.247	1
			1681	-1.572	2	1731	.174	2	1781	.402	12	1831	.090	11	1881	.082	1
			1682	-.738	2	1732	.166	2	1782	1.036	12	1832	.421	11	1882	1.863	1
1633	-.216	1	1683	.056	2	1733	1.207	2	1783	.482	12	1833	.166	11	1883	1.400	1
1634	.111	1	1684	-.152	2	1734	1.297	2	1784	-.512	12	1834	.517	11	1884	1.133	1
1635	-1.767	1	1685	-1.030	2	1735	-.577	2	1785	-.522	12	1835	-.035	11	1885	-.102	1
1636	-.705	1	1686	-1.401	2	1736	-1.393	2	1786	.337	12	1836	.438	11	1886	-.126	1
1637	-1.222	1	1687	-.691	2	1737	-.815	2	1787	1.250	12	1837	-.182	11	1887	-.582	1
1638	.791	1	1688	.455	2	1738	-.165	2	1788	.841	12	1838	.103	11	1888	-.716	1
1639	1.295	1	1689	.558	2	1739	1.069	2	1789	.357	12	1839	-2.350	11	1889	.850	1
1640	.629	1	1690	.407	2	1740	.897	2	1790	-1.284	12	1840	.712	11	1890	.028	1
1641	2.894	1	1691	.878	2	1741	.375	3	1791	-.629	12	1841	-.665	11	1891	.705	1

1642	.561	1	1692	1.358	2	1742	1.241	3	1792	-.969	12	1842	-2.014	11	1892	1.797	1
1643	.581	1	1693	-1.321	2	1743	-.298	3	1793	-.064	12	1843	.830	11	1893	.796	1
1644	-.458	1	1694	.744	2	1744	-.829	3	1794	.086	12	1844	-.241	11	1894	-2.203	1
1645	-.860	1	1695	1.081	2	1745	1.037	3	1795	.095	12	1845	.845	11	1895	-.261	1
1646	.184	1	1696	.821	2	1746	-.107	4	1796	1.056	12	1846	.366	11	1896	-1.123	1
1647	.250	1	1697	.814	2	1747	.021	4	1797	.596	12	1847	.711	11	1897	1.544	1
1648	.616	1	1698	.086	2	1748	-.928	4	1798	-.215	12	1848	-.659	11	1898	-1.237	1
1649	.800	1	1699	-1.107	2	1749	-.168	4	1799	-.361	12	1849	-.216	11	1899	-.005	1

PART 3: Master Dating Series: CCD 21:43 Tue 11 Aug 2009 Page 4

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
1900	-1.646	1	1950	-.527	1												
1901	.102	1	1951	1.450	1												
1902	-.167	1	1952	-1.313	1												
1903	1.717	1	1953	-.054	1												
1904	1.008	1	1954	.626	1												
1905	.573	1	1955	1.406	1												
1906	.515	1	1956	-.263	1												
1907	-.756	1	1957	-.060	1												
1908	-.282	1	1958	1.409	1												
1909	.118	1	1959	-.882	1												
1910	1.173	1	1960	-.126	1												
1911	-3.994	1	1961	.611	1												
1912	-.535	1	1962	.701	1												
1913	-.688	1	1963	.135	1												
1914	-.983	1	1964	-2.777	1												
1915	.548	1	1965	1.026	1												
1916	1.214	1	1966	-1.862	1												
1917	2.838	1	1967	1.535	1												
1918	-.397	1	1968	.650	1												
1919	.327	1	1969	-1.605	1												
1920	.125	1	1970	-.483	1												
1921	-.926	1	1971	.360	1												
1922	1.066	1	1972	.154	1												
1923	.326	1	1973	-.316	1												
1924	.578	1	1974	-.802	1												
1925	-1.774	1	1975	1.241	1												
1926	.216	1	1976	2.230	1												
1927	-.609	1	1977	.585	1												
1928	.841	1	1978	.293	1												
1929	-.739	1	1979	-1.174	1												
1930	-1.477	1	1980	-1.004	1												
1931	.005	1															
1932	1.071	1															

```
  1933  -.977   1
  1934  -.056   1
  1935  1.389   1
  1936 -1.868   1
  1937  1.364   1
  1938  1.336   1
  1939  -.660   1

  1940   .679   1
  1941  -.421   1
  1942   .370   1
  1943  -.615   1
  1944 -1.947   1
  1945  2.021   1
  1946   .856   1
  1947  -.158   1
  1948 -1.424   1
  1949  -.721   1
------------------------------------------------------------------------------------------------------------------------------------
PART 4:  Master Bar Plot: CCD                                                                        21:43  Tue 11 Aug 2009  Page   5
------------------------------------------------------------------------------------------------------------------------------------
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1650------A     1700--c         1750--------C   1800---a        1850----@       1900g           1950--b
                   1651m           1701---a        1751----@       1801------A     1851------A     1901-----@      1951----------F
                   1652n           1702--c         1752------A     1802-------B    1852------A     1902----a       1952-e
                   1653---a        1703-c          1753-----@      1803----@       1853g           1903----------G 1953----@
                   1654f           1704------A     1754----@       1804--c         1854----@       1904---------D  1954--------C
                   1655-----A      1705---------D  1755f           1805---------D  1855----------E 1905-------B    1955----------F
                   1656--c         1706--b         1756----@       1806----a       1856------A     1906-------B    1956---a
                   1657----------G 1707--------C   1757----a       1807------A     1857----------G 1907--c         1957----@
                   1658---a        1708g           1758-----@      1808--------D   1858-----@      1908---a        1958----------F
                   1659-------B    1709---a        1759-------B    1809---------D  1859f           1909-----@      1959-d
                   1660-d          1710---------E  1760--c         1810---------D  1860----------G 1910---------E  1960----a
                   1661--------C   1711--------C   1761------A     1811------A     1861--c         1911p           1961-------B
                   1662-----@      1712---a        1762-----@      1812-d          1862-------B    1912--b         1962--------C
                   1663-----@      1713-d          1763--------C   1813-d          1863-------B    1913--c         1963-----A
                   1664-------B    1714-----A      1764------A     1814f           1864--c         1914-d          1964k
                   1665----------F 1715-e          1765-------B    1815--c         1865--c         1915-------B    1965---------D
                   1666---------D  1716-------B    1766----@       1816----a       1866-------B    1916---------E  1966g
                   1667------A     1717----------F 1767--b         1817-----@      1867-------B    1917----------K 1967----------F
                   1668g           1718----a       1768------A     1818-----@      1868--------C   1918---b        1968--------C
                   1669----------F 1719----------F 1769-----@      1819-e          1869----------J 1919------A     1969f
                   1670----a       1720--c         1770--------C   1820-----A      1870------A     1920-----A      1970---b
                   1671--b         1721--c         1771---------D  1821-e          1871--b         1921-d          1971------A
                   1672-c          1722----@       1772--------C   1822---a        1872h           1922---------D  1972-----A
                   1673---------E  1723--c         1773----a       1823-------B    1873-----@      1923------A     1973---a
                   1674-----@      1724h           1774j           1824---------E  1874-e          1924-------B    1974--c
                   1675---------D  1725--b         1775--c         1825------A     1875--c         1925g           1975---------E
                   1676--c         1726-d          1776---a        1826----@       1876-------B    1926------A     1976----------I
                   1677----------F 1727---------E  1777------A     1827---------E  1877-----@      1927--b         1977-------B
```

```
                1678--------C   1728-------B    1778-----@      1828----@       1878--------C   1928--------C   1978------A
                1679---a        1729--------C   1779-e          1829----@       1879j           1929--c         1979-e
                1680------A     1730---a        1780--b         1830-------B    1880i           1930f           1980-d
                1681f           1731------A     1781-------B    1831-----@      1881-----@      1931-----@
                1682--c         1732------A     1782---------D  1832-------B    1882----------G 1932---------D
1633----a       1683-----@      1733---------E  1783-------B    1833------A     1883----------F 1933-d
1634-----@      1684----a       1734---------E  1784--b         1834-------B    1884---------E  1934----@
1635g           1685-d          1735--b         1785--b         1835----@       1885----@       1935----------F
1636--c         1686f           1736f           1786------A     1836-------B    1886----a       1936g
1637-e          1687--c         1737--c         1787---------E  1837----a       1887--b         1937----------E
1638--------C   1688-------B    1738----a       1788--------C   1838-----@      1888--c         1938----------E
1639---------E  1689-------B    1739---------D  1789------A     1839i           1889--------C   1939--c
1640--------C   1690-------B    1740--------D   1790-e          1840--------C   1890-----@      1940--------C
1641----------L 1691--------D   1741------A     1791--c         1841--c         1891--------C   1941---b
1642-------B    1692----------E 1742---------E  1792-d          1842h           1892----------G 1942------A
1643-------B    1693-e          1743---a        1793----@       1843--------C   1893--------C   1943--b
1644---b        1694--------C   1744--c         1794-----@      1844---a        1894i           1944h
1645-c          1695---------D  1745---------D  1795-----@      1845--------C   1895---a        1945----------H
1646------A     1696--------C   1746----@       1796---------D  1846------A     1896-d          1946--------C
1647------A     1697--------C   1747-----@      1797-------B    1847--------C   1897----------F 1947----a
1648-------B    1698-----@      1748-d          1798----a       1848--c         1898-e          1948f
1649--------C   1699-d          1749----a       1799---a        1849----a       1899-----@      1949--c
```


Correlations of 40-year dated segments, lagged 10 years
Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1660 1699	1670 1709	1680 1719	1690 1729	1700 1739	1710 1749	1720 1759	1730 1769	1740 1779	1750 1789	1760 1799	1770 1809	1780 1819	1790 1829	1800 1839	1810 1849	1820 1859
1	NORRIS	1633 1980	.37A	.34A	.29B	.42	.31A	.25A	.29B	.16B	.43	.55	.66	.77	.56	.60	.68	.57	.49
2	TEST S	1667 1829	.37A	.34B	.29A	.42	.31B	.25A	.26A	.24B	.33A	.39	.30A	.15B	.17B	.10B			
3	CC1N03A	1778 1851												.52	.55	.67	.59	.59	.56
4	CC1N04A	1760 1851											.46	.54	.74	.72	.77	.73	.71
5	CC1S03A	1765 1851											.84	.86	.78	.72	.80	.81	.80
6	CC1S03B	1764 1851											.79	.79	.71	.65	.75	.71	.70
7	CC1S06A	1765 1851											.06B	.15B	.27B	.49	.79	.71	.69
8	CC2N03A	1756 1851										.82	.84	.84	.72	.68	.44	.41B	.40
9	CC2N04A	1741 1851									.47	.63	.71	.59	.44	.42B	.39	.52	.51
10	CC2E04B	1752 1851										.74	.81	.81	.69	.61	.46	.48	.53
11	CC2W03A	1754 1851										.49	.68	.70	.58	.59	.52	.46	.46
12	CC2W05B	1746 1850									.08B	.22B	.39	.46	.63	.62	.57	.59	.58
Av segment correlation			.37	.34	.29	.42	.31	.25	.28	.20	.33	.55	.59	.60	.57	.57	.61	.60	.59

For each series with potential problems the following diagnostics may appear:

[A] Correlations with master dating series of flagged 40-year segments of series filtered with 32-year spline,
at every point from ten years earlier (-10) to ten years later (+10) than dated

[B] Effect of those data values which most lower or raise correlation with master series
Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

[C] Year-to-year changes very different from the mean change in other series

[D] Absent rings (zero values)

[E] Values which are statistical outliers from mean for the year

NORRIS 1633 to 1980 348 years Series 1

[*] Early part of series cannot be checked from 1633 to 1666 -- not matched by another series

[*] Later part of series cannot be checked from 1852 to 1980 -- not matched by another series

[A]

Segment	High	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
1667 1706	0	-.05	-.27	.15	.04	-.17	-.05	.25	-.24	.03	.11	.37*	-.03	.07	-.13	.06	.07	-.05	-.31	.12	.00	-.10
1670 1709	0	-.05	-.13	.05	.11	-.15	-.08	.23	-.29	.09	.22	.34*	-.07	.00	-.02	.02	.13	-.06	-.21	-.02	-.02	-.05
1680 1719	-7	-.05	-.08	-.29	.41*	-.14	-.08	.14	-.37	.08	.30	.29|	-.10	-.01	.04	-.26	.16	.01	-.34	.14	-.03	-.20
1700 1739	0	.03	-.02	-.30	.12	.07	-.16	.04	-.39	-.05	.13	.31*	.06	-.02	.02	-.36	.26	.00	-.18	.06	-.11	-.22
1710 1749	0	-.04	.01	-.19	.07	.18	-.08	-.16	-.22	-.01	.12	.25*	.14	.07	-.16	-.31	.21	-.10	-.20	.09	-.03	-.23
1720 1759	5	-.02	.00	-.11	.04	.27	.01	-.25	-.17	-.08	.01	.29|	.22	.08	-.13	-.06	.30*	-.02	-.03	-.08	-.04	-.31
1730 1769	-7	-.12	-.06	-.15	.30*	.26	.11	-.28	-.25	-.21	-.07	.16|	.27	.19	-.14	-.18	.09	-.12	.11	.18	-.04	-.33

[B] Entire series, effect on correlation (.425) is:
Lower 1842> -.024 1851< -.024 1680> -.016 1711> -.013 1736< -.012 1710< -.012 Higher 1839 .044 1774 .025
1667 to 1706 segment:
Lower 1680> -.073 1686> -.043 1676< -.030 1690< -.024 1703< -.019 1704> -.018 Higher 1668 .050 1669 .034
1670 to 1709 segment:
Lower 1680> -.080 1686> -.054 1676< -.029 1690< -.025 1704> -.020 1703< -.018 Higher 1708 .068 1681 .033
1680 to 1719 segment:
Lower 1680> -.061 1711> -.050 1710< -.047 1690< -.026 1686> -.025 1714> -.022 Higher 1708 .068 1719 .036
1700 to 1739 segment:
Lower 1711> -.055 1736< -.052 1710< -.039 1729> -.035 1737> -.031 1714> -.025 Higher 1724 .064 1708 .060
1710 to 1749 segment:
Lower 1711> -.050 1736< -.047 1710< -.041 1729> -.032 1741> -.025 1737> -.023 Higher 1724 .078 1719 .035
1720 to 1759 segment:
Lower 1736< -.049 1737> -.039 1729> -.038 1748> -.035 1741> -.029 1735< -.017 Higher 1724 .075 1755 .053
1730 to 1769 segment:

```
     Lower   1737> -.036   1762< -.036   1748> -.034   1741> -.031   1760> -.026   1736< -.024  Higher   1755  .082   1742  .032

 [C] Year-to-year changes diverging by over 4.0 std deviations:
      1710 1711   4.1 SD

 [E] Outliers    31   3.0 SD above or -4.5 SD below mean for year
      1676 -5.2 SD;    1680 +6.9 SD;    1683 +3.4 SD;    1686 +6.0 SD;    1690 -4.8 SD;    1692 +3.5 SD;    1701 +3.3 SD;
      1704 +4.0 SD;    1710 -7.9 SD;    1711 +4.4 SD;    1714 +5.2 SD;    1715 +3.6 SD;    1729 +5.7 SD;    1735 -5.2 SD;
      1736 -7.0 SD;    1737 +4.5 SD;    1741 +5.2 SD;    1748 +4.1 SD;    1753 -5.7 SD;    1758 +4.6 SD;    1759 +3.5 SD;
      1760 +3.7 SD;    1762 -5.7 SD;    1769 +3.2 SD;    1800 +3.8 SD;    1810 -5.2 SD;    1817 +4.1 SD;    1820 +3.2 SD;
      1842 +8.8 SD;    1843 +3.5 SD;    1851 -8.1 SD
==================================================================================================================================

 TEST S    1667 to  1829     163 years                                                                                 Series   2

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------   ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1667 1706    0    .07 -.14  .18 -.22 -.11 -.09  .16 -.14 -.03 -.02  .37* .10  .10 -.29  .24 -.09 -.07  .12 -.02 -.15 -.14
   1670 1709    7    .04 -.03  .12 -.21 -.12 -.02  .10 -.13  .07 -.04  .34| .24  .11 -.35  .11  .06 -.17  .35*-.25 -.16 -.05
   1680 1719    0   -.05 -.03  .05 -.21 -.02  .24 -.16  .02  .03 -.04  .29* .25  .04 -.42  .15 -.11 -.07  .29 -.21  .07  .05
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1700 1739   -5   -.18 -.03 -.02 -.28  .00  .32*-.32  .00  .01  .04  .31| .12  .00 -.38  .01 -.15  .13  .15 -.22 -.04  .01
   1710 1749    0   -.19 -.21  .04 -.01 -.09  .19 -.27 -.04  .01  .02  .25* .15 -.19 -.12 -.04 -.07  .06  .17 -.19  .00  .05
   1720 1759    0   -.13 -.27  .13  .09 -.16  .02 -.15 -.24  .01  .06  .26* .25 -.21  .00 -.04  .01  .10  .20 -.24 -.18 -.05
   1730 1769    7   -.19 -.25  .02  .26 -.16  .08 -.11 -.25  .09  .08  .24| .19 -.32  .03 -.09  .05 -.06  .33*-.09 -.01 -.01
   1740 1779    0   -.21 -.23  .19  .32 -.19 -.09 -.16 -.30 -.02 -.06  .33* .26 -.08  .28 -.11  .17 -.08  .19 -.07 -.10 -.03
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1760 1799    0   -.18 -.09 -.36  .14  .04  .02 -.10 -.40 -.13  .05  .30* .16  .17  .13 -.08  .02 -.21  .20  .13 -.08 -.07
   1770 1809    7   -.21 -.11 -.14  .16  .11 -.08 -.01 -.19 -.29  .17  .15| .07  .00 -.03 -.08  .18  .00  .36* .19 -.05 -.15
   1780 1819    7   -.19  .04 -.02 -.05  .21 -.04 -.06 -.20 -.33  .15  .17| .05  .11 -.17 -.13 -.01  .00  .51* .10  .19 -.10
   1790 1829    7   -.28  .03  .04  .03  .26  .01 -.02 -.28 -.30  .11  .10|-.08  .17 -.04 -.10  .01 -.05  .47* .08  .17 -.10

 [B] Entire series, effect on correlation (  .275) is:
      Lower   1807< -.028   1796< -.021   1680< -.015   1736> -.015   1771< -.014   1743< -.014  Higher   1774  .027   1755  .018
    1667 to 1706 segment:
      Lower   1680< -.073   1686< -.043   1676> -.030   1690> -.024   1703> -.019   1704< -.018  Higher   1668  .050   1669  .034
    1670 to 1709 segment:
      Lower   1680< -.080   1686< -.054   1676> -.029   1690> -.025   1704< -.020   1703> -.018  Higher   1708  .068   1681  .033
    1680 to 1719 segment:
      Lower   1680< -.061   1711< -.050   1710> -.047   1690> -.026   1686< -.025   1714< -.022  Higher   1708  .068   1719  .036
    1700 to 1739 segment:
      Lower   1711< -.055   1736> -.052   1710> -.039   1729< -.035   1737< -.031   1714< -.025  Higher   1724  .064   1708  .060
    1710 to 1749 segment:
      Lower   1736> -.057   1743< -.048   1711< -.043   1710> -.032   1729< -.028   1714< -.020  Higher   1724  .065   1719  .033
    1720 to 1759 segment:
      Lower   1736> -.068   1743< -.058   1754< -.042   1729< -.033   1748< -.026   1737< -.023  Higher   1755  .066   1724  .061
    1730 to 1769 segment:
      Lower   1736> -.078   1743< -.061   1754< -.044   1737< -.024   1735> -.019   1748< -.018  Higher   1755  .090   1742  .027
    1740 to 1779 segment:
      Lower   1779> -.075   1771< -.072   1743< -.064   1754< -.045   1748< -.020   1753> -.019  Higher   1774  .126   1755  .081
```

```
    1760 to 1799 segment:
      Lower   1796< -.139   1771< -.094   1779> -.085   1780> -.020   1792> -.012   1784> -.010  Higher   1774  .202   1790  .058
    1770 to 1809 segment:
      Lower   1807< -.113   1796< -.088   1779> -.060   1771< -.060   1780> -.015   1804> -.015  Higher   1774  .179   1790  .054
    1780 to 1819 segment:
      Lower   1807< -.112   1796< -.096   1814> -.048   1804> -.014   1780> -.013   1800> -.012  Higher   1812  .115   1790  .052
    1790 to 1829 segment:
      Lower   1807< -.089   1796< -.078   1814> -.044   1827< -.034   1828> -.021   1804> -.014  Higher   1812  .113   1790  .046

 [E] Outliers    30   3.0 SD above or -4.5 SD below mean for year
      1676 +5.2 SD;    1679 +3.4 SD;    1680 -6.9 SD;    1686 -6.0 SD;    1690 +4.8 SD;    1693 +3.4 SD;    1703 +3.4 SD;
      1710 +7.9 SD;    1714 -5.2 SD;    1729 -5.7 SD;    1735 +5.2 SD;    1736 +7.0 SD;    1737 -4.5 SD;    1743 -5.6 SD;
      1747 +3.3 SD;    1748 -4.6 SD;    1754 -5.4 SD;    1758 +4.1 SD;    1771 -5.8 SD;    1779 +6.6 SD;    1780 +4.7 SD;
      1796 -8.2 SD;    1800 +3.2 SD;    1804 +3.5 SD;    1807 -8.8 SD;    1812 -4.8 SD;    1814 +5.3 SD;    1817 +3.6 SD;
      1826 -5.5 SD;    1827 -7.0 SD
====================================================================================================================================

 CC1N03A   1778 to  1851      74 years                                                                                    Series   3

 [B] Entire series, effect on correlation (  .539) is:
      Lower   1823< -.035   1785> -.028   1782< -.025   1788< -.011   1812> -.010   1839> -.009  Higher   1814  .019   1842  .018

 [E] Outliers     9   3.0 SD above or -4.5 SD below mean for year
      1778 +3.2 SD;    1779 +3.4 SD;    1782 -5.3 SD;    1785 +6.2 SD;    1814 -5.6 SD;    1815 -4.7 SD;    1823 -7.3 SD;
      1832 +3.3 SD;    1851 +3.5 SD
====================================================================================================================================

 CC1N04A   1760 to  1851      92 years                                                                                    Series   4

 [B] Entire series, effect on correlation (  .629) is:
      Lower   1774> -.055   1770< -.021   1830< -.014   1844> -.013   1822> -.009   1833< -.008  Higher   1839  .077   1827  .011

 [E] Outliers     8   3.0 SD above or -4.5 SD below mean for year
      1770 -4.7 SD;    1772 +3.0 SD;    1774 +7.3 SD;    1787 +3.6 SD;    1802 +3.9 SD;    1822 +4.2 SD;    1839 -5.7 SD;
      1844 +4.3 SD
====================================================================================================================================

 CC1S03A   1765 to  1851      87 years                                                                                    Series   5

 [B] Entire series, effect on correlation (  .815) is:
      Lower   1826> -.013   1841> -.009   1824< -.006   1837> -.005   1809< -.005   1825< -.005  Higher   1839  .036   1774  .022

 [E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
      1826 +3.4 SD;    1839 -5.4 SD;    1847 +3.8 SD
====================================================================================================================================

 CC1S03B   1764 to  1851      88 years                                                                                    Series   6

 [B] Entire series, effect on correlation (  .743) is:
      Lower   1826> -.014   1828> -.013   1842> -.013   1799> -.009   1837< -.008   1824< -.006  Higher   1839  .048   1774  .033
```

```
[E] Outliers     4   3.0 SD above or -4.5 SD below mean for year
      1826 +3.8 SD;    1828 +3.5 SD;    1832 +4.0 SD;    1847 +5.2 SD
======================================================================================================================================

CC1S06A   1765 to  1851      87 years                                                                                    Series   7

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1765 1804    5   -.16 -.20 -.26  .24  .30  .15 -.04 -.17  .27  .19  .06|-.34 -.38 -.05  .06  .37* .20 -.16 -.17 -.05  .03
   1770 1809   -6   -.09 -.21 -.25  .26  .33* .16 -.01 -.14  .18  .19  .15|-.28 -.29 -.02  .01  .19  .02 -.27 -.13  .01 -.06
   1780 1819   -1   -.10 -.20 -.20  .17  .31  .07 -.08 -.05  .27  .35* .27|-.17 -.24 -.11  .05  .09  .10 -.16 -.18 -.01 -.13

[B] Entire series, effect on correlation (  .420) is:
      Lower   1771< -.044   1786< -.041   1843< -.027   1794< -.019   1780< -.018   1784> -.014  Higher   1839  .109   1827  .015
    1765 to 1804 segment:
      Lower   1771< -.074   1786< -.061   1794< -.025   1784> -.025   1773> -.023   1768< -.020  Higher   1779  .052   1774  .046
    1770 to 1809 segment:
      Lower   1771< -.080   1786< -.067   1794< -.027   1784> -.026   1773> -.023   1797< -.018  Higher   1779  .051   1774  .037
    1780 to 1819 segment:
      Lower   1786< -.091   1794< -.038   1784> -.036   1780< -.025   1797< -.022   1791> -.022  Higher   1787  .034   1805  .033

[E] Outliers    15   3.0 SD above or -4.5 SD below mean for year
      1769 -5.5 SD;    1771 -5.4 SD;    1773 +3.5 SD;    1774 +5.5 SD;    1780 -6.6 SD;    1784 +4.4 SD;    1786 -6.4 SD;
      1788 +4.3 SD;    1791 +4.3 SD;    1794 -5.1 SD;    1795 -5.4 SD;    1803 +3.6 SD;    1804 +3.5 SD;    1843 -6.9 SD;
      1851 +4.3 SD
======================================================================================================================================

CC2N03A   1756 to  1851      96 years                                                                                    Series   8

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1810 1849   -3   -.12 -.04 -.03  .20 -.21  .11 -.15  .42* .09 -.02  .41|-.19 -.05 -.07 -.18 -.04  .04  .31 -.19 -.05 -.07

[B] Entire series, effect on correlation (  .582) is:
      Lower   1839> -.054   1848> -.032   1812> -.020   1847< -.016   1828< -.012   1832< -.011  Higher   1774  .049   1842  .018
    1810 to 1849 segment:
      Lower   1839> -.073   1848> -.052   1812> -.030   1847< -.028   1832< -.019   1828< -.018  Higher   1842  .075   1814  .031

[E] Outliers     6   3.0 SD above or -4.5 SD below mean for year
      1812 +3.9 SD;    1828 -5.9 SD;    1839 +5.5 SD;    1842 -9.1 SD;    1847 -4.9 SD;    1848 +4.7 SD
======================================================================================================================================

CC2N04A   1741 to  1851     111 years                                                                                    Series   9

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1790 1829   -7   -.22 -.11 -.02  .42*-.11  .16 -.26 -.33  .14 -.11  .42| .32  .06  .00 -.12 -.11 -.13  .24  .07  .01 -.12

[B] Entire series, effect on correlation (  .485) is:
```

```
   Lower   1743> -.030   1808< -.029   1753> -.023   1832< -.020   1812> -.012   1741< -.012  Higher   1774  .033   1842  .029
  1790 to 1829 segment:
   Lower   1808< -.111   1812> -.033   1815> -.025   1797< -.024   1818< -.017   1811< -.016  Higher   1814  .049   1790  .047

[E] Outliers    18   3.0 SD above or -4.5 SD below mean for year
   1741 -4.5 SD;    1743 +5.6 SD;    1749 +3.7 SD;    1753 +5.1 SD;    1754 +3.3 SD;    1771 +4.1 SD;    1794 +3.1 SD;
   1795 +3.0 SD;    1808 -5.9 SD;    1812 +3.1 SD;    1815 +4.8 SD;    1816 +3.7 SD;    1829 +3.0 SD;    1832 -5.3 SD;
   1841 -7.9 SD;    1842 -4.8 SD;    1849 +3.0 SD;    1850 +4.5 SD
====================================================================================================================================

CC2E04B   1752 to  1851     100 years                                                                                    Series  10

[B] Entire series, effect on correlation (  .610) is:
   Lower   1839> -.046   1841> -.024   1826< -.017   1810< -.017   1811< -.012   1778< -.008  Higher   1774  .035   1755  .019

[E] Outliers     6   3.0 SD above or -4.5 SD below mean for year
   1811 -6.1 SD;    1826 -5.2 SD;    1833 +3.0 SD;    1839 +5.1 SD;    1841 +4.8 SD;    1842 -5.5 SD
====================================================================================================================================

CC2W03A   1754 to  1851      98 years                                                                                    Series  11

[B] Entire series, effect on correlation (  .482) is:
   Lower   1755> -.046   1846< -.020   1759< -.017   1773< -.013   1842> -.013   1847< -.010  Higher   1774  .063   1821  .017

[E] Outliers    11   3.0 SD above or -4.5 SD below mean for year
   1755 +6.3 SD;    1759 -5.1 SD;    1761 +4.7 SD;    1762 +4.5 SD;    1774 -5.5 SD;    1780 +3.2 SD;    1788 +3.5 SD;
   1832 +5.0 SD;    1842 +4.5 SD;    1844 +3.6 SD;    1847 -5.3 SD
====================================================================================================================================

CC2W05B   1746 to  1850     105 years                                                                                    Series  12

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
  ---------   ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
  1746 1785    -1    .27  .01 -.28  .21  .02  .21  .06 -.01 -.17  .35* .08|-.10 -.18 -.48  .17  .03  .04  .02 -.22 -.05 -.12
  1750 1789    -5    .32  .00 -.30  .17  .02  .36* .06 -.06 -.13  .32  .22|-.11 -.16 -.46  .04  .01  .04  .02 -.29  .08 -.10

[B] Entire series, effect on correlation (  .426) is:
   Lower   1770< -.036   1774> -.030   1819> -.021   1761< -.019   1748> -.019   1747< -.019  Higher   1839  .047   1814  .021
  1746 to 1785 segment:
   Lower   1770< -.081   1761< -.043   1747< -.041   1748> -.036   1753< -.031   1774> -.028  Higher   1755  .098   1779  .066
  1750 to 1789 segment:
   Lower   1770< -.091   1774> -.059   1761< -.047   1753< -.036   1754> -.029   1758< -.025  Higher   1755  .094   1779  .065

[E] Outliers    16   3.0 SD above or -4.5 SD below mean for year
   1746 +3.2 SD;    1747 -5.1 SD;    1751 +4.0 SD;    1752 +4.6 SD;    1754 +3.2 SD;    1756 -4.9 SD;    1761 -5.5 SD;
   1770 -5.6 SD;    1772 +4.9 SD;    1773 +4.4 SD;    1774 +6.4 SD;    1806 +4.2 SD;    1814 -5.5 SD;    1819 +5.2 SD;
   1832 -4.6 SD;    1834 +3.0 SD
====================================================================================================================================
```

PART 7: DESCRIPTIVE STATISTICS: CCD   21:43 Tue 11 Aug 2009 Page   7

						Corr	//-------- Unfiltered	--------\\			//---- Filtered	-----\\		
			No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr	()
1	NORRIS	1633 1980	348	17	7	.425	.99	1.60	.139	.187	.143	2.58	.344	.000	1
2	TEST S	1667 1829	163	14	12	.275	1.00	1.62	.204	.492	.170	2.73	.434	.024	1
3	CC1N03A	1778 1851	74	6	0	.539	1.25	3.30	.642	.525	.387	2.72	.528	.055	1
4	CC1N04A	1760 1851	92	7	0	.629	1.71	3.53	.709	.620	.274	2.78	.374	-.018	1
5	CC1S03A	1765 1851	87	7	0	.815	1.46	4.27	.962	.842	.268	2.58	.405	-.013	1
6	CC1S03B	1764 1851	88	7	0	.743	1.53	3.98	1.010	.790	.322	2.87	.499	-.024	1
7	CC1S06A	1765 1851	87	7	3	.420	1.67	3.37	.696	.759	.234	2.73	.473	-.006	1
8	CC2N03A	1756 1851	96	8	1	.582	1.91	4.93	.803	.565	.329	2.62	.397	-.039	1
9	CC2N04A	1741 1851	111	9	1	.485	1.97	5.71	.793	.255	.375	2.87	.471	.018	1
10	CC2E04B	1752 1851	100	8	0	.610	1.57	3.96	.934	.742	.305	2.60	.393	-.044	1
11	CC2W03A	1754 1851	98	8	0	.482	1.75	4.64	.958	.780	.264	2.78	.494	.051	1
12	CC2W05B	1746 1850	105	9	2	.426	1.68	3.98	.638	.554	.290	2.74	.518	-.097	2
Total or mean:			1449	107	26	.511	1.43	5.71	.585	.511	.251	2.87	.425	-.006	

PART 8: ADJUSTMENTS FOR UNDATED SERIES: CCD   21:43 Tue 11 Aug 2009 Page   8

```
 Time span  1633  1980   348 years, best matches for  40-year segments lagged  10 years
 Listed in order from highest correlation

           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1N02A  1794 1833     0 .46    92 .42    -7 .41   107 .38   145 .34    35 .34    60 .32   -29 .32   -64 .32   -45 .32   -52 .31
 CC1N02A  1804 1843     0 .49    92 .48    -7 .46  -168 .45    35 .40  -167 .37   -84 .34   122 .34   -47 .33   -29 .33   107 .33
 CC1N02A  1811 1850    92 .42     0 .41  -168 .39   -66 .38  -106 .38    61 .37    20 .37   -29 .37   -83 .36   -84 .35   -47 .32
      3 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       -29  3  .34    +0  3  .45    +92  3  .44
 Chronological order
       Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
       -29  3     +0  3    +92  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
           Counted       Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC1S01A  1775 1814     0 .65    47 .45   165 .45  -127 .43    80 .41   -24 .34   -55 .34    -5 .33  -111 .32   -91 .31    50 .31
 CC1S01A  1785 1824     0 .68    92 .44    20 .44  -113 .41   145 .37    58 .35   130 .35    81 .33    22 .32   117 .32  -106 .32
 CC1S01A  1786 1825  Lag from prior segment   1 years; insufficient
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
```

```
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC1S05A  1778 1817   -98 .49  -127 .49    74 .47     0 .44   -24 .41    82 .41   146 .40   -55 .34    15 .33   -54 .32   -53 .31
CC1S05A  1788 1827     0 .49  -146 .42   -98 .42  -154 .38   138 .38   -82 .36    90 .36    66 .36    -7 .35    82 .33   105 .32
CC1S05A  1798 1837     0 .48    66 .46  -113 .43   138 .41  -146 .39    33 .37  -138 .36    92 .34   -82 .33   -98 .32   105 .32
CC1S05A  1808 1847    40 .46     0 .46     7 .44  -126 .42   -84 .41    20 .41  -113 .36    92 .36   -59 .33   -77 .30   -18 .30
CC1S05A  1812 1851  Lag from prior segment   4 years; insufficient
     4 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  4  .47   -98  3  .41
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC1E03A  1749 1788   132 .43    -5 .38   169 .38   -55 .38  -116 .37     0 .37    74 .36   -71 .31    86 .30   -77 .30   -43 .29
CC1E03A  1759 1798   -55 .58     0 .50    74 .45   -77 .42   132 .37   -43 .37   -24 .33   -32 .30   110 .30   -44 .30     5 .30
CC1E03A  1769 1808     0 .58   -55 .43  -111 .42   132 .41   121 .39   -44 .38   -98 .37  -128 .34   -77 .34    96 .34   -43 .32
CC1E03A  1779 1818     0 .69   -24 .43  -111 .41  -128 .38   -77 .36   135 .34   152 .32  -146 .32    25 .31   -54 .29    74 .28
CC1E03A  1789 1828     0 .68   -40 .46  -111 .45   -66 .38    25 .36  -138 .35  -132 .33   152 .32   -78 .31    97 .31  -105 .30
CC1E03A  1799 1838     0 .62   -40 .59  -111 .49  -132 .41  -163 .39  -133 .38    25 .37   111 .33   -66 .31   -59 .31  -138 .28
CC1E03A  1809 1848     0 .56  -133 .53  -163 .44   111 .39   -59 .38  -111 .37    63 .37  -167 .32    88 .31   -40 .31    -7 .29
CC1E03A  1812 1851  Lag from prior segment   3 years; insufficient
     7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  7  .57  -111  5  .43   -77  4  .35   -43  3  .33   -40  3  .45   -55  3  .46   +25  3  .35   +74  3  .36
     +132  3  .40
Chronological order
      Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No    Add No
     -111  5    -77  4    -55  3    -43  3    -40  3     +0  7    +25  3    +74  3  +132  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
Series    Segment    Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
-------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
CC1E03B  1745 1784   132 .45   -32 .42   -80 .36    74 .35    60 .34    -1 .34   157 .33   173 .33     6 .31   -44 .30    83 .30
CC1E03B  1755 1794    24 .43   174 .40   -55 .38    74 .37    -1 .35     0 .35   121 .33   140 .30   -82 .29   -32 .29  -119 .28
CC1E03B  1765 1804   121 .52     0 .50    49 .40   -55 .40   -44 .38    74 .35   174 .31   -16 .30  -119 .30    -1 .29   160 .28
CC1E03B  1775 1814     0 .72   121 .49    49 .38    80 .36   -24 .34  -128 .33   160 .32   107 .29   -78 .29    74 .29   -44 .28
CC1E03B  1785 1824     0 .70  -132 .46   121 .42    94 .39    22 .35    81 .35   -16 .32  -138 .32   -91 .31   130 .31   -82 .29
CC1E03B  1795 1834     0 .57  -132 .53    94 .41    79 .39   -40 .39   107 .34  -133 .33    66 .31    40 .28   111 .28  -111 .27
CC1E03B  1805 1844     0 .51    -3 .45    79 .37   122 .36  -106 .35    22 .35   -28 .34    94 .34    97 .32    66 .31    58 .31
CC1E03B  1811 1850     0 .48  -133 .39    -3 .39   122 .37    79 .35  -106 .34    69 .34   -40 .31    97 .28   -30 .27   -28 .27
     8 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  7  .55   +74  4  .34  +121  4  .44    -1  3  .33   +79  3  .37   +94  3  .38   -44  3  .32
```

```
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
      -44  3    -1  3    +0  7   +74  4   +79  3   +94  3  +121  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2N05A  1772 1811     0 .58  -104 .48   -48 .39    -5 .38   -24 .36    82 .35   121 .34   -54 .32   108 .32   146 .32   -66 .30
 CC2N05A  1782 1821     0 .68   -29 .42   145 .39   117 .38  -104 .38  -122 .35    58 .34   121 .32    45 .30     9 .30   -68 .29
 CC2N05A  1792 1831     0 .58    92 .53   -29 .49    20 .42   108 .42   145 .39    58 .38   -68 .38  -152 .36   -30 .33  -135 .29
 CC2N05A  1802 1841   -29 .51    92 .50  -168 .44     0 .40   108 .40   -67 .38    58 .37   -68 .35    20 .34  -152 .33    60 .32
 CC2N05A  1812 1851    92 .46    -8 .42    89 .38    64 .34  -139 .33  -168 .32   -73 .32  -154 .31    20 .30   -68 .29    53 .28
      5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
      -68  4  .33    +0  4  .56   -29  3  .47   +20  3  .35   +58  3  .36   +92  3  .50  +108  3  .38
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
      -68  4   -29  3    +0  4   +20  3   +58  3   +92  3  +108  3
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2W04A  1774 1813     0 .54   121 .52   -44 .38  -140 .36   140 .36   -56 .35   -55 .34   -25 .34   144 .34    80 .33    72 .32
 CC2W04A  1784 1823     0 .55  -106 .46  -140 .41   -35 .39    80 .38    97 .37    25 .35   150 .34   -40 .34   -78 .33   -84 .31
 CC2W04A  1794 1833     0 .50   -40 .47  -132 .40    97 .38     7 .38  -133 .36   111 .35  -106 .34   -78 .32    79 .32    25 .31
 CC2W04A  1804 1843    97 .52     0 .51   -40 .49  -133 .41     7 .40    25 .40   122 .38   -59 .38   -84 .38    79 .34   -96 .33
 CC2W04A  1812 1851     0 .58   -40 .51    97 .47   -59 .47  -133 .46     7 .40   122 .39  -106 .39  -163 .37   111 .34   -84 .32
      5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  5  .54   -40  4  .45   +97  4  .44  -106  3  .40  -133  3  .41    +7  3  .39   +25  3  .35   -84  3  .34
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
     -133  3  -106  3   -84  3   -40  4    +0  5    +7  3   +25  3   +97  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
          Counted        Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment   Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- ---------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------  --------
 CC2W04B  1766 1805     1 .50     0 .49   -36 .46   -65 .43   138 .40  -122 .39  -121 .39   -92 .38   -37 .37   120 .37   -18 .35
 CC2W04B  1776 1815     0 .48  -140 .40   150 .40    28 .39    88 .39    25 .36   -71 .34  -115 .33   120 .32    21 .31    50 .31
 CC2W04B  1786 1825     0 .51  -140 .48   150 .44    25 .43   120 .41    -2 .41    58 .36  -108 .35    28 .34    97 .33    -1 .31
 CC2W04B  1796 1835     0 .62  -108 .49    25 .45   -40 .45    -2 .43    58 .41  -135 .38   -59 .36  -132 .34    97 .34    66 .30
 CC2W04B  1806 1845     0 .65    97 .49   -40 .39   -59 .38    92 .35    25 .35   122 .35   -68 .34  -163 .33    58 .33    95 .32
 CC2W04B  1811 1850     0 .66    97 .45   -59 .42  -108 .35   -40 .35   -84 .35  -163 .34    58 .34  -133 .32    92 .32    95 .32
      6 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  6  .57   +25  4  .40   +58  4  .36   +97  4  .40   -59  3  .39   -40  3  .40  -108  3  .40  +120  3  .36
```

```
Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
     -108  3   -59  3   -40  3    +0  6   +25  4   +58  4   +97  4  +120  3
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
           Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment  Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- --------- -------- -------- -------- -------- -------- -------- -------- -------- -------- -------- --------
 CC2W05A  1777 1816    0 .55   97 .47   -1 .45  150 .44  -78 .40  -77 .40  -99 .36   99 .36  -25 .34  -56 .34  -24 .33
 CC2W05A  1787 1826    0 .65   97 .63  -77 .48  -78 .45  -90 .43  -24 .41  -66 .34  150 .34  -91 .33  152 .33   80 .32
 CC2W05A  1797 1836   83 .51   97 .50    0 .44  -54 .41   51 .40  -38 .40  136 .40   11 .37 -142 .36  -14 .34 -160 .34
 CC2W05A  1807 1846   97 .56    0 .52   83 .52  -38 .45  -54 .42 -160 .40 -142 .39  -14 .36 -146 .35   14 .35  -77 .34
 CC2W05A  1812 1851  -54 .50 -177 .50    0 .49   83 .47 -160 .46   97 .44 -176 .42  -38 .39 -146 .36  -84 .35 -129 .35
      5 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
       +0  5  .53   +97  5  .52   -54  3  .45   -38  3  .41  -160  3  .40   +83  3  .50   -77  3  .41
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
     -160  3   -77  3   -54  3   -38  3    +0  5   +83  3   +97  5
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
           Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment  Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- --------- -------- -------- -------- -------- -------- -------- -------- -------- -------- -------- --------
 CC2W06A  1752 1791  140 .45  185 .44 -103 .43   19 .42  -11 .40    1 .40  100 .39    0 .38  -72 .33   -5 .32  -87 .31
 CC2W06A  1762 1801  115 .65   -6 .48  140 .43  -72 .42   43 .42 -103 .41  -48 .41  100 .39  168 .38  -60 .36  -36 .35
 CC2W06A  1772 1811  115 .65  -88 .45  -48 .41 -103 .39  -60 .38  140 .37   43 .36   -5 .34  -76 .34  168 .34  100 .32
 CC2W06A  1782 1821  115 .63  -88 .43  -22 .42   -6 .37 -103 .36  -53 .34 -145 .33  -76 .32  -60 .31   43 .31   45 .31
 CC2W06A  1792 1831  115 .59  -22 .48  -88 .45 -128 .37 -120 .37 -115 .34 -145 .33  -76 .32   83 .32  -29 .32   43 .29
 CC2W06A  1802 1841    0 .49   33 .49   -2 .43  125 .38   20 .38   66 .38 -138 .37   53 .35  138 .35 -160 .33  -29 .31
 CC2W06A  1812 1851    0 .61 -106 .51  -29 .44   70 .40  -28 .35  -64 .33  -84 .32 -118 .32  -95 .31  111 .31 -133 .30
      7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Number of segments
      Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
     -103  4  .40   +43  4  .35  +115  4  .63   -60  3  .35   -29  3  .36    +0  3  .50   -88  3  .44  +100  3  .37
      -76  3  .33  +140  3  .42
 Chronological order
      Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
     -103  4   -88  3   -76  3   -60  3   -29  3    +0  3   +43  4  +100  3  +115  4  +140  3
=================== ======== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
           Counted      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr      Corr
 Series    Segment  Add  # 1  Add  # 2  Add  # 3  Add  # 4  Add  # 5  Add  # 6  Add  # 7  Add  # 8  Add  # 9  Add  #10  Add  #11
 -------- --------- -------- -------- -------- -------- -------- -------- -------- -------- -------- -------- --------
 CC2W06B  1757 1796    0 .67  114 .46   68 .42  120 .42  121 .41   79 .39  151 .38 -122 .37  -36 .37   -7 .35  -25 .34
 CC2W06B  1767 1806    0 .67  -37 .44  -25 .42  -93 .42   68 .40 -122 .39  -56 .39  121 .39   73 .39   -1 .35   -6 .34
 CC2W06B  1777 1816    0 .43  -56 .42 -100 .40  -44 .37 -128 .36   73 .34   88 .33  -93 .33   94 .32   -1 .31  -55 .31
 CC2W06B  1787 1826 -106 .52    0 .50 -140 .42   40 .37    7 .36 -132 .35   80 .33   20 .30  -78 .29   60 .28  -93 .28
 CC2W06B  1797 1836   40 .53 -106 .48    7 .45  -88 .41   66 .40 -132 .39  -34 .36    0 .35  -40 .35  112 .31   33 .30
 CC2W06B  1807 1846    0 .50 -106 .45 -133 .43    7 .42  122 .37   33 .37  -20 .36  -84 .35   70 .34  -29 .34   40 .33
 CC2W06B  1812 1851    0 .60 -133 .60  -20 .47   70 .44    7 .42 -106 .35  -40 .34 -118 .33   33 .33  122 .32   40 .31
      7 segments  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
```

```
 Number of segments
       Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av   Add No R_av
        +0  7  .53  -106  4  .45    +7  4  .41   +40  4  .38   +33  3  .34   -93  3  .34
 Chronological order
       Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No   Add No
      -106  4   -93  3    +0  7    +7  4   +33  3   +40  4
===================  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========  ========
       11 undated series

                                       - = [  COFECHA CCD  COF  ] = -
```

Appendix VII. Final interseries correlation for corn crib provided by COFECHA.

```
[]  Dendrochronology Program Library                                        Run CCMTR  Program COF  21:45  Tue 11 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                        Version 6.06P    27253
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           CCMTR

 File of DATED series:   CCFinal

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                              1234567
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Time span of Master dating series is  1741 to  1851   111 years
 Continuous time span is               1741 to  1851   111 years
 Portion with two or more series is    1745 to  1851   107 years
```

```
                                        ****************************************
                                        *C* Number of dated series        21 *C*
                                        *O* Master series 1741 1851  111 yrs *O*
                                        *F* Total rings in all series   1842 *F*
                                        *E* Total dated rings checked   1838 *E*
                                        *C* Series intercorrelation     .564 *C*
                                        *H* Average mean sensitivity    .307 *H*
                                        *A* Segments, possible problems   17 *A*
                                        *** Mean length of series       87.7 ***
                                        ****************************************

 ABSENT RINGS listed by SERIES:            (See Master Dating Series for absent rings listed by year)

              No ring measurements of zero value

PART 2:  TIME PLOT OF TREE-RING SERIES: CCMTR                                                   21:45  Tue 11 Aug 2009  Page   2
------------------------------------------------------------------------------------------------------------------------------------
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident   Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .   <=====>    .    .    .    . CC1N02A    1 1794 1850   57
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC1N03A    2 1778 1851   74
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1N04A    3 1760 1851   92
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <====>  .    .    .    .    . CC1S01A    4 1775 1825   51
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03A    5 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03B    6 1764 1851   88
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC1S05A    7 1778 1851   74
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S06A    8 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC1E03A    9 1749 1851  103
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC1E03B   10 1745 1850  106
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2N03A   11 1756 1851   96
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2N04A   12 1741 1851  111
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2N05A   13 1772 1851   80
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2E04B   14 1752 1851  100
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W03A   15 1754 1851   98
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2W04A   16 1774 1851   78
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC2W04B   17 1766 1850   85
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2W05A   18 1777 1851   75
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2W05B   19 1746 1850  105
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W06A   20 1752 1851  100
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W06B   21 1757 1851   95
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1750	1.395	4	1800	-.889	21	1850	.039	20						
			1751	.104	4	1801	.225	21	1851	.724	16						
			1752	.245	6	1802	.286	21									
			1753	.193	6	1803	-.349	21									
			1754	.077	7	1804	-1.416	21									
			1755	-1.339	7	1805	1.512	21									
			1756	-.745	8	1806	-.302	21									
			1757	.243	9	1807	.845	21									
			1758	-.445	9	1808	.168	21									
			1759	.080	9	1809	1.080	21									
			1760	-.873	10	1810	1.453	21									
			1761	-.182	10	1811	.365	21									
			1762	.554	10	1812	-.604	21									
			1763	.827	10	1813	-.804	21									
			1764	.564	11	1814	-2.840	21									
			1765	.573	13	1815	-.144	21									
			1766	.013	14	1816	.265	21									
			1767	-.485	14	1817	.014	21									
			1768	.043	14	1818	.131	21									
			1769	-.027	14	1819	-2.063	21									
			1770	.776	14	1820	-.191	21									
			1771	1.068	14	1821	-1.760	21									
			1772	.939	15	1822	-.217	21									
			1773	-.405	15	1823	.584	21									
			1774	-2.760	16	1824	1.410	21									
			1775	-.094	17	1825	.782	21									
			1776	.145	17	1826	.111	20									
			1777	1.025	18	1827	2.276	20									
			1778	.184	20	1828	-.593	20									
			1779	-2.335	20	1829	.265	20									
			1780	-1.185	20	1830	.612	20									
			1781	.438	20	1831	-.009	20									
			1782	1.219	20	1832	-.596	20									
			1783	.610	20	1833	.430	20									
			1784	-.274	20	1834	.381	20									
			1785	-.923	20	1835	.082	20									
			1786	.443	20	1836	.400	20									
			1787	1.432	20	1837	-.193	20									
			1788	1.122	20	1838	-.190	20									
			1789	.380	20	1839	-2.384	20									
			1790	-1.675	20	1840	.853	20									
1741	-1.278	1	1791	-1.318	20	1841	-1.115	20									

```
  1742  1.511   1       1792 -1.339  20       1842 -2.699  20
  1743  1.779   1       1793   .003  20       1843   .926  20
  1744 -1.419   1       1794   .400  21       1844  -.165  20
  1745   .826   2       1795   .648  21       1845  1.097  20
  1746   .743   3       1796  1.368  21       1846   .553  20
  1747 -1.111   3       1797   .942  21       1847   .822  20
  1748 -1.070   3       1798  -.129  21       1848  -.775  20
  1749   .870   4       1799  -.302  21       1849  -.464  20
------------------------------------------------------------------------------------------------------------------------------------
PART 4:  Master Bar Plot: CCMTR                                                                     21:45  Tue 11 Aug 2009  Page   4
------------------------------------------------------------------------------------------------------------------------------------
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1750----------F 1800-d          1850----@
                   1751-----@      1801------A     1851--------C
                   1752------A     1802------A
                   1753-----A      1803---a
                   1754-----@      1804-f
                   1755-e          1805----------F
                   1756--c         1806---a
                   1757------A     1807--------C
                   1758--b         1808-----A
                   1759-----@      1809---------D
                   1760-c          1810----------F
                   1761---a        1811------A
                   1762-------B    1812--b
                   1763--------C   1813--c
                   1764-------B    1814k
                   1765-------B    1815---a
                   1766----@       1816------A
                   1767--b         1817----@
                   1768----@       1818-----A
                   1769----@       1819h
                   1770--------C   1820---a
                   1771---------D  1821g
                   1772---------D  1822---a
                   1773---b        1823-------B
                   1774k           1824----------F
                   1775----@       1825--------C
                   1776-----A      1826-----@
                   1777---------D  1827----------I
                   1778-----A      1828--b
                   1779i           1829------A
                   1780-e          1830-------B
                   1781-------B    1831----@
                   1782---------E  1832--b
                   1783-------B    1833-------B
                   1784---a        1834------B
                   1785-d          1835-----@
                   1786-------B    1836------B
                   1787----------F 1837---a
```

```
                 1788---------D  1838---a
                 1789------B     1839j
                 1790g           1840--------C
 1741-e          1791-e          1841-d
 1742----------F 1792-e          1842k
 1743----------G 1793----@       1843---------D
 1744-f          1794------B     1844---a
 1745--------C   1795-------C    1845---------D
 1746--------C   1796----------E 1846-------B
 1747-d          1797---------D  1847--------C
 1748-d          1798---a        1848--c
 1749--------C   1799---a        1849--b
```


Correlations of 40-year dated segments, lagged 10 years
Flags: A = correlation under .3665 but highest as dated; B = correlation higher at other than dated position

Seq	Series	Time_span	1740 1779	1750 1789	1760 1799	1770 1809	1780 1819	1790 1829	1800 1839	1810 1849	1820 1859
1	CC1N02A	1794 1850						.56	.58	.56	.49
2	CC1N03A	1778 1851				.55	.58	.67	.58	.60	.59
3	CC1N04A	1760 1851			.47	.50	.63	.67	.64	.64	.62
4	CC1S01A	1775 1825				.70	.70	.75			
5	CC1S03A	1765 1851			.81	.82	.76	.72	.67	.69	.68
6	CC1S03B	1764 1851			.76	.77	.73	.68	.67	.62	.60
7	CC1S05A	1778 1851				.50	.43	.54	.61	.54	.49
8	CC1S06A	1765 1851			.13B	.19B	.24B	.38	.61	.62	.61
9	CC1E03A	1749 1851	.41	.40B	.55	.65	.79	.77	.73	.63	.63
10	CC1E03B	1745 1850	.30B	.27B	.54	.65	.80	.81	.64	.62	.61
11	CC2N03A	1756 1851		.80	.89	.90	.83	.80	.69	.60	.60
12	CC2N04A	1741 1851	.50	.62	.73	.70	.67	.67	.68	.69	.68
13	CC2N05A	1772 1851				.59	.66	.65	.57	.25B	.22B
14	CC2E04B	1752 1851		.69	.74	.75	.59	.53	.46	.50	.56
15	CC2W03A	1754 1851		.48	.62	.63	.47	.48	.38B	.37B	.37
16	CC2W04A	1774 1851				.70	.77	.76	.70	.75	.76
17	CC2W04B	1766 1850			.51	.55	.54	.65	.75	.77	.76
18	CC2W05A	1777 1851				.55	.49	.47	.46	.48	.49
19	CC2W05B	1746 1850	.26B	.32A	.47	.50	.63	.65	.62	.66	.65
20	CC2W06A	1752 1851		.31B	.06B	.14B	.16B	.24B	.64	.75	.76
21	CC2W06B	1757 1851		.68	.65	.61	.59	.65	.61	.70	.69
Av segment correlation			.37	.51	.57	.60	.60	.62	.62	.60	.59

```
------------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
====================================================================================================================================

 CC1N02A   1794 to  1850      57 years                                                                                    Series   1

 [B] Entire series, effect on correlation (  .477) is:
       Lower   1850< -.038   1848> -.028   1806> -.025   1840< -.017   1807< -.015   1814> -.015  Higher   1819  .067   1839  .024

====================================================================================================================================

 CC1N03A   1778 to  1851      74 years                                                                                    Series   2

 [B] Entire series, effect on correlation (  .541) is:
       Lower   1785> -.033   1823< -.032   1832> -.025   1782< -.020   1815< -.015   1788< -.012  Higher   1814  .057   1827  .020

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1785 +3.2 SD
====================================================================================================================================

 CC1N04A   1760 to  1851      92 years                                                                                    Series   3

 [B] Entire series, effect on correlation (  .574) is:
       Lower   1774> -.034   1770< -.017   1833< -.013   1830< -.009   1777< -.009   1851< -.009  Higher   1839  .036   1827  .019

====================================================================================================================================

 CC1S01A   1775 to  1825      51 years                                                                                    Series   4

 [B] Entire series, effect on correlation (  .752) is:
       Lower   1780> -.027   1794< -.023   1800> -.018   1795< -.016   1790> -.013   1778< -.012  Higher   1779  .036   1819  .031

====================================================================================================================================
```

```
CC1S03A   1765 to  1851      87 years                                                                                    Series   5

[B] Entire series, effect on correlation (  .734) is:
      Lower   1832> -.017   1814> -.014   1825< -.009   1841> -.008   1826> -.008   1833< -.008  Higher   1774  .025   1819  .016

====================================================================================================================================

CC1S03B   1764 to  1851      88 years                                                                                    Series   6

[B] Entire series, effect on correlation (  .681) is:
      Lower   1832> -.026   1828> -.024   1826> -.008   1842> -.008   1847> -.007   1837< -.007  Higher   1774  .031   1839  .031

====================================================================================================================================

CC1S05A   1778 to  1851      74 years                                                                                    Series   7

[B] Entire series, effect on correlation (  .485) is:
      Lower   1842> -.065   1798< -.021   1851< -.016   1808< -.015   1849< -.014   1797< -.011  Higher   1779  .053   1827  .025

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1842 +4.1 SD
====================================================================================================================================

CC1S06A   1765 to  1851      87 years                                                                                    Series   8

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1765 1804    5   -.09 -.27 -.22  .30  .29  .07 -.08 -.20  .13  .29  .13|-.33 -.32 -.10  .02  .39* .18 -.15 -.13 -.10  .08
   1770 1809   -7   -.04 -.29 -.24  .34* .34  .07 -.04 -.18  .07  .25  .19|-.27 -.20 -.07 -.01  .22  .03 -.16 -.03 -.07 -.05
   1780 1819   -1   -.08 -.23 -.24  .24  .27  .02 -.06 -.14  .11  .34* .24|-.12 -.11 -.15  .01  .15  .14 -.04 -.11 -.11 -.10

[B] Entire series, effect on correlation (  .409) is:
      Lower   1786< -.038   1771< -.034   1843< -.022   1794< -.021   1791> -.016   1773> -.014  Higher   1839  .066   1827  .021
    1765 to 1804 segment:
      Lower   1786< -.065   1771< -.064   1794< -.034   1791> -.031   1773> -.027   1795< -.024  Higher   1779  .071   1787  .032
    1770 to 1809 segment:
      Lower   1786< -.068   1771< -.066   1794< -.035   1791> -.030   1773> -.026   1795< -.025  Higher   1779  .070   1805  .031
    1780 to 1819 segment:
      Lower   1786< -.079   1794< -.041   1791> -.036   1795< -.027   1797< -.021   1803> -.017  Higher   1810  .039   1805  .036

====================================================================================================================================

CC1E03A   1749 to  1851     103 years                                                                                    Series   9

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1750 1789   -5      - -.06 -.10 -.04  .15  .41*-.01 -.37 -.34  .18  .40|-.15 -.29 -.18  .10  .30  .29 -.10 -.39 -.13 -.01

[B] Entire series, effect on correlation (  .577) is:
      Lower   1770< -.019   1774> -.014   1752< -.012   1848< -.012   1803> -.012   1841> -.012  Higher   1814  .040   1779  .029
```

```
    1750 to 1789 segment:
      Lower   1770< -.054   1752< -.035   1760> -.026   1773> -.022   1774> -.021   1761< -.018  Higher   1779  .166   1782  .025

==================================================================================================================================

 CC1E03B   1745 to  1850     106 years                                                                                    Series  10

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1745 1784    5      -    -    -    -    -    - -.25 -.09 -.36  .29  .30|-.04 -.45 -.10  .26  .31* .27 -.22 -.09 -.16  .02
    1750 1789   -1      - -.17  .04  .00  .16  .22 -.29 -.30 -.35  .38* .27|-.08 -.41 -.13  .18  .34  .36 -.21 -.17 -.11  .05

 [B] Entire series, effect on correlation (  .562) is:
      Lower   1774> -.024   1835> -.018   1771< -.013   1839> -.013   1770< -.012   1752< -.012  Higher   1842  .031   1814  .027
    1745 to 1784 segment:
      Lower   1774> -.039   1771< -.039   1770< -.034   1752< -.034   1754< -.031   1760> -.023  Higher   1779  .128   1777  .033
    1750 to 1789 segment:
      Lower   1774> -.038   1771< -.035   1770< -.031   1752< -.030   1754< -.028   1760> -.025  Higher   1779  .138   1777  .033

==================================================================================================================================

 CC2N03A   1756 to  1851      96 years                                                                                    Series  11

 [B] Entire series, effect on correlation (  .694) is:
      Lower   1848> -.027   1839> -.025   1847< -.012   1756> -.011   1763< -.008   1846< -.008  Higher   1774  .029   1779  .012

==================================================================================================================================

 CC2N04A   1741 to  1851     111 years                                                                                    Series  12

 [*] Early part of series cannot be checked from 1741 to 1744 -- not matched by another series

 [B] Entire series, effect on correlation (  .608) is:
      Lower   1747> -.023   1753> -.019   1808< -.009   1746< -.009   1841< -.008   1797< -.007  Higher   1842  .024   1774  .023

==================================================================================================================================

 CC2N05A   1772 to  1851      80 years                                                                                    Series  13

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1810 1849   -8   -.13 -.07  .34*-.15  .05  .21 -.22  .15  .16  .17  .25| .13 -.04    -    -    -    -    -    -    -    -
    1812 1851   -8   -.14 -.08  .35*-.15  .04  .18 -.23  .11  .15  .12  .22|   -    -    -    -    -    -    -    -    -    -

 [B] Entire series, effect on correlation (  .379) is:
      Lower   1847< -.090   1848> -.041   1839> -.026   1840< -.026   1772< -.019   1773> -.015  Higher   1819  .046   1774  .027
    1810 to 1849 segment:
      Lower   1847< -.146   1848> -.061   1840< -.043   1839> -.036   1822< -.021   1842> -.014  Higher   1819  .097   1827  .058
    1812 to 1851 segment:
      Lower   1847< -.143   1848> -.064   1840< -.041   1839> -.039   1822< -.020   1842> -.016  Higher   1819  .102   1827  .066
```

```
 [C] Year-to-year changes diverging by over 4.0 std deviations:
      1847 1848   4.4 SD

==================================================================================================================================

 CC2E04B   1752 to  1851     100 years                                                                                    Series  14

 [B] Entire series, effect on correlation (  .596) is:
      Lower   1841> -.025   1810< -.021   1826< -.019   1839> -.015   1757< -.012   1811< -.012  Higher   1774  .031   1842  .022

==================================================================================================================================

 CC2W03A   1754 to  1851      98 years                                                                                    Series  15

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1800 1839    2   -.20  .01 -.04  .26 -.27  .07 -.24  .16  .02  .14  .38|-.02  .39*-.06  .04 -.11 -.24  .01 -.09 -.05 -.05
   1810 1849   -7   -.16  .12  .03  .37*-.26  .14 -.21  .03 -.06 -.13  .37|-.08  .28    -    -    -    -    -    -    -    -

 [B] Entire series, effect on correlation (  .427) is:
      Lower   1755> -.027   1832> -.025   1846< -.020   1829< -.015   1814> -.015   1761> -.014  Higher   1774  .057   1821  .025
    1800 to 1839 segment:
      Lower   1832> -.065   1829< -.039   1814> -.032   1828> -.023   1800> -.022   1815< -.022  Higher   1821  .067   1839  .035
    1810 to 1849 segment:
      Lower   1832> -.056   1846< -.048   1829< -.036   1814> -.026   1815< -.021   1828> -.020  Higher   1821  .057   1839  .032

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1832 +3.4 SD
==================================================================================================================================

 CC2W04A   1774 to  1851      78 years                                                                                    Series  16

 [B] Entire series, effect on correlation (  .740) is:
      Lower   1808< -.024   1821> -.014   1832< -.014   1841> -.010   1813> -.007   1834< -.007  Higher   1814  .019   1827  .015

==================================================================================================================================

 CC2W04B   1766 to  1850      85 years                                                                                    Series  17

 [B] Entire series, effect on correlation (  .634) is:
      Lower   1773< -.033   1790> -.025   1816< -.021   1783< -.015   1841> -.013   1804> -.012  Higher   1814  .033   1774  .029

==================================================================================================================================

 CC2W05A   1777 to  1851      75 years                                                                                    Series  18

 [B] Entire series, effect on correlation (  .462) is:
      Lower   1828< -.053   1819> -.051   1779> -.028   1806> -.017   1782< -.010   1830< -.008  Higher   1814  .055   1839  .030
```

```
 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
       1819 +3.1 SD;    1828 -5.6 SD
==================================================================================================================================

 CC2W05B   1746 to  1850     105 years                                                                                  Series  19

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
     ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1746 1785   -1      -    -    -    -    -  .15 -.11  .00 -.07  .26* .26|-.06 -.28 -.25  .13  .10  .05 -.10 -.29 -.07 -.13
    1750 1789    0      -  .10 -.25  .00  .05  .31 -.01 -.15 -.03  .29  .32*-.03 -.22 -.26 -.03  .05  .05 -.08 -.29  .02 -.06

 [B] Entire series, effect on correlation (  .528) is:
       Lower   1819> -.041   1770< -.034   1774> -.026   1753< -.023   1748> -.013   1806> -.012  Higher   1814  .044   1839  .029
     1746 to 1785 segment:
       Lower   1770< -.083   1753< -.053   1774> -.052   1748> -.032   1761< -.022   1762< -.017  Higher   1779  .092   1755  .054
     1750 to 1789 segment:
       Lower   1770< -.088   1774> -.062   1753< -.056   1761< -.022   1762< -.019   1752> -.016  Higher   1779  .093   1755  .057

==================================================================================================================================

 CC2W06A   1752 to  1851     100 years                                                                                  Series  20

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
     ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1752 1791    1    .22 -.36 -.27 -.06  .23  .29  .05 -.24 -.22  .00  .31| .41* .08 -.31 -.34  .13  .14  .07  .08 -.21 -.09
    1760 1799   -5    .02 -.34 -.22 -.10  .42  .45* .12 -.42 -.33 -.10  .06| .22  .15 -.07 -.06  .06  .03  .10  .23 -.34  .01
    1770 1809   -6   -.08 -.28 -.17 -.07  .42* .39  .14 -.45 -.14 -.25  .14| .12  .09 -.13 -.07  .08  .14  .07  .24 -.38  .00
    1780 1819   -5    .03 -.29 -.09  .00  .34  .36* .13 -.38 -.12 -.33  .16| .08  .03  .04 -.14 -.05  .02  .06  .31 -.27  .10
    1790 1829    8   -.13 -.20 -.11  .18  .17  .23  .03 -.30  .07 -.40  .24| .04  .13  .06 -.01 -.06 -.12  .09  .28*-.27  .06

 [B] Entire series, effect on correlation (  .367) is:
       Lower   1796< -.157   1772< -.020   1771< -.014   1791> -.014   1759< -.013   1754< -.011  Higher   1842  .031   1774  .024
     1752 to 1791 segment:
       Lower   1772< -.067   1771< -.047   1759< -.046   1791> -.043   1754< -.037   1767> -.027  Higher   1774  .101   1779  .079
     1760 to 1799 segment:
       Lower   1796< -.315   1772< -.035   1791> -.028   1771< -.026   1767> -.017   1792> -.017  Higher   1774  .110   1779  .086
     1770 to 1809 segment:
       Lower   1796< -.292   1772< -.031   1791> -.030   1771< -.023   1792> -.021   1804> -.011  Higher   1774  .080   1779  .063
     1780 to 1819 segment:
       Lower   1796< -.339   1791> -.030   1792> -.020   1804> -.010   1808< -.008   1811< -.007  Higher   1819  .065   1814  .063
     1790 to 1829 segment:
       Lower   1796< -.328   1791> -.026   1792> -.017   1808< -.010   1804> -.009   1811< -.008  Higher   1819  .052   1814  .048

 [C] Year-to-year changes diverging by over 4.0 std deviations:
       1795 1796  -5.1 SD

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1796 -7.6 SD
==================================================================================================================================
```

CC2W06B 1757 to 1851 95 years Series 21

[B] Entire series, effect on correlation (.648) is:
Lower 1808< -.024 1798> -.009 1828> -.009 1786< -.009 1849> -.008 1838< -.007 Higher 1774 .020 1827 .014

PART 7: DESCRIPTIVE STATISTICS: CCMTR 21:45 Tue 11 Aug 2009 Page 6

						Corr	//-------- Unfiltered --------\\				//---- Filtered -----\\				
			No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr	()
1	CC1N02A	1794 1850	57	4	0	.477	2.52	7.48	1.380	.745	.313	2.61	.534	-.067	1
2	CC1N03A	1778 1851	74	6	0	.541	1.25	3.30	.642	.525	.387	2.72	.528	.055	1
3	CC1N04A	1760 1851	92	7	0	.574	1.71	3.53	.709	.620	.274	2.78	.374	-.018	1
4	CC1S01A	1775 1825	51	3	0	.752	2.20	4.01	.711	.450	.273	2.80	.541	.053	3
5	CC1S03A	1765 1851	87	7	0	.734	1.46	4.27	.962	.842	.268	2.58	.405	-.013	1
6	CC1S03B	1764 1851	88	7	0	.681	1.53	3.98	1.010	.790	.322	2.87	.499	-.024	1
7	CC1S05A	1778 1851	74	6	0	.485	2.07	6.22	1.462	.858	.295	2.69	.517	-.057	1
8	CC1S06A	1765 1851	87	7	3	.409	1.67	3.37	.696	.759	.234	2.73	.473	-.006	1
9	CC1E03A	1749 1851	103	9	1	.577	1.98	5.09	.855	.640	.278	2.83	.476	.021	1
10	CC1E03B	1745 1850	106	9	2	.562	2.12	5.98	.963	.482	.325	2.78	.458	.008	1
11	CC2N03A	1756 1851	96	8	0	.694	1.91	4.93	.803	.565	.329	2.62	.397	-.039	1
12	CC2N04A	1741 1851	111	9	0	.608	1.97	5.71	.793	.255	.375	2.87	.471	.018	1
13	CC2N05A	1772 1851	80	6	2	.379	1.76	7.12	1.067	.309	.346	2.71	.493	-.047	1
14	CC2E04B	1752 1851	100	8	0	.596	1.57	3.96	.934	.742	.305	2.60	.393	-.044	1
15	CC2W03A	1754 1851	98	8	2	.427	1.75	4.64	.958	.780	.264	2.78	.494	.051	1
16	CC2W04A	1774 1851	78	6	0	.740	1.37	2.98	.532	.424	.309	2.75	.453	-.024	1
17	CC2W04B	1766 1850	85	7	0	.634	1.57	4.02	.689	.548	.314	2.89	.509	.050	1
18	CC2W05A	1777 1851	75	6	0	.462	1.67	3.04	.520	.611	.252	2.47	.354	-.049	2
19	CC2W05B	1746 1850	105	9	2	.528	1.68	3.98	.638	.554	.290	2.74	.518	-.097	2
20	CC2W06A	1752 1851	100	8	5	.367	1.77	4.41	.818	.444	.360	2.57	.397	-.025	1
21	CC2W06B	1757 1851	95	8	0	.648	1.76	3.92	.712	.529	.320	2.75	.539	.019	1
Total or mean:			1842	148	17	.564	1.77	7.48	.843	.590	.307	2.89	.464	-.011	

- = [COFECHA CCMTRCOF] = -

Appendix VIII. Final interseries correlation for Tipton-Haynes provided by COFECHA.

```
[]  Dendrochronology Program Library                                        Run THMTR  Program COF  00:01  Fri 14 Aug 2009  Page   1
[]
[]  P R O G R A M      C O F E C H A                                                                        Version 6.06P    27256
------------------------------------------------------------------------------------------------------------------------------------

 QUALITY CONTROL AND DATING CHECK OF TREE-RING MEASUREMENTS

 Title of run:           THMTR

 File of DATED series:   THFinalDates.txt

 CONTENTS:

    Part 1:  Title page, options selected, summary, absent rings by series
    Part 2:  Histogram of time spans
    Part 3:  Master series with sample depth and absent rings by year
    Part 4:  Bar plot of Master Dating Series
    Part 5:  Correlation by segment of each series with Master
    Part 6:  Potential problems: low correlation, divergent year-to-year changes, absent rings, outliers
    Part 7:  Descriptive statistics

 RUN CONTROL OPTIONS SELECTED                             VALUE

         1  Cubic smoothing spline 50% wavelength cutoff for filtering
                                                            32 years
         2  Segments examined are                           40 years lagged successively by  10 years
         3  Autoregressive model applied                     A  Residuals are used in master dating series and testing
         4  Series transformed to logarithms                 Y  Each series log-transformed for master dating series and testing
         5  CORRELATION is Pearson (parametric, quantitative)
            Critical correlation, 99% confidence level   .3665
         6  Master dating series saved                       N
         7  Ring measurements listed                         N
         8  Parts printed                               1234567
         9  Absent rings are omitted from master series and segment correlations  (Y)

 Time span of Master dating series is  1714 to  1851   138 years
 Continuous time span is               1714 to  1851   138 years
 Portion with two or more series is    1729 to  1851   123 years
```

```
****************************************
*C* Number of dated series        38 *C*
*O* Master series 1714 1851  138 yrs *O*
*F* Total rings in all series   2846 *F*
*E* Total dated rings checked   2831 *E*
*C* Series intercorrelation     .567 *C*
*H* Average mean sensitivity    .263 *H*
*A* Segments, possible problems   29 *A*
*** Mean length of series       74.9 ***
****************************************
```

ABSENT RINGS listed by SERIES: (See Master Dating Series for absent rings listed by year)

No ring measurements of zero value

PART 2: TIME PLOT OF TREE-RING SERIES: THMTR   00:01 Fri 14 Aug 2009 Page   2

```
---------------------------------------------------------------------------------------------------------------------------------------
  1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 Ident    Seq Time-span  Yrs
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    : -------- --- ---- ---- ----
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03A      1 1751 1798   48
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP03B      2 1754 1798   45
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . BP04A      3 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP05A      4 1755 1798   44
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . BP05B      5 1750 1798   49
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    .    .    . BP06A      6 1741 1798   58
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . BP06B      7 1733 1795   63
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . UPB01      8 1739 1798   60
   .    .    .    .    .    .    .    .    .    .    .    .    .    .<=======>.    .    .    .    .    . UPB02      9 1714 1798   85
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC01E     10 1735 1799   65
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . PC03E     11 1752 1799   48
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <===>.    .    .    .    .    . PC04E     12 1753 1799   47
   .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    .    . PC01W     13 1729 1798   70
   .    .    .    .    .    .    .    .    .    .    .    .    .    . <======>.    .    .    .    .    . PC02W     14 1729 1799   71
   .    .    .    .    .    .    .    .    .    .    .    .    .    .  <=====>.    .    .    .    .    . PC03W     15 1730 1799   70
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=======> .    .    .    .    . FLOOR04   16 1758 1821   64
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <====>.    .    .    .    .    . FLOOR05   17 1742 1798   57
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .   <=====>    .    .    .    . CC1N02A   18 1794 1850   57
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC1N03A   19 1778 1851   74
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1N04A   20 1760 1851   92
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <====>  .    .    .    .    . CC1S01A   21 1775 1825   51
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03A   22 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S03B   23 1764 1851   88
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC1S05A   24 1778 1851   74
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC1S06A   25 1765 1851   87
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC1E03A   26 1749 1851  103
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC1E03B   27 1745 1850  106
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2N03A   28 1756 1851   96
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2N04A   29 1741 1851  111
```

```
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2N05A   30 1772 1851   80
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2E04B   31 1752 1851  100
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W03A   32 1754 1851   98
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2W04A   33 1774 1851   78
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    .<========>    .    .    .    . CC2W04B   34 1766 1850   85
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    . <=======>    .    .    .    . CC2W05A   35 1777 1851   75
   .    .    .    .    .    .    .    .    .    .    .    .    .    .   <==========>    .    .    .    . CC2W05B   36 1746 1850  105
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W06A   37 1752 1851  100
   .    .    .    .    .    .    .    .    .    .    .    .    .    .    <=========>    .    .    .    . CC2W06B   38 1757 1851   95
   :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :    :
1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050
```

PART 3: Master Dating Series: THMTR   00:01 Fri 14 Aug 2009 Page   3

Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab	Year	Value	No Ab
			1750	1.135	15	1800	-1.007	22	1850	.036	20						
			1751	-.216	16	1801	.122	22	1851	.717	16						
			1752	-1.163	19	1802	.246	22									
			1753	.419	20	1803	-.382	22									
			1754	.794	22	1804	-1.416	22									
			1755	-1.178	23	1805	1.416	22									
			1756	-.427	24	1806	-.304	22									
			1757	.610	25	1807	.765	22									
			1758	.227	26	1808	.216	22									
			1759	.317	26	1809	1.084	22									
			1760	-1.632	27	1810	1.484	22									
			1761	.290	27	1811	.361	22									
			1762	-.029	27	1812	-.561	22									
			1763	.353	27	1813	-.869	22									
1714	-1.422	1	1764	.603	28	1814	-2.659	22									
1715	-1.098	1	1765	.422	30	1815	-.201	22									
1716	2.174	1	1766	-.104	31	1816	.283	22									
1717	.680	1	1767	-.237	31	1817	.048	22									
1718	-.657	1	1768	.580	31	1818	.193	22									
1719	.986	1	1769	.509	31	1819	-1.956	22									
1720	-1.021	1	1770	1.034	31	1820	-.232	22									
1721	2.265	1	1771	1.209	31	1821	-1.558	22									
1722	1.213	1	1772	.339	32	1822	-.218	21									
1723	.708	1	1773	-.367	32	1823	.578	21									
1724	-1.440	1	1774	-3.704	33	1824	1.399	21									
1725	-.830	1	1775	-.952	34	1825	.775	21									
1726	-.297	1	1776	.109	34	1826	.108	20									
1727	1.754	1	1777	.827	35	1827	2.260	20									
1728	1.587	1	1778	.008	37	1828	-.592	20									
1729	.952	3	1779	-1.913	37	1829	.261	20									

```
  1730   .122   4       1780  -.281  37       1830   .605  20
  1731  -.999   4       1781   .549  37       1831  -.012  20
  1732 -2.069   4       1782  1.235  37       1832  -.595  20
  1733  -.558   5       1783   .413  37       1833   .425  20
  1734   .761   5       1784  -.202  37       1834   .376  20
  1735  -.010   6       1785 -1.046  37       1835   .079  20
  1736  -.351   6       1786   .355  37       1836   .395  20
  1737   .033   6       1787   .777  37       1837  -.195  20
  1738   .159   6       1788   .981  37       1838  -.191  20
  1739  -.321   8       1789   .402  37       1839 -2.372  20

  1740   .084   8       1790 -1.164  37       1840   .845  20
  1741   .376  10       1791 -1.149  37       1841 -1.111  20
  1742  1.700  11       1792  -.490  37       1842 -2.686  20
  1743 -1.692  11       1793   .638  37       1843   .918  20
  1744  -.677  11       1794   .167  38       1844  -.166  20
  1745   .071  12       1795   .364  38       1845  1.088  20
  1746   .864  13       1796  1.393  37       1846   .547  20
  1747   .257  13       1797   .245  37       1847   .814  20
  1748 -1.275  13       1798  -.308  37       1848  -.773  20
  1749  -.080  14       1799  -.620  27       1849  -.464  20
-------------------------------------------------------------------------------------------------------------------------------------
PART 4:  Master Bar Plot: THMTR                                                                   00:01  Fri 14 Aug 2009  Page   4
-------------------------------------------------------------------------------------------------------------------------------------
   Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value  Year Rel value
                   1750---------E  1800-d          1850-----@
                   1751---a        1801-----@      1851--------C
                   1752-e          1802------A
                   1753-------B    1803---b
                   1754--------C   1804-f
                   1755-e          1805----------F
                   1756---b        1806---a
                   1757--------B   1807--------C
                   1758------A     1808-----A
                   1759------A     1809---------D
                   1760g           1810----------F
                   1761------A     1811------A
                   1762----@       1812--b
                   1763------A     1813-c
   1714-f          1764--------B   1814k
   1715-d          1765-------B    1815---a
   1716----------I 1766----@       1816------A
   1717--------C   1767---a        1817-----@
   1718--c         1768--------B   1818-----A
   1719---------D  1769-------B    1819h
   1720-d          1770---------D  1820---a
   1721----------I 1771---------E  1821f
   1722---------E  1772------A     1822---a
   1723--------C   1773---a        1823--------B
   1724-f          1774o           1824----------F
```

```
   1725--c         1775-d          1825--------C
   1726---a        1776-----@      1826-----@
   1727----------G 1777--------C   1827----------I
   1728----------F 1778----@       1828--b
   1729---------D  1779h           1829------A
   1730-----@      1780---a        1830--------B
   1731-d          1781-------B    1831----@
   1732h           1782---------E  1832--b
   1733--b         1783-------B    1833-------B
   1734--------C   1784---a        1834-------B
   1735----@       1785-d          1835-----@
   1736---a        1786------A     1836-------B
   1737-----@      1787--------C   1837---a
   1738-----A      1788---------D  1838---a
   1739---a        1789-------B    1839i
   1740-----@      1790-e          1840--------C
   1741-------B    1791-e          1841-d
   1742----------G 1792--b         1842k
   1743g           1793--------C   1843---------D
   1744--c         1794-----A      1844----a
   1745-----@      1795------A     1845---------D
   1746---------C  1796----------F 1846-------B
   1747------A     1797------A     1847--------C
   1748-e          1798---a        1848--c
   1749----@       1799--b         1849--b
```

```
PART 5:  CORRELATION OF SERIES BY SEGMENTS: THMTR                                                  00:01  Fri 14 Aug 2009  Page   5
-------------------------------------------------------------------------------------------------------------------------------------
 Correlations of  40-year dated segments, lagged  10 years
 Flags:  A = correlation under   .3665 but highest as dated;  B = correlation higher at other than dated position

 Seq Series  Time_span   1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820
                         1759 1769 1779 1789 1799 1809 1819 1829 1839 1849 1859
 --- -------- ---------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
   1 BP03A    1751 1798                 .84  .81
   2 BP03B    1754 1798                 .67  .64
   3 BP04A    1739 1798       .50  .47  .43  .57
   4 BP05A    1755 1798                 .48  .46
   5 BP05B    1750 1798                 .81  .72
   6 BP06A    1741 1798            .72  .67  .70
   7 BP06B    1733 1795       .45  .72  .80  .75
   8 UPB01    1739 1798       .53  .50  .49  .38
   9 UPB02    1714 1798   .51  .54  .79  .74  .70
  10 PC01E    1735 1799       .59  .63  .50  .48
  11 PC03E    1752 1799                 .65  .62
  12 PC04E    1753 1799                 .85  .81
  13 PC01W    1729 1798   .31B .31B .77  .82  .76
  14 PC02W    1729 1799   .63  .62  .86  .88  .86
```

```
 15 PC03W    1730 1799        .61  .85  .85  .84
 16 FLOOR04  1758 1821                  .69  .73  .72  .32A .19B
 17 FLOOR05  1742 1798             .52  .55  .46
 18 CC1N02A  1794 1850                                      .56  .59  .56  .49
 19 CC1N03A  1778 1851                            .52  .54  .65  .58  .59  .58
 20 CC1N04A  1760 1851                       .24B .32A .53  .62  .65  .65  .62
 21 CC1S01A  1775 1825                            .74  .76  .78
 22 CC1S03A  1765 1851                       .85  .84  .76  .71  .68  .69  .68
 23 CC1S03B  1764 1851                       .81  .81  .73  .66  .67  .62  .60
 24 CC1S05A  1778 1851                            .54  .49  .57  .61  .54  .49
 25 CC1S06A  1765 1851                       .10B .18B .25B .44  .63  .63  .61
 26 CC1E03A  1749 1851             .32B .32B .31B .48  .75  .72  .72  .62  .62
 27 CC1E03B  1745 1850             .15B .16B .27A .46  .75  .77  .64  .62  .61
 28 CC2N03A  1756 1851                  .82  .85  .87  .77  .77  .69  .60  .60
 29 CC2N04A  1741 1851             .56  .74  .77  .74  .69  .67  .67  .70  .68
 30 CC2N05A  1772 1851                            .59  .68  .66  .57  .25B .22B
 31 CC2E04B  1752 1851                  .65  .75  .78  .57  .53  .47  .50  .57
 32 CC2W03A  1754 1851                  .59  .68  .67  .46  .45  .38B .36A .36A
 33 CC2W04A  1774 1851                            .54  .69  .70  .69  .75  .75
 34 CC2W04B  1766 1850                       .52  .54  .54  .63  .75  .76  .76
 35 CC2W05A  1777 1851                            .52  .43  .46  .45  .48  .49
 36 CC2W05B  1746 1850             .10B .16B .31A .36A .58  .63  .62  .65  .64
 37 CC2W06A  1752 1851                  .33B .16B .23B .21B .28A .64  .75  .76
 38 CC2W06B  1757 1851                  .64  .61  .52  .49  .61  .60  .70  .69
Av segment correlation   .48  .52  .57  .62  .60  .57  .57  .59  .61  .60  .59
```

```
PART 6:  POTENTIAL PROBLEMS: THMTR                                                                 00:01  Fri 14 Aug 2009  Page   5
------------------------------------------------------------------------------------------------------------------------------------

 For each series with potential problems the following diagnostics may appear:

 [A] Correlations with master dating series of flagged  40-year segments of series filtered with  32-year spline,
     at every point from ten years earlier (-10) to ten years later (+10) than dated

 [B] Effect of those data values which most lower or raise correlation with master series
     Symbol following year indicates value in series is greater (>) or lesser (<) than master series value

 [C] Year-to-year changes very different from the mean change in other series

 [D] Absent rings (zero values)

 [E] Values which are statistical outliers from mean for the year
====================================================================================================================================

 BP03A     1751 to  1798      48 years                                                                                  Series   1

 [B] Entire series, effect on correlation (  .796) is:
       Lower   1794< -.029   1762< -.015   1756> -.011   1751> -.009   1792> -.008   1787< -.007  Higher   1774  .136   1760  .019
```

```
====================================================================================================================================

 BP03B     1754 to  1798      45 years                                                                                  Series   2

 [B] Entire series, effect on correlation (  .658) is:
       Lower   1762< -.078   1794< -.029   1779> -.026   1764< -.022   1790> -.014   1788< -.013  Higher   1774  .148   1760  .034

====================================================================================================================================

 BP04A     1739 to  1798      60 years                                                                                  Series   3

 [B] Entire series, effect on correlation (  .513) is:
       Lower   1752< -.076   1760> -.022   1779> -.021   1764< -.013   1742< -.012   1740> -.009  Higher   1743  .045   1774  .039

====================================================================================================================================

 BP05A     1755 to  1798      44 years                                                                                  Series   4

 [B] Entire series, effect on correlation (  .453) is:
       Lower   1761< -.086   1760> -.075   1797< -.038   1779> -.032   1762> -.016   1787< -.013  Higher   1774  .367   1796  .018

 [C] Year-to-year changes diverging by over 4.0 std deviations:
       1760 1761  -4.7 SD

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1760 +3.3 SD
====================================================================================================================================

 BP05B     1750 to  1798      49 years                                                                                  Series   5

 [B] Entire series, effect on correlation (  .712) is:
       Lower   1790> -.047   1779> -.029   1797< -.023   1792> -.016   1780> -.011   1753< -.010  Higher   1774  .237   1760  .014

====================================================================================================================================

 BP06A     1741 to  1798      58 years                                                                                  Series   6

 [B] Entire series, effect on correlation (  .651) is:
       Lower   1779> -.039   1754< -.026   1798> -.018   1795< -.018   1758> -.017   1741< -.015  Higher   1774  .211   1743  .021

====================================================================================================================================

 BP06B     1733 to  1795      63 years                                                                                  Series   7

 [B] Entire series, effect on correlation (  .590) is:
       Lower   1790> -.043   1738< -.038   1740< -.020   1794< -.019   1748> -.016   1754< -.015  Higher   1774  .179   1760  .033

====================================================================================================================================

 UPB01     1739 to  1798      60 years                                                                                  Series   8
```

```
[B] Entire series, effect on correlation (  .449) is:
      Lower   1779> -.034   1790> -.012   1776< -.011   1795< -.011   1770< -.009   1759< -.008  Higher   1774  .055   1743  .029

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1743 -5.6 SD
=====================================================================================================================================

UPB02     1714 to  1798      85 years                                                                                    Series   9

[*] Early part of series cannot be checked from 1714 to 1728 -- not matched by another series

[B] Entire series, effect on correlation (  .628) is:
      Lower   1730< -.045   1779> -.021   1729< -.015   1738< -.015   1759< -.014   1732> -.012  Higher   1774  .148   1743  .029

=====================================================================================================================================

PC01E     1735 to  1799      65 years                                                                                    Series  10

[B] Entire series, effect on correlation (  .488) is:
      Lower   1781< -.052   1737< -.025   1751< -.024   1784> -.019   1740< -.018   1735> -.009  Higher   1774  .092   1743  .033

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1784 +3.7 SD
=====================================================================================================================================

PC03E     1752 to  1799      48 years                                                                                    Series  11

[B] Entire series, effect on correlation (  .619) is:
      Lower   1774> -.030   1760< -.017   1763< -.011   1796< -.009   1787< -.009   1798< -.007  Higher   1779  .030   1770  .009

=====================================================================================================================================

PC04E     1753 to  1799      47 years                                                                                    Series  12

[B] Entire series, effect on correlation (  .813) is:
      Lower   1796< -.031   1792> -.014   1787< -.011   1793> -.007   1777< -.006   1767> -.005  Higher   1774  .131   1779  .017

=====================================================================================================================================

PC01W     1729 to  1798      70 years                                                                                    Series  13

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1729 1768    4   -.14  .01  .21  .27 -.15 -.18  .03  .06  .02  .00  .31|-.13 -.15 -.29  .54* .02 -.21 -.18  .00  .15 -.20
   1730 1769    4   -.17  .01  .19  .25 -.16 -.14  .04  .06 -.02 -.03  .31|-.11 -.12 -.26  .54*-.07 -.21 -.17  .02  .15 -.23

[B] Entire series, effect on correlation (  .528) is:
      Lower   1739< -.145   1796< -.027   1743> -.022   1762< -.009   1734< -.008   1776< -.007  Higher   1774  .160   1760  .031
    1729 to 1768 segment:
```

```
      Lower   1739< -.249   1743> -.028   1734< -.013   1762< -.008   1755> -.007   1736> -.006  Higher   1760  .099   1742  .033
    1730 to 1769 segment:
      Lower   1739< -.250   1743> -.028   1734< -.012   1762< -.008   1755> -.007   1736> -.006  Higher   1760  .100   1742  .034

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1739 -5.3 SD
==================================================================================================================================

 PC02W     1729 to  1799      71 years                                                                                    Series  14

 [B] Entire series, effect on correlation (  .773) is:
      Lower   1739> -.016   1733< -.011   1743> -.010   1762< -.007   1745< -.007   1731> -.007  Higher   1774  .121   1760  .014

==================================================================================================================================

 PC03W     1730 to  1799      70 years                                                                                    Series  15

 [B] Entire series, effect on correlation (  .750) is:
      Lower   1739> -.016   1730> -.015   1796< -.015   1745< -.013   1731> -.012   1776< -.009  Higher   1774  .137   1760  .016

==================================================================================================================================

 FLOOR04   1758 to  1821      64 years                                                                                    Series  16

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1780 1819    0   -.05  .29 -.26  .11 -.16  .08 -.21 -.16 -.26  .14  .32* .31  .09 -.14 -.21 -.21  .19 -.01  .00  .01 -.12
   1782 1821    1   -.09  .23 -.25  .01 -.02  .08 -.22 -.15 -.36  .22  .19| .33* .11 -.08 -.19 -.21  .27 -.13  .04  .03 -.11

 [B] Entire series, effect on correlation (  .457) is:
      Lower   1814> -.077   1821> -.070   1759< -.029   1815< -.013   1779> -.009   1807< -.008  Higher   1774  .290   1796  .017
    1780 to 1819 segment:
      Lower   1814> -.166   1815< -.027   1807< -.017   1789< -.015   1791> -.008   1797< -.008  Higher   1796  .046   1810  .038
    1782 to 1821 segment:
      Lower   1814> -.123   1821> -.123   1815< -.023   1807< -.015   1789< -.013   1820< -.008  Higher   1796  .052   1810  .043

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
      1814 +3.3 SD;    1821 +3.8 SD
==================================================================================================================================

 FLOOR05   1742 to  1798      57 years                                                                                    Series  17

 [B] Entire series, effect on correlation (  .403) is:
      Lower   1793< -.044   1749< -.027   1760> -.023   1786< -.020   1792> -.018   1750< -.017  Higher   1774  .155   1779  .054

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1792 +3.3 SD
==================================================================================================================================
```

```
 CC1N02A   1794 to  1850      57 years                                                                                    Series  18

 [B] Entire series, effect on correlation (  .473) is:
       Lower   1850< -.039   1848> -.028   1806> -.024   1840< -.018   1826< -.015   1807< -.015  Higher   1819  .065   1839  .024

====================================================================================================================================

 CC1N03A   1778 to  1851      74 years                                                                                    Series  19

 [B] Entire series, effect on correlation (  .522) is:
       Lower   1785> -.036   1823< -.033   1832> -.026   1782< -.020   1788< -.013   1828> -.013  Higher   1814  .060   1827  .022

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1785 +3.3 SD
====================================================================================================================================

 CC1N04A   1760 to  1851      92 years                                                                                    Series  20

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1760 1799   -5    .18  .02 -.21 -.13 -.03  .35* .02 -.07 -.06  .34  .24| .07 -.18 -.47 -.03 -.01  .20  .14 -.09  .05 -.10
    1770 1809    0    .20  .09 -.26 -.14  .11  .21  .02  .03 -.02  .17  .32* .04 -.20 -.33  .01  .03  .06 -.10  .16  .01 -.01

 [B] Entire series, effect on correlation (  .486) is:
       Lower   1774> -.071   1770< -.018   1833< -.012   1830< -.009   1851< -.008   1793< -.008  Higher   1839  .051   1827  .023
     1760 to 1799 segment:
       Lower   1774> -.137   1770< -.042   1793< -.018   1762> -.013   1777< -.011   1788< -.010  Higher   1779  .061   1760  .044
     1770 to 1809 segment:
       Lower   1774> -.145   1770< -.044   1793< -.020   1777< -.013   1788< -.012   1776< -.011  Higher   1779  .054   1805  .051

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1774 +3.9 SD
====================================================================================================================================

 CC1S01A   1775 to  1825      51 years                                                                                    Series  21

 [B] Entire series, effect on correlation (  .787) is:
       Lower   1800> -.023   1795< -.014   1794< -.011   1809< -.010   1812> -.009   1778< -.008  Higher   1819  .033   1779  .023

====================================================================================================================================

 CC1S03A   1765 to  1851      87 years                                                                                    Series  22

 [B] Entire series, effect on correlation (  .751) is:
       Lower   1832> -.017   1814> -.011   1825< -.009   1841> -.008   1826> -.008   1833< -.008  Higher   1774  .034   1819  .014

====================================================================================================================================
```

```
 CC1S03B   1764 to  1851      88 years                                                                                    Series  23

 [B] Entire series, effect on correlation (  .703) is:
       Lower   1832> -.027   1828> -.024   1826> -.009   1842> -.009   1847> -.008   1837< -.008  Higher   1774  .050   1839  .027

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1832 +3.1 SD
====================================================================================================================================

 CC1S05A   1778 to  1851      74 years                                                                                    Series  24

 [B] Entire series, effect on correlation (  .492) is:
       Lower   1842> -.073   1798< -.019   1851< -.017   1808< -.016   1849< -.014   1834< -.009  Higher   1779  .036   1827  .026

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1842 +4.2 SD
====================================================================================================================================

 CC1S06A   1765 to  1851      87 years                                                                                    Series  25

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1765 1804    5   -.26 -.11 -.16  .26  .32  .11 -.10 -.17  .06  .16  .10|-.30 -.32  .05 -.02  .44* .18 -.09 -.07 -.16  .03
    1770 1809   -6   -.22 -.18 -.23  .27  .35* .12 -.08 -.13  .03  .15  .18|-.22 -.22  .05 -.05  .26  .00 -.13  .02 -.11 -.08
    1780 1819   -1   -.17 -.18 -.22  .18  .29  .00 -.10 -.10  .05  .33* .25|-.07 -.07 -.13  .00  .20  .10 -.02 -.08 -.12 -.15

 [B] Entire series, effect on correlation (  .392) is:
       Lower   1786< -.033   1771< -.032   1780< -.025   1843< -.021   1774> -.019   1769< -.014  Higher   1839  .069   1827  .022
     1765 to 1804 segment:
       Lower   1771< -.056   1786< -.052   1780< -.028   1769< -.022   1791> -.021   1768< -.018  Higher   1779  .053   1774  .046
     1770 to 1809 segment:
       Lower   1771< -.060   1786< -.059   1780< -.036   1791> -.021   1795< -.019   1803> -.014  Higher   1779  .051   1805  .030
     1780 to 1819 segment:
       Lower   1786< -.074   1780< -.048   1791> -.031   1795< -.022   1803> -.020   1804> -.018  Higher   1810  .045   1805  .038

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
       1774 +3.0 SD
====================================================================================================================================

 CC1E03A   1749 to  1851     103 years                                                                                    Series  26

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1749 1788   -5    .07  .02 -.06 -.12  .06  .42* .11 -.28 -.27  .19  .32|-.20 -.40 -.24  .23  .21  .20  .05 -.27 -.11 -.01
    1750 1789   -5    .08  .02 -.07 -.15  .09  .42* .11 -.30 -.28  .20  .32|-.21 -.39 -.22  .21  .20  .22  .04 -.27 -.11 -.01
    1760 1799   -5    .02 -.12 -.18  .02  .21  .33*-.09 -.33 -.19  .21  .31|-.05 -.32 -.32  .03  .19  .26 -.11 -.21 -.15  .05

 [B] Entire series, effect on correlation (  .512) is:
       Lower   1774> -.041   1770< -.020   1760> -.019   1761< -.014   1753< -.012   1803> -.011  Higher   1814  .041   1779  .022
```

```
    1749 to 1788 segment:
      Lower   1774> -.053   1770< -.052   1760> -.041   1761< -.035   1753< -.031   1768< -.022  Higher   1779  .107   1752  .025
    1750 to 1789 segment:
      Lower   1774> -.055   1770< -.051   1760> -.042   1761< -.035   1753< -.030   1768< -.022  Higher   1779  .107   1750  .026
    1760 to 1799 segment:
      Lower   1774> -.064   1770< -.050   1760> -.044   1761< -.034   1768< -.021   1772> -.012  Higher   1779  .107   1790  .028

====================================================================================================================================

 CC1E03B   1745 to  1850     106 years                                                                                    Series  27

 [A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
    ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
    1745 1784    4   -.05 -.08  .10  .01  .00  .20  .04 -.24 -.29  .18  .15|-.02 -.49 -.15  .36* .24  .26 -.09  .03 -.17  .00
    1750 1789    6   -.02 -.10  .03 -.01  .15  .24 -.08 -.30 -.27  .26  .16|-.12 -.47 -.12  .28  .22  .41*-.07 -.07 -.14  .03
    1760 1799    0    .06 -.12 -.07  .00  .19  .25 -.30 -.37 -.17  .24  .27*-.03 -.42 -.15  .10  .23  .16 -.05 -.10  .02  .07

 [B] Entire series, effect on correlation (  .476) is:
      Lower   1774> -.054   1760> -.019   1835> -.016   1754< -.014   1770< -.013   1768< -.012  Higher   1842  .040   1814  .029
    1745 to 1784 segment:
      Lower   1774> -.044   1754< -.035   1760> -.032   1770< -.032   1768< -.030   1771< -.030  Higher   1779  .096   1752  .030
    1750 to 1789 segment:
      Lower   1774> -.054   1760> -.037   1754< -.034   1770< -.031   1768< -.030   1771< -.029  Higher   1779  .100   1752  .032
    1760 to 1799 segment:
      Lower   1774> -.103   1760> -.040   1770< -.035   1768< -.034   1771< -.033   1761< -.013  Higher   1779  .084   1790  .052

 [E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
      1774 +3.3 SD;    1835 +3.1 SD
====================================================================================================================================

 CC2N03A   1756 to  1851      96 years                                                                                    Series  28

 [B] Entire series, effect on correlation (  .701) is:
      Lower   1848> -.027   1839> -.024   1847< -.012   1816< -.008   1846< -.008   1757< -.006  Higher   1774  .046   1779  .010

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1842 -4.7 SD
====================================================================================================================================

 CC2N04A   1741 to  1851     111 years                                                                                    Series  29

 [B] Entire series, effect on correlation (  .631) is:
      Lower   1743> -.050   1841< -.011   1808< -.010   1741< -.007   1849> -.006   1818< -.006  Higher   1842  .021   1774  .019

 [E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1743 +3.4 SD
====================================================================================================================================
```

```
CC2N05A   1772 to  1851      80 years                                                                                    Series  30

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1810 1849   -8   -.12 -.06  .36*-.17  .06  .21 -.22  .15  .17  .16  .25| .14 -.06    -    -    -    -    -    -    -    -
   1812 1851   -8   -.13 -.07  .37*-.16  .06  .18 -.22  .11  .15  .12  .22|   -    -    -    -    -    -    -    -    -    -

[B] Entire series, effect on correlation (  .383) is:
      Lower   1847< -.091   1848> -.040   1840< -.027   1839> -.026   1822< -.013   1842> -.012  Higher   1819  .043   1774  .031
    1810 to 1849 segment:
      Lower   1847< -.146   1848> -.062   1840< -.043   1839> -.037   1822< -.021   1842> -.014  Higher   1819  .096   1827  .059
    1812 to 1851 segment:
      Lower   1847< -.143   1848> -.065   1840< -.041   1839> -.040   1822< -.020   1842> -.016  Higher   1819  .101   1827  .067

[C] Year-to-year changes diverging by over 4.0 std deviations:
      1847 1848   4.4 SD

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1848 +3.1 SD
==================================================================================================================================

CC2E04B   1752 to  1851     100 years                                                                                    Series  31

[B] Entire series, effect on correlation (  .586) is:
      Lower   1841> -.024   1810< -.020   1826< -.018   1752> -.016   1839> -.013   1757< -.013  Higher   1774  .044   1842  .021

==================================================================================================================================

CC2W03A   1754 to  1851      98 years                                                                                    Series  32

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1800 1839    2   -.23  .01 -.03  .28 -.26  .07 -.22  .14  .03  .13  .38|-.01  .39*-.06  .04 -.11 -.25  .01 -.09 -.05 -.06
   1810 1849    0   -.16  .13  .03  .36 -.24  .14 -.20  .02 -.05 -.13  .36*-.08  .28    -    -    -    -    -    -    -    -
   1812 1851    0   -.15  .05  .02  .35 -.16  .12 -.14 -.02 -.05 -.13  .36*   -    -    -    -    -    -    -    -    -    -

[B] Entire series, effect on correlation (  .476) is:
      Lower   1832> -.026   1846< -.021   1755> -.017   1829< -.016   1773< -.015   1814> -.014  Higher   1774  .103   1821  .016
    1800 to 1839 segment:
      Lower   1832> -.067   1829< -.039   1814> -.029   1800> -.024   1828> -.024   1815< -.019  Higher   1821  .055   1839  .036
    1810 to 1849 segment:
      Lower   1832> -.057   1846< -.048   1829< -.036   1814> -.023   1828> -.020   1815< -.018  Higher   1821  .046   1839  .033
    1812 to 1851 segment:
      Lower   1832> -.055   1846< -.051   1829< -.038   1814> -.021   1828> -.019   1815< -.019  Higher   1821  .046   1839  .035

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1832 +3.6 SD
==================================================================================================================================
```

```
CC2W04A   1774 to  1851      78 years                                                                                    Series  33

[B] Entire series, effect on correlation (  .664) is:
      Lower   1774> -.029   1808< -.024   1832< -.012   1797> -.012   1792< -.011   1821> -.009  Higher   1814  .023   1827  .019

====================================================================================================================================

CC2W04B   1766 to  1850      85 years                                                                                    Series  34

[B] Entire series, effect on correlation (  .636) is:
      Lower   1773< -.046   1816< -.022   1790> -.013   1791< -.013   1841> -.013   1793< -.012  Higher   1774  .034   1814  .030

====================================================================================================================================

CC2W05A   1777 to  1851      75 years                                                                                    Series  35

[B] Entire series, effect on correlation (  .451) is:
      Lower   1819> -.054   1828< -.043   1779> -.019   1806> -.018   1780< -.012   1782< -.010  Higher   1814  .056   1839  .032

[E] Outliers     2   3.0 SD above or -4.5 SD below mean for year
      1819 +3.2 SD;    1828 -5.8 SD
====================================================================================================================================

CC2W05B   1746 to  1850     105 years                                                                                    Series  36

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1746 1785  -10    .36*-.11 -.10 -.02  .06  .17  .15 -.15 -.07  .24  .10|-.14 -.20 -.36  .27  .15 -.05  .07 -.25 -.06 -.20
   1750 1789  -10    .41*-.12 -.16 -.05  .09  .32  .09 -.13 -.09  .26  .16|-.16 -.16 -.36  .18  .10  .00  .11 -.28  .00 -.14
   1760 1799    0    .24 -.06 -.20 -.01  .08  .29  .01 -.21 -.04  .26  .31* .03 -.35 -.45  .13  .05  .02  .00 -.20  .05 -.08
   1770 1809    0    .23 -.10 -.24 -.09  .03  .31  .08 -.12 -.12  .15  .36* .05 -.23 -.38  .22  .04 -.17 -.22 -.21  .23  .22

[B] Entire series, effect on correlation (  .436) is:
      Lower   1774> -.054   1819> -.034   1770< -.032   1753< -.027   1752> -.025   1761< -.016  Higher   1814  .046   1839  .034
    1746 to 1785 segment:
      Lower   1770< -.066   1774> -.053   1752> -.052   1753< -.052   1761< -.032   1748> -.025  Higher   1779  .070   1755  .049
    1750 to 1789 segment:
      Lower   1774> -.074   1770< -.071   1753< -.056   1752> -.056   1761< -.035   1758< -.014  Higher   1779  .073   1755  .051
    1760 to 1799 segment:
      Lower   1774> -.150   1770< -.103   1761< -.051   1772> -.015   1793< -.009   1773> -.006  Higher   1779  .070   1790  .040
    1770 to 1809 segment:
      Lower   1774> -.141   1770< -.111   1806> -.028   1772> -.017   1793< -.011   1802< -.008  Higher   1779  .067   1790  .036

[E] Outliers     3   3.0 SD above or -4.5 SD below mean for year
      1752 +3.5 SD;    1772 +3.0 SD;    1774 +3.5 SD
====================================================================================================================================
```

```
CC2W06A   1752 to  1851     100 years                                                                                    Series  37

[A] Segment   High   -10   -9   -8   -7   -6   -5   -4   -3   -2   -1   +0   +1   +2   +3   +4   +5   +6   +7   +8   +9  +10
   ---------  ----   ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
   1752 1791    1    .02 -.26 -.24 -.06  .28  .23 -.07 -.23 -.21 -.08  .33| .42* .13 -.15 -.29  .06  .16 -.03  .04 -.20 -.13
   1760 1799   -5   -.04 -.15 -.24 -.12  .32  .36*-.01 -.39 -.23 -.04  .16| .27  .17  .03 -.10 -.05  .01  .04  .18 -.31  .02
   1770 1809   -5   -.14 -.08 -.23 -.07  .29  .32* .02 -.45 -.05 -.19  .23| .17  .10 -.02 -.12  .03  .10  .06  .20 -.42  .03
   1780 1819   -5   -.01 -.16 -.13 -.01  .24  .36* .03 -.41 -.02 -.32  .21| .18  .02  .03 -.15 -.07 -.01  .07  .29 -.28  .12
   1790 1829    0   -.20 -.10 -.16  .19  .11  .25 -.06 -.30  .15 -.36  .28* .13  .09  .05 -.04 -.07 -.16  .11  .26 -.26  .05

[B] Entire series, effect on correlation (  .391) is:
      Lower   1796< -.144   1752> -.023   1760> -.016   1754< -.015   1771< -.014   1759< -.011  Higher   1842  .029   1774  .024
    1752 to 1791 segment:
      Lower   1752> -.064   1754< -.046   1771< -.042   1760> -.039   1759< -.037   1791> -.031  Higher   1774  .141   1779  .053
    1760 to 1799 segment:
      Lower   1796< -.312   1771< -.028   1760> -.026   1791> -.021   1772< -.013   1762> -.007  Higher   1774  .153   1779  .051
    1770 to 1809 segment:
      Lower   1796< -.290   1771< -.024   1791> -.024   1804> -.012   1772< -.011   1808< -.010  Higher   1774  .096   1779  .040
    1780 to 1819 segment:
      Lower   1796< -.349   1791> -.027   1804> -.013   1808< -.012   1818< -.007   1792> -.006  Higher   1819  .065   1814  .058
    1790 to 1829 segment:
      Lower   1796< -.324   1791> -.023   1808< -.012   1804> -.011   1818< -.008   1811< -.008  Higher   1819  .050   1827  .046

[C] Year-to-year changes diverging by over 4.0 std deviations:
      1795 1796  -5.1 SD    1796 1797   4.2 SD

[E] Outliers     1   3.0 SD above or -4.5 SD below mean for year
      1796 -7.8 SD
==================================================================================================================================

CC2W06B   1757 to  1851      95 years                                                                                    Series  38

[B] Entire series, effect on correlation (  .626) is:
      Lower   1808< -.025   1780< -.024   1828> -.009   1798> -.008   1849> -.008   1786< -.007  Higher   1760  .016   1774  .015

==================================================================================================================================
```

						Corr	//-------- Unfiltered --------\\				//---- Filtered -----\\				
			No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr	()
1	BP03A	1751 1798	48	2	0	.796	2.29	3.27	.392	.419	.158	2.45	.456	-.014	2
2	BP03B	1754 1798	45	2	0	.658	2.14	3.33	.358	.432	.140	2.66	.573	-.092	2
3	BP04A	1739 1798	60	4	0	.513	1.77	2.97	.394	.584	.162	2.58	.383	.039	1
4	BP05A	1755 1798	44	2	0	.453	1.88	2.41	.362	.269	.191	2.43	.486	-.106	2
5	BP05B	1750 1798	49	2	0	.712	1.84	2.71	.386	.362	.197	2.38	.402	.013	1
6	BP06A	1741 1798	58	3	0	.651	1.77	3.47	.483	.605	.156	2.59	.392	.039	1
7	BP06B	1733 1795	63	4	0	.590	1.51	2.46	.330	.582	.176	2.46	.460	.016	1
8	UPB01	1739 1798	60	4	0	.449	1.73	3.96	.505	.351	.218	2.70	.357	-.050	2
9	UPB02	1714 1798	85	5	0	.628	1.91	3.26	.415	.363	.200	2.55	.421	.012	1
10	PC01E	1735 1799	65	4	0	.488	1.95	3.58	.635	.672	.219	2.88	.627	-.036	1
11	PC03E	1752 1799	48	2	0	.619	2.03	3.16	.507	.598	.170	2.64	.402	-.062	1
12	PC04E	1753 1799	47	2	0	.813	2.16	3.27	.545	.569	.180	2.62	.456	-.018	1
13	PC01W	1729 1798	70	5	2	.528	1.87	3.05	.488	.333	.210	2.44	.425	-.059	2
14	PC02W	1729 1799	71	5	0	.773	1.88	3.58	.503	.680	.154	2.54	.366	.036	1
15	PC03W	1730 1799	70	4	0	.750	1.85	3.31	.459	.615	.164	2.41	.352	-.025	2
16	FLOOR04	1758 1821	64	5	2	.457	1.32	3.40	.773	.866	.181	2.51	.365	.027	1
17	FLOOR05	1742 1798	57	3	0	.403	1.24	2.66	.615	.786	.174	2.59	.511	.001	1
18	CC1N02A	1794 1850	57	4	0	.473	2.52	7.48	1.380	.745	.313	2.61	.534	-.067	1
19	CC1N03A	1778 1851	74	6	0	.522	1.25	3.30	.642	.525	.387	2.72	.528	.055	1
20	CC1N04A	1760 1851	92	7	2	.486	1.71	3.53	.709	.620	.274	2.78	.374	-.018	1
21	CC1S01A	1775 1825	51	3	0	.787	2.20	4.01	.711	.450	.273	2.80	.541	.053	3
22	CC1S03A	1765 1851	87	7	0	.751	1.46	4.27	.962	.842	.268	2.58	.405	-.013	1
23	CC1S03B	1764 1851	88	7	0	.703	1.53	3.98	1.010	.790	.322	2.87	.499	-.024	1
24	CC1S05A	1778 1851	74	6	0	.492	2.07	6.22	1.462	.858	.295	2.69	.517	-.057	1
25	CC1S06A	1765 1851	87	7	3	.392	1.67	3.37	.696	.759	.234	2.73	.473	-.006	1
26	CC1E03A	1749 1851	103	9	3	.512	1.98	5.09	.855	.640	.278	2.83	.476	.021	1
27	CC1E03B	1745 1850	106	9	3	.476	2.12	5.98	.963	.482	.325	2.78	.458	.008	1
28	CC2N03A	1756 1851	96	8	0	.701	1.91	4.93	.803	.565	.329	2.62	.397	-.039	1
29	CC2N04A	1741 1851	111	9	0	.631	1.97	5.71	.793	.255	.375	2.87	.471	.018	1
30	CC2N05A	1772 1851	80	6	2	.383	1.76	7.12	1.067	.309	.346	2.71	.493	-.047	1
31	CC2E04B	1752 1851	100	8	0	.586	1.57	3.96	.934	.742	.305	2.60	.393	-.044	1
32	CC2W03A	1754 1851	98	8	3	.476	1.75	4.64	.958	.780	.264	2.78	.494	.051	1
33	CC2W04A	1774 1851	78	6	0	.664	1.37	2.98	.532	.424	.309	2.75	.453	-.024	1
34	CC2W04B	1766 1850	85	7	0	.636	1.57	4.02	.689	.548	.314	2.89	.509	.050	1
35	CC2W05A	1777 1851	75	6	0	.451	1.67	3.04	.520	.611	.252	2.47	.354	-.049	2
36	CC2W05B	1746 1850	105	9	4	.436	1.68	3.98	.638	.554	.290	2.74	.518	-.097	2
37	CC2W06A	1752 1851	100	8	5	.391	1.77	4.41	.818	.444	.360	2.57	.397	-.025	1
38	CC2W06B	1757 1851	95	8	0	.626	1.76	3.92	.712	.529	.320	2.75	.539	.019	1
Total or mean:			2846	206	29	.567	1.78	7.48	.716	.572	.263	2.89	.453	-.012	

- = [COFECHA THMTRCOF] = -

Appendix IX. Geophysical Images.

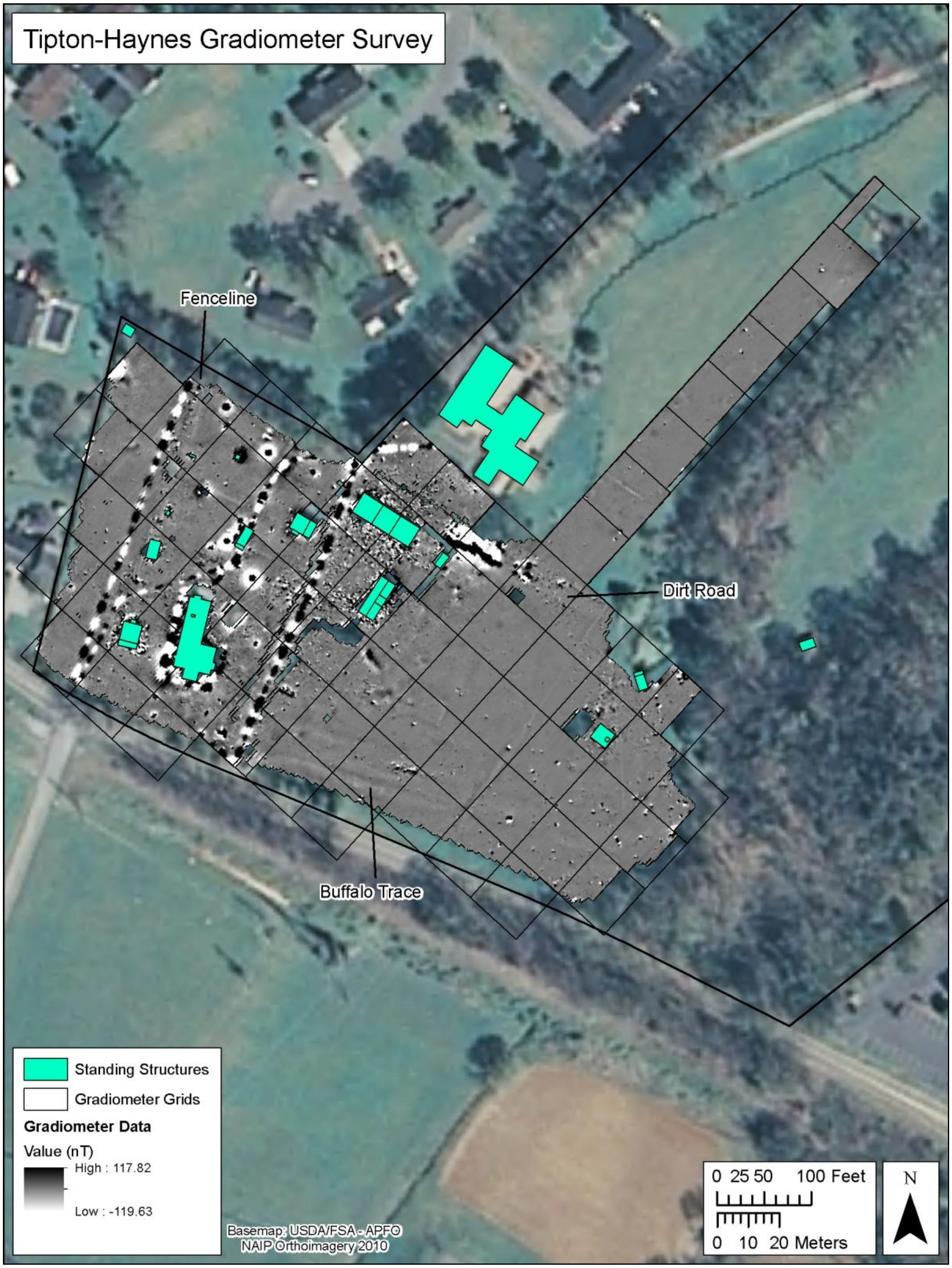

Figure IX.1. Gradiometer survey data with evident features.

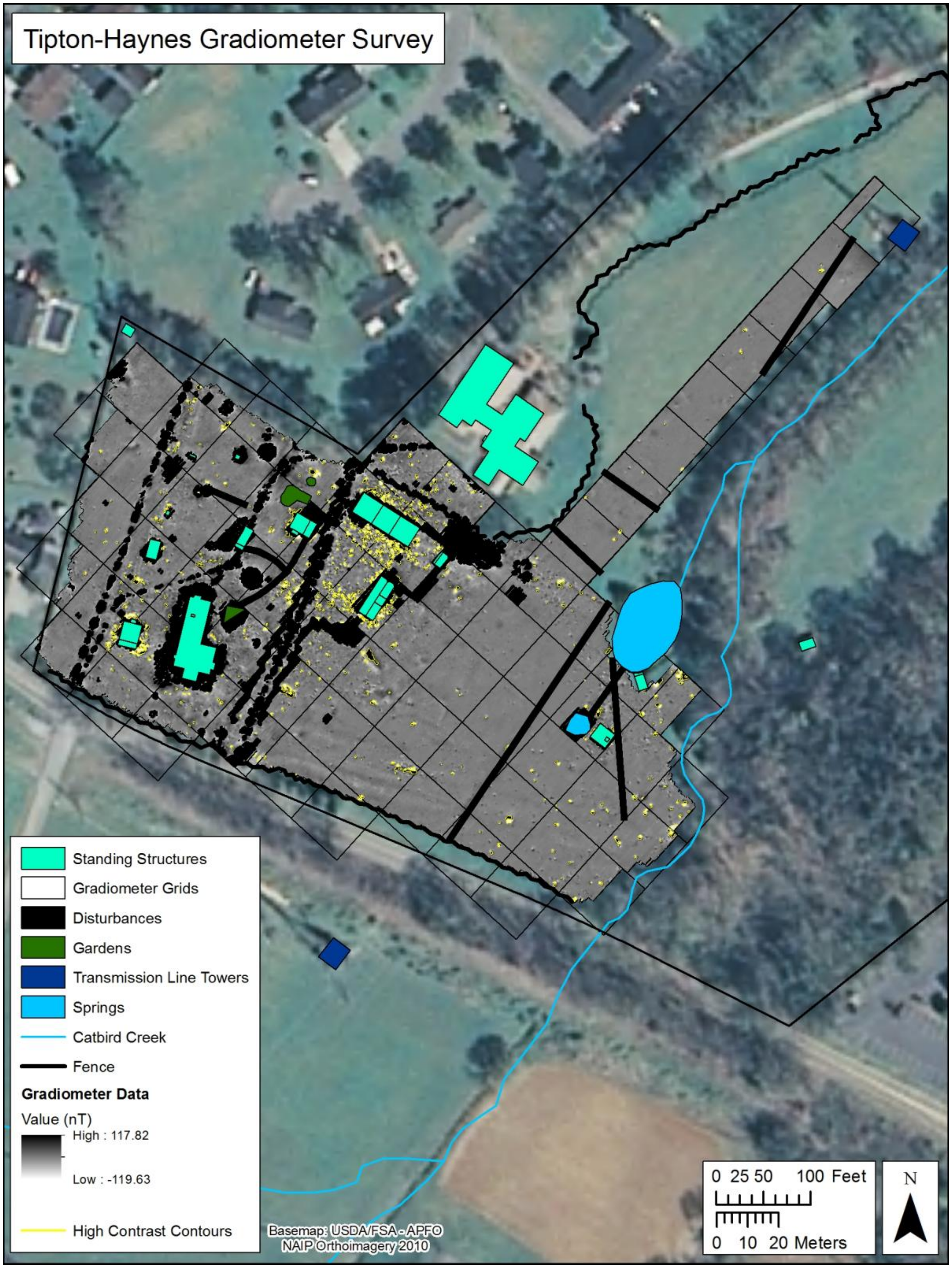

Figure IX.2. Gradiometer survey data highlighting high contrast contours (>50/<-50 nT).

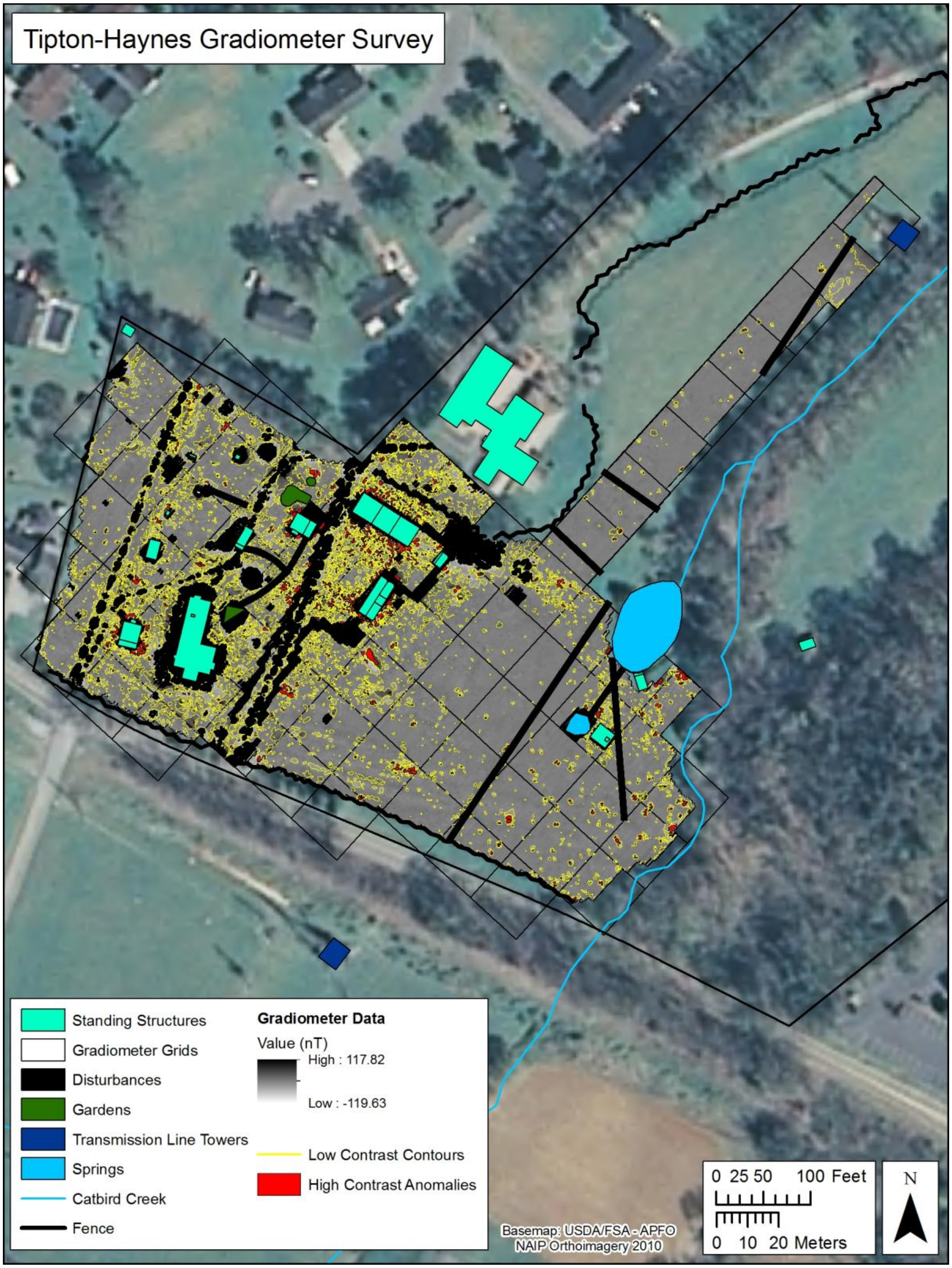

Figure IX.3. Gradiometer survey data highlighting low contrast contours (-10 to 10 nT).

Figure IX.4. Core historic area gradiometer survey data.

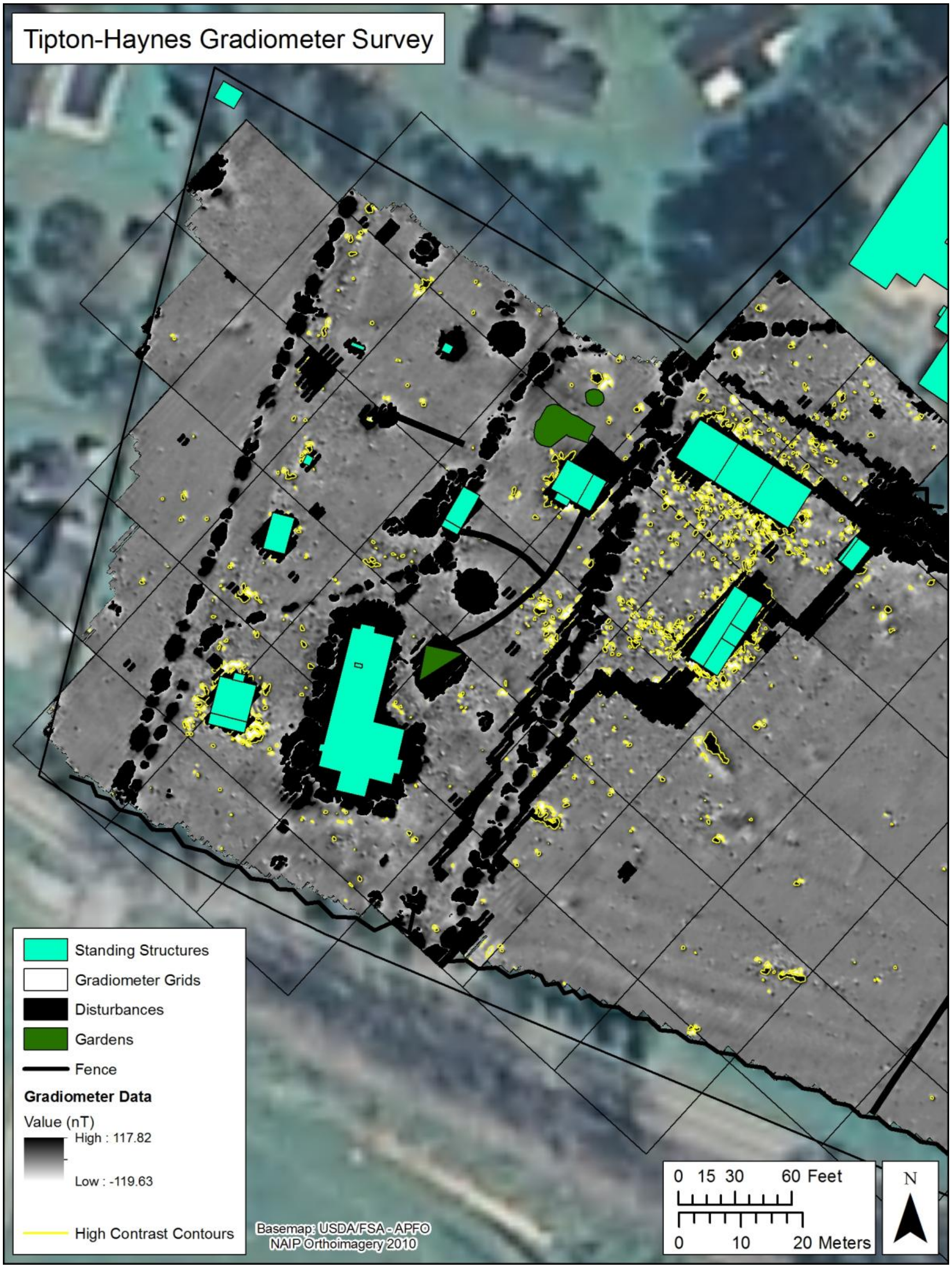

Figure IX.5. Core historic area gradiometer survey data highlighting high contrast contours (>50/<-50 nT).

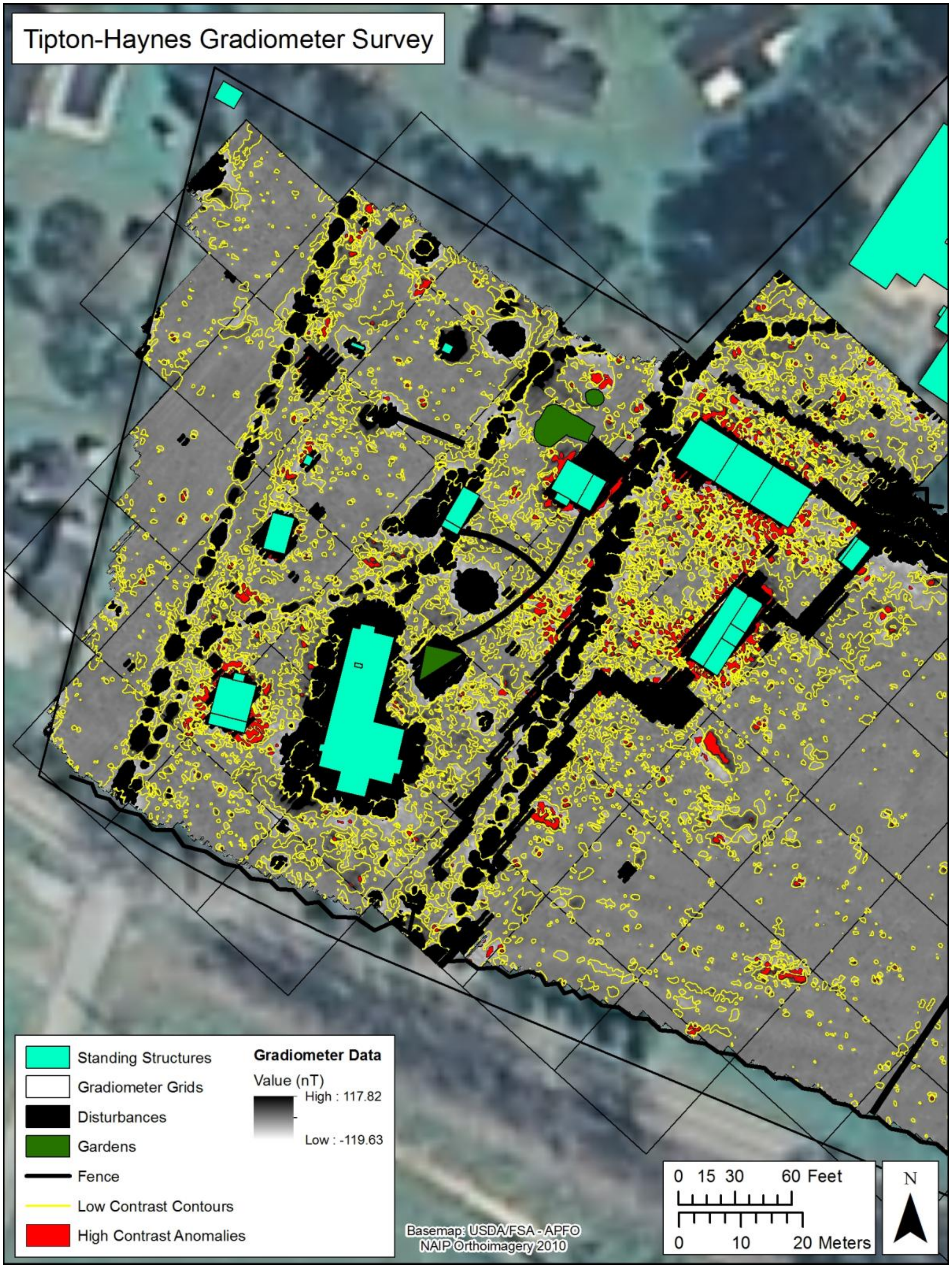

Figure IX.6. Core historic area gradiometer survey data highlighting low contrast contours (-10 to 10 nT).

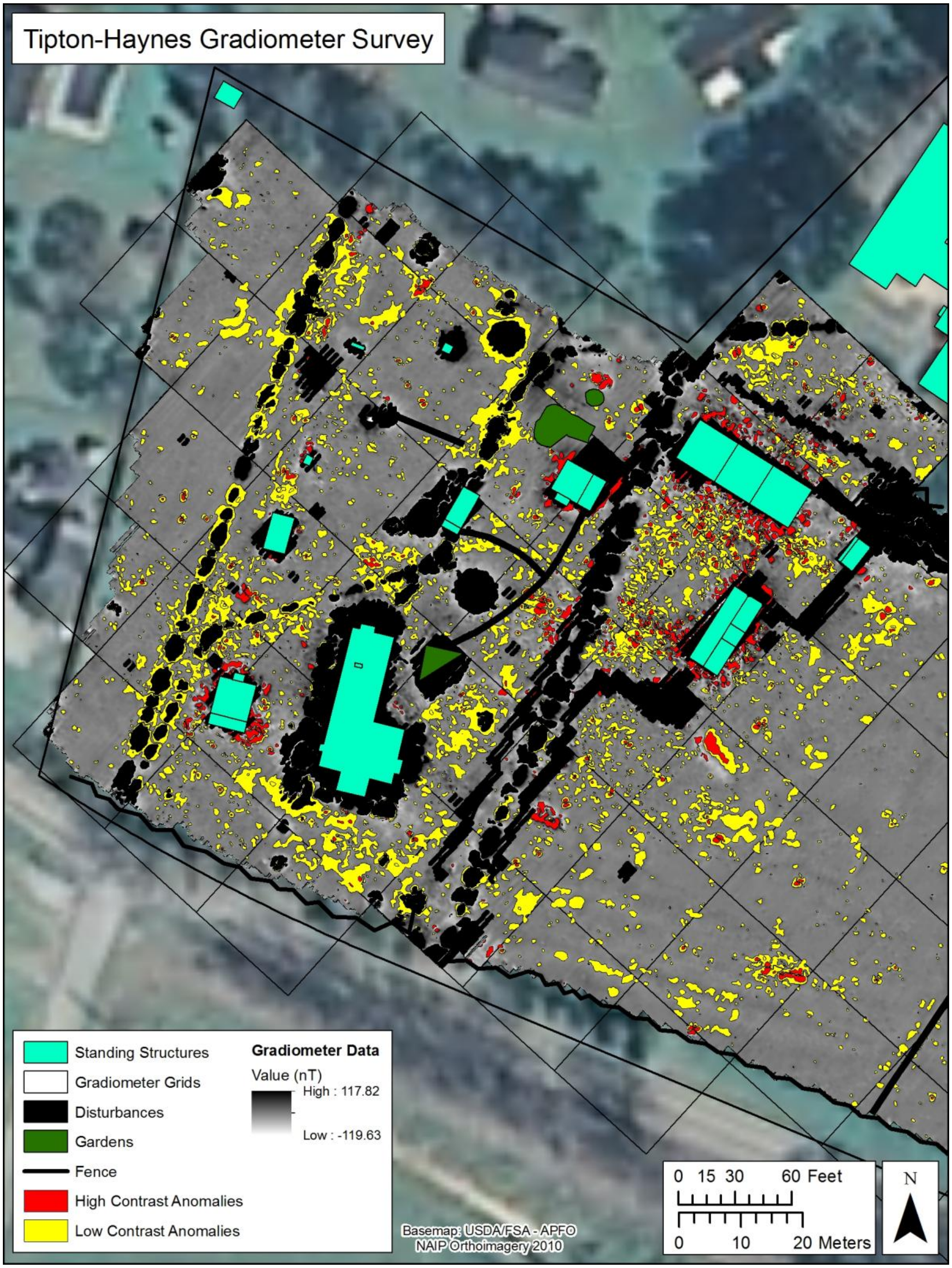

Figure IX.7. Core historic area gradiometer survey data highlighting high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

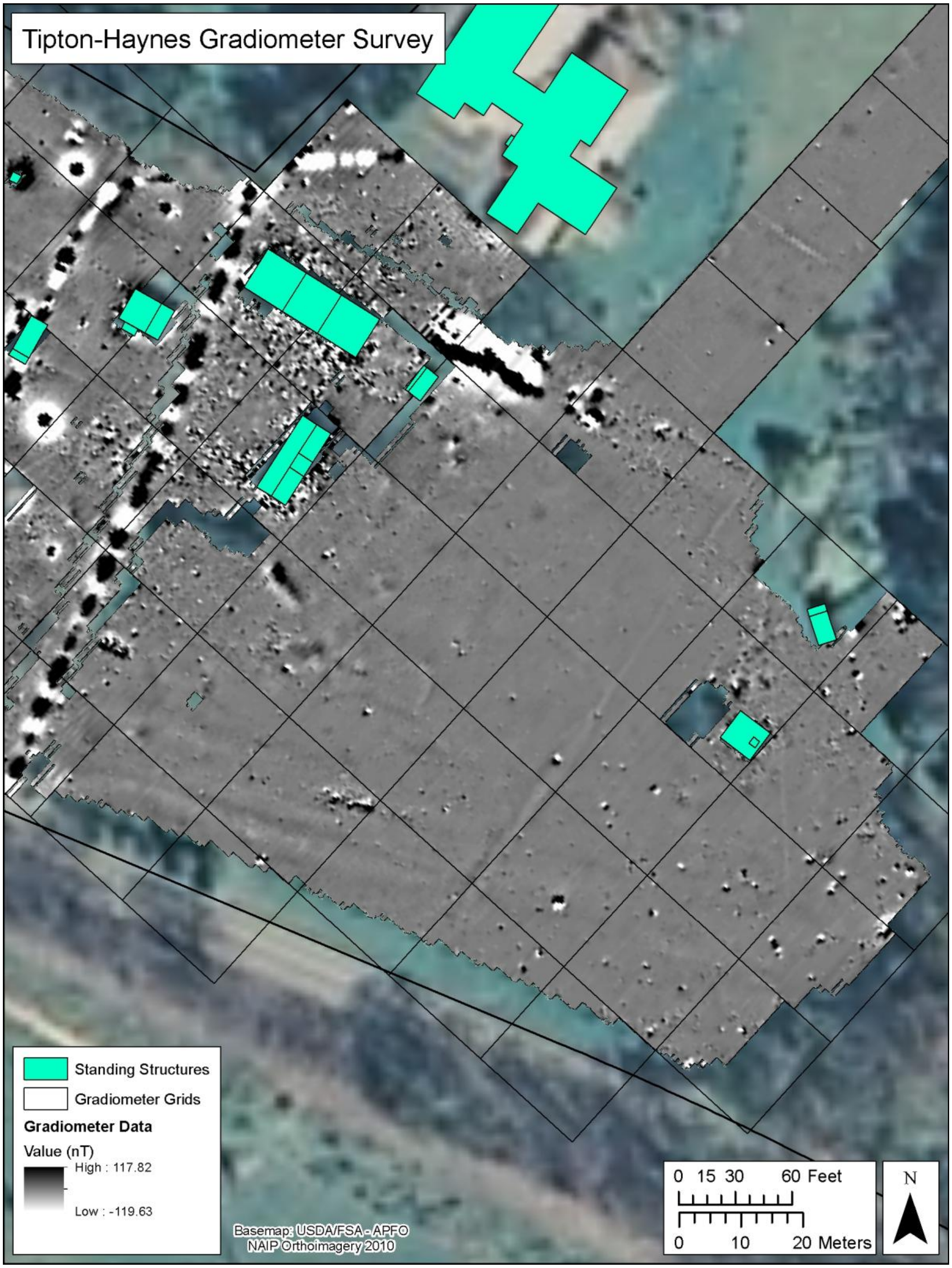

Figure IX.8. East field gradiometer survey data.

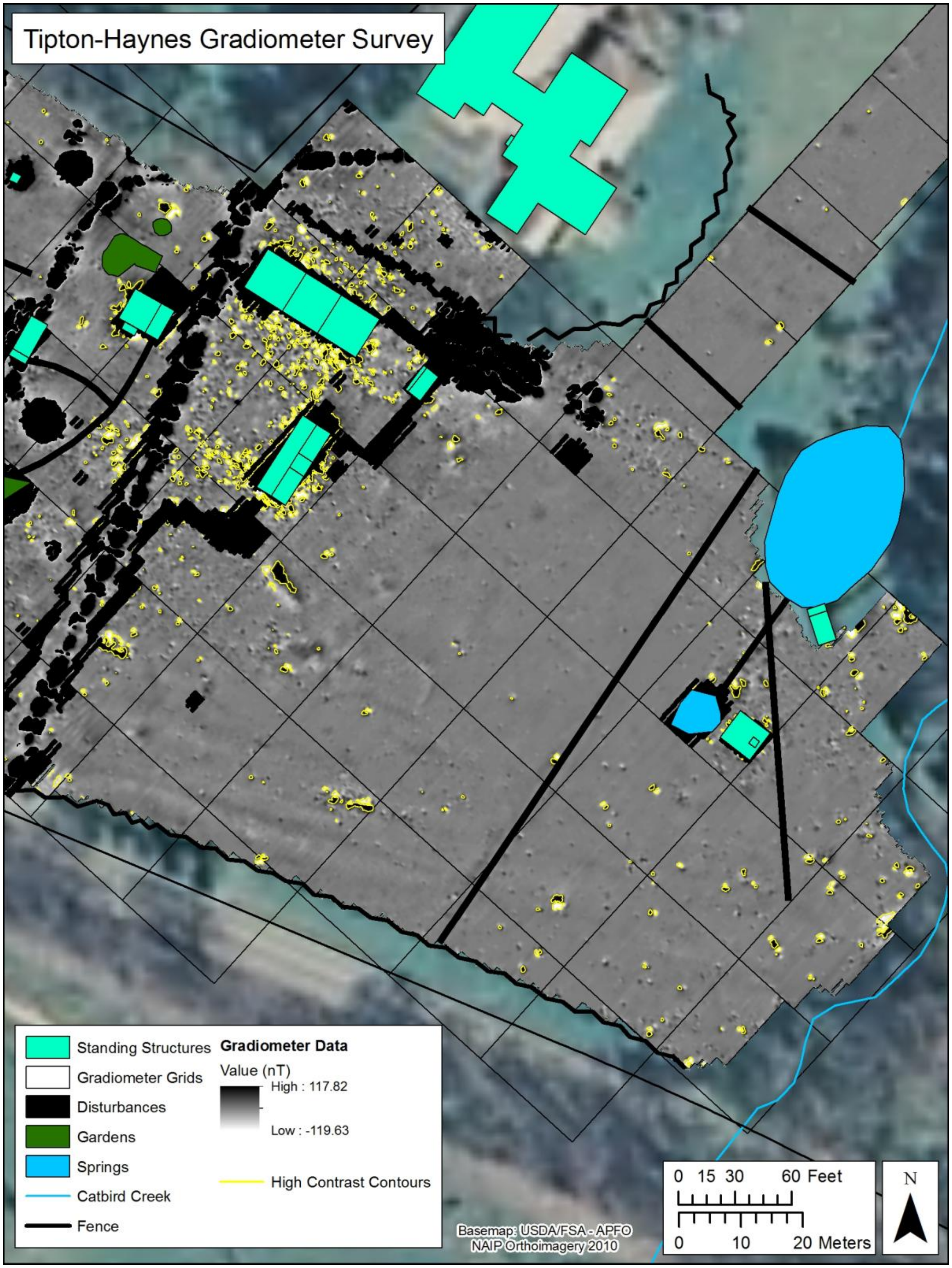

Figure IX.9. East field gradiometer survey data highlighting high contrast contours (>50/<-50 nT).

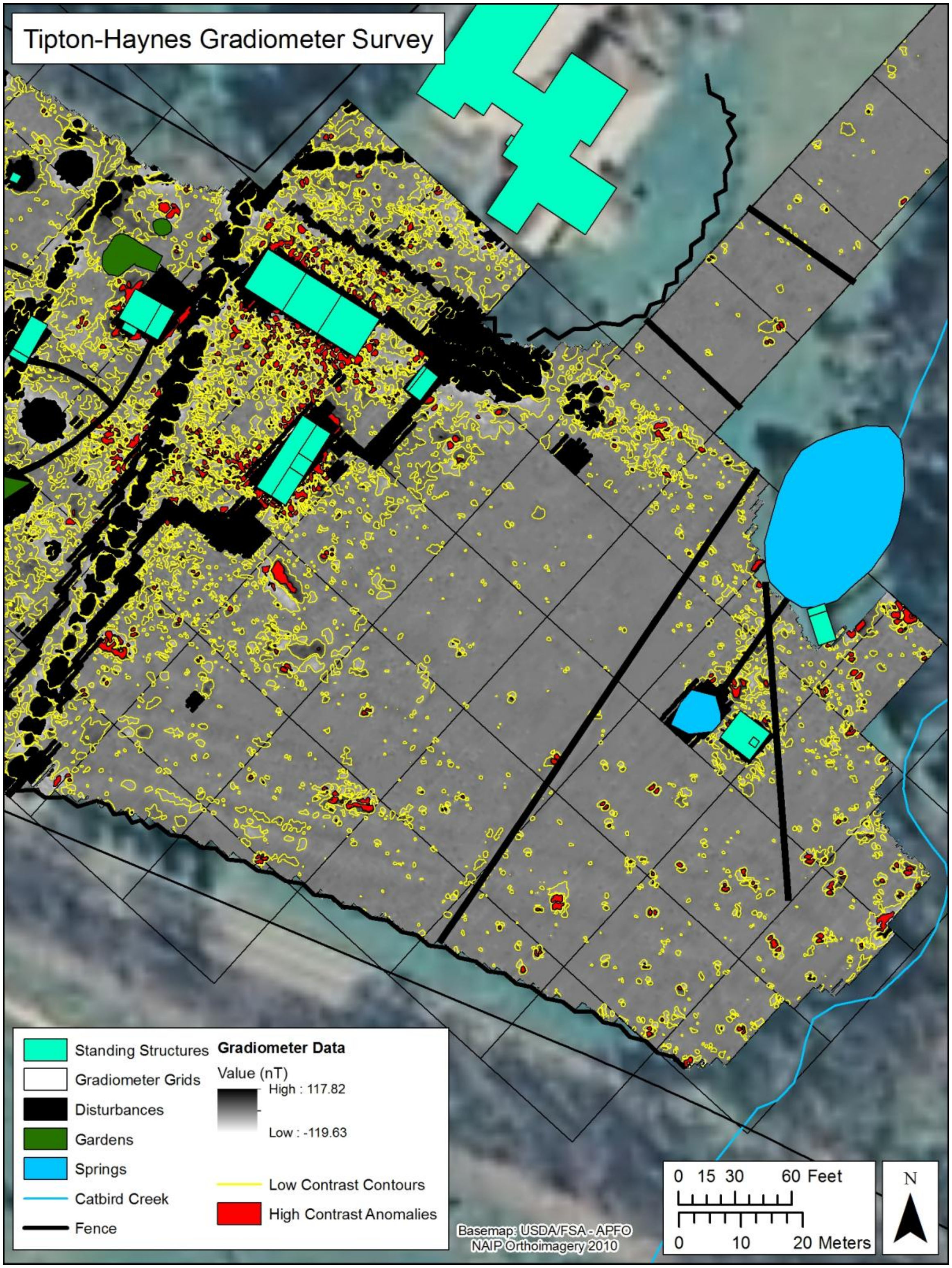

Figure IX.10. East field gradiometer survey data highlighting low contrast contours (-10 to 10 nT).

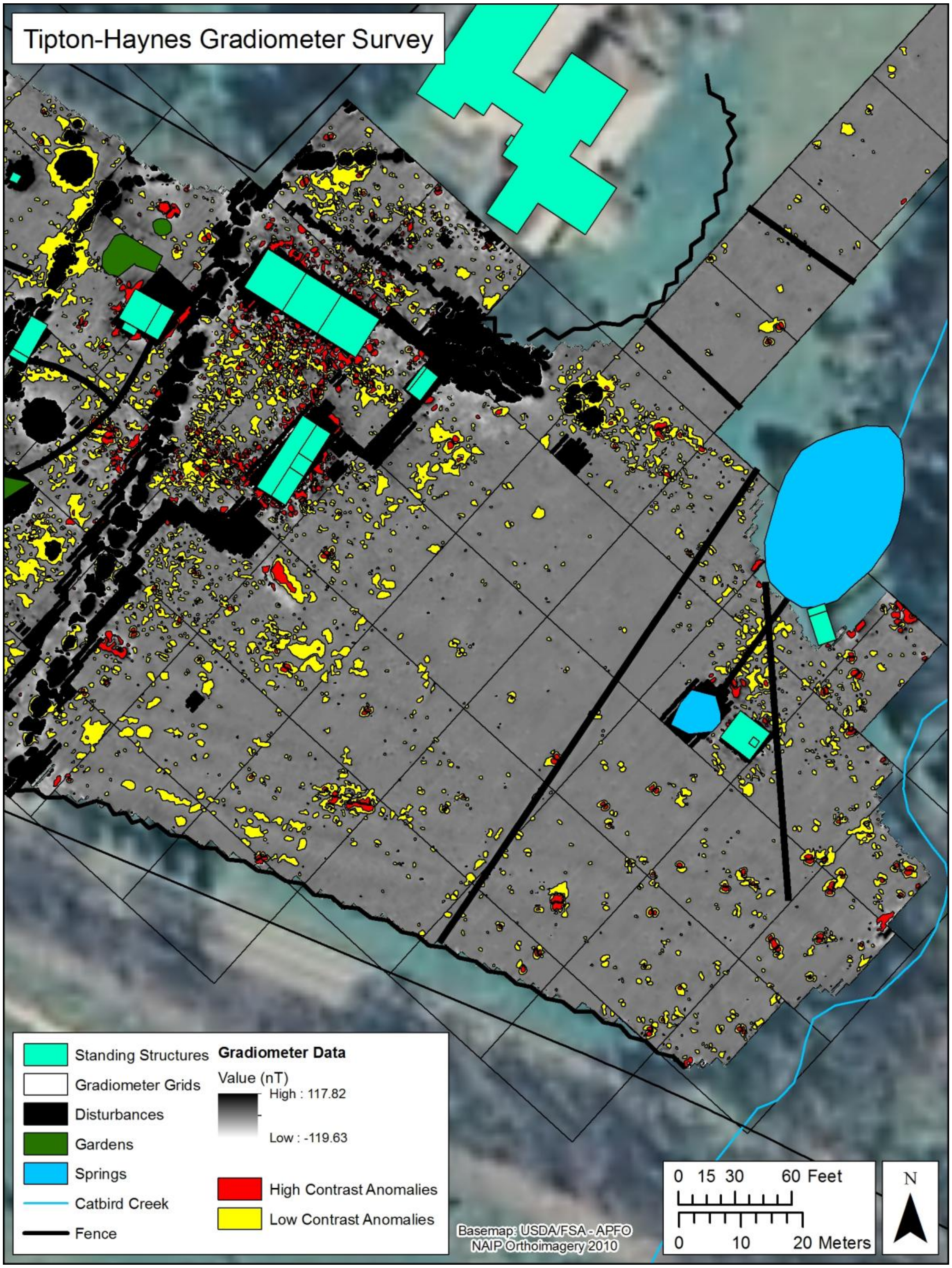

Figure IX.11. East field gradiometer survey data highlighting high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

Figure IX.12. North field gradiometer survey data.

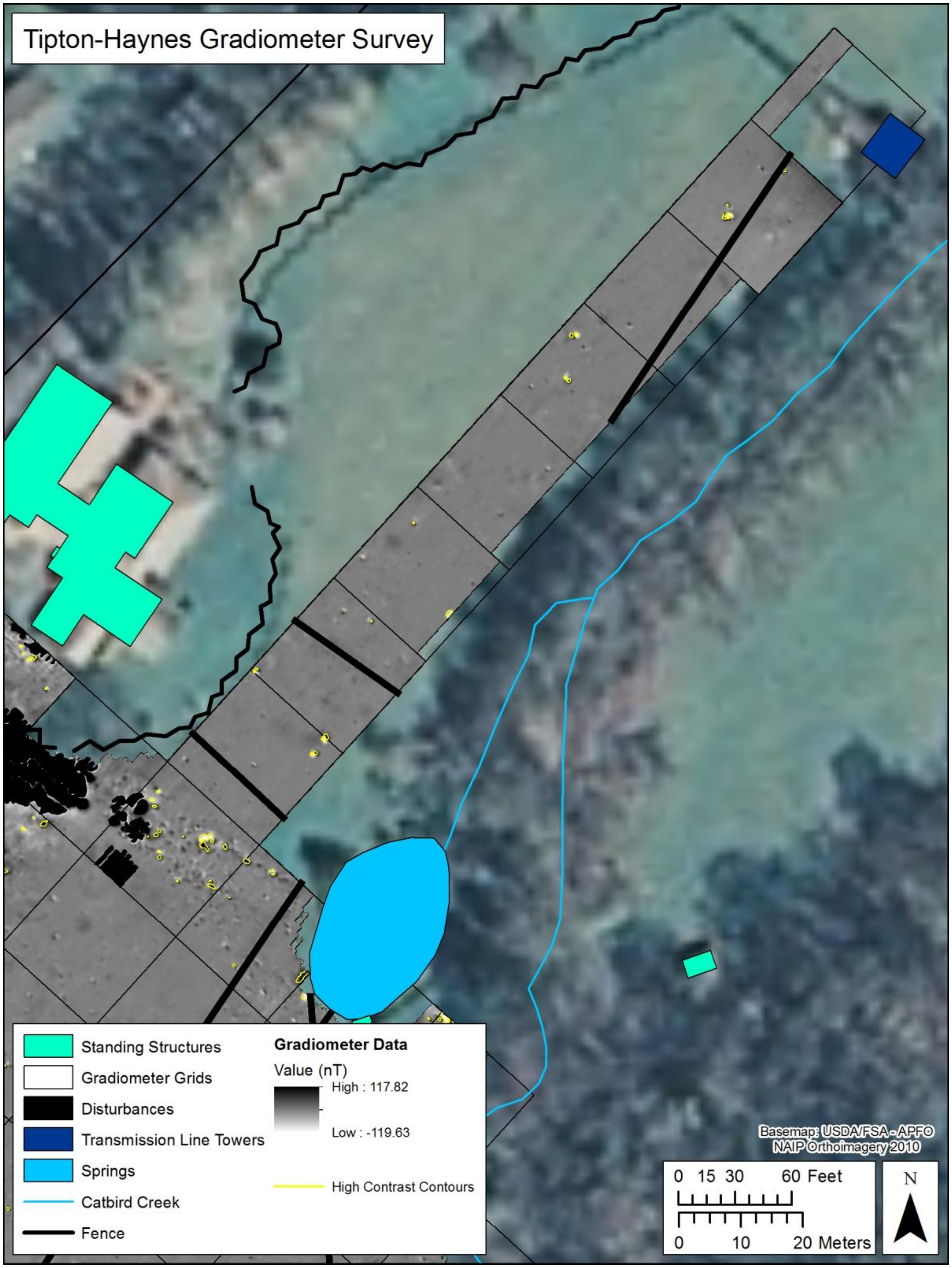

Figure IX.13. North field gradiometer survey data highlighting high contrast contours (>50/<-50 nT).

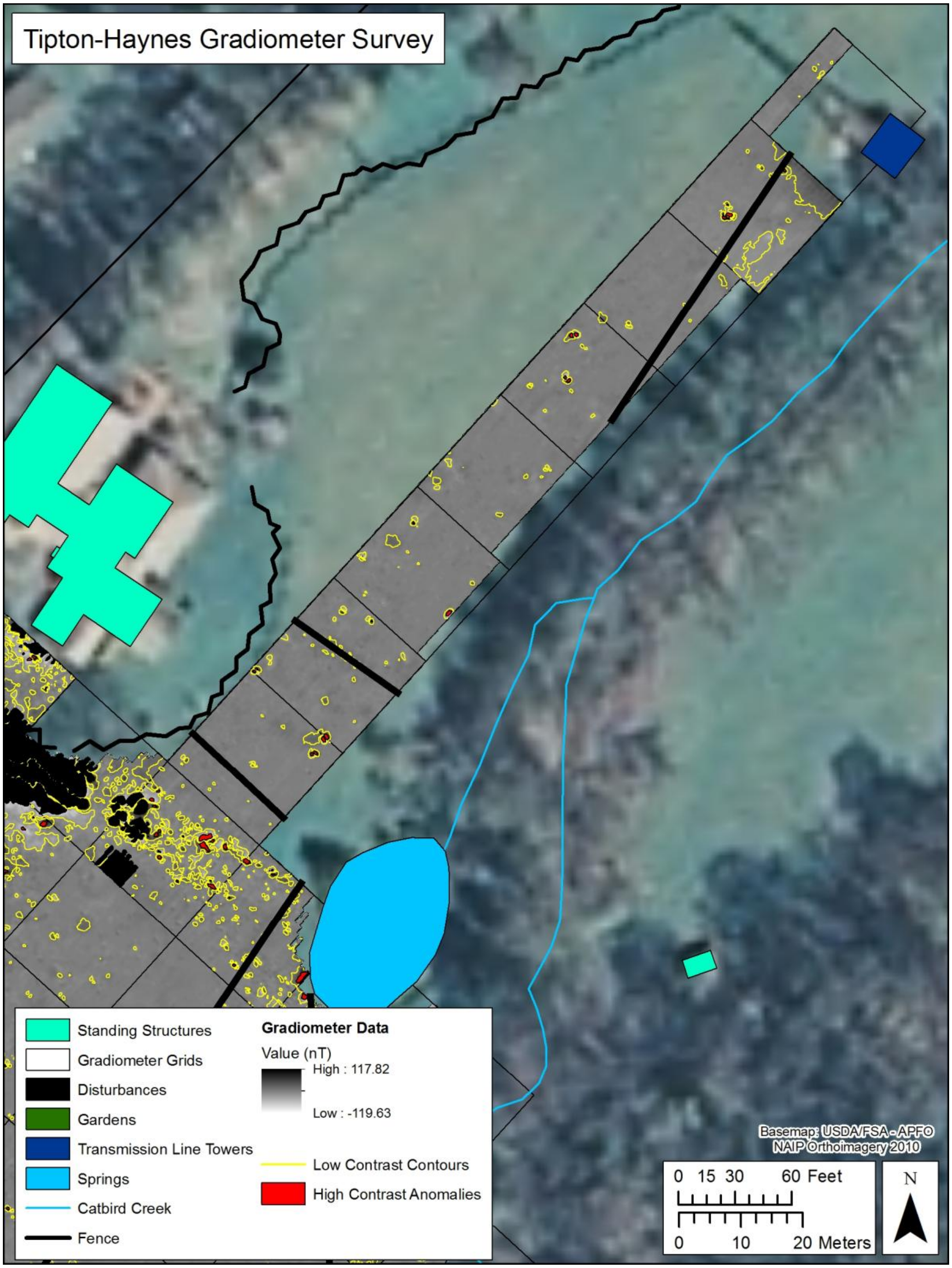

Figure IX.14. North field gradiometer survey data highlighting low contrast contours (-10 to 10 nT).

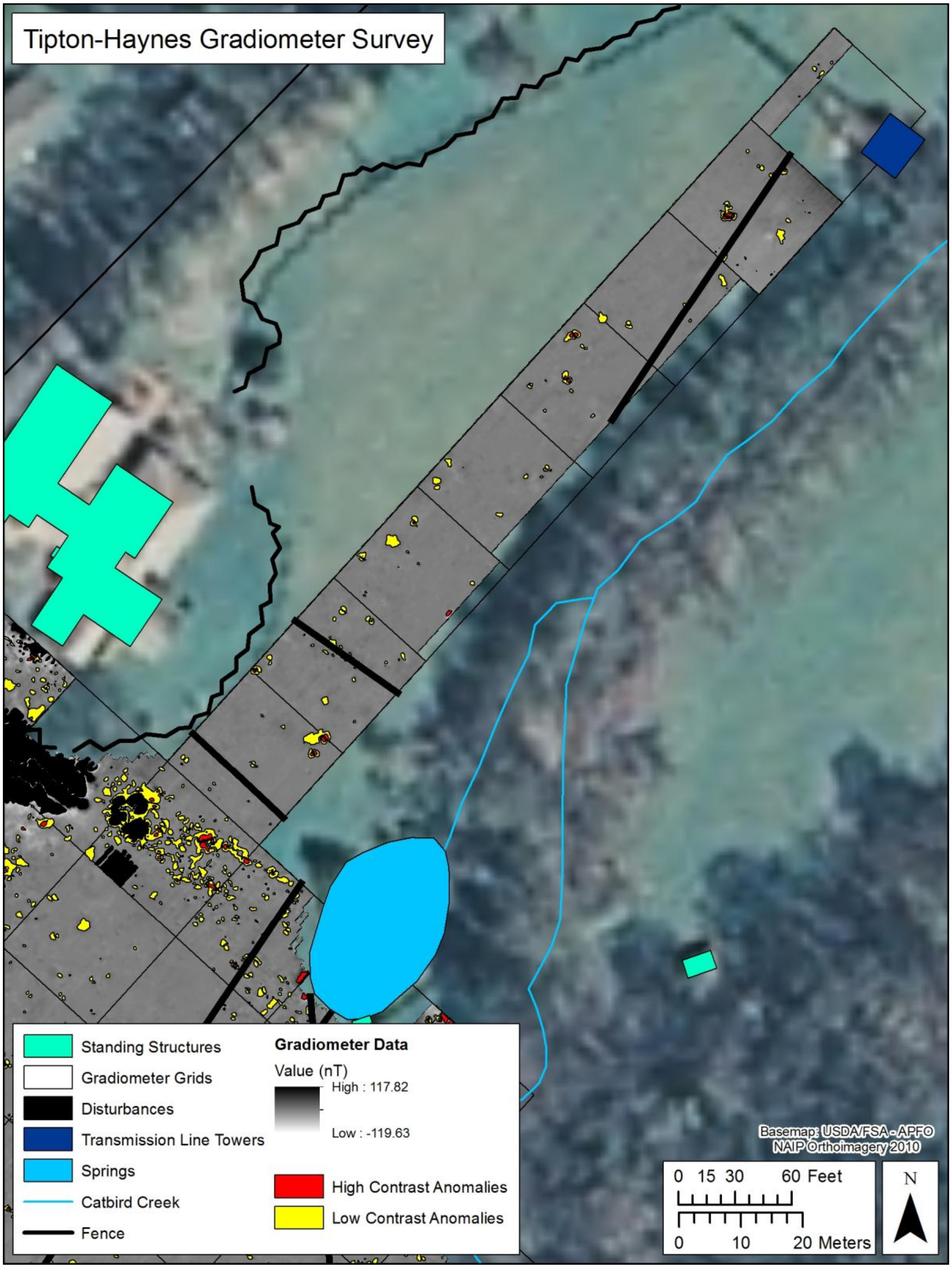

Figure IX.15. East field gradiometer survey data highlighting high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

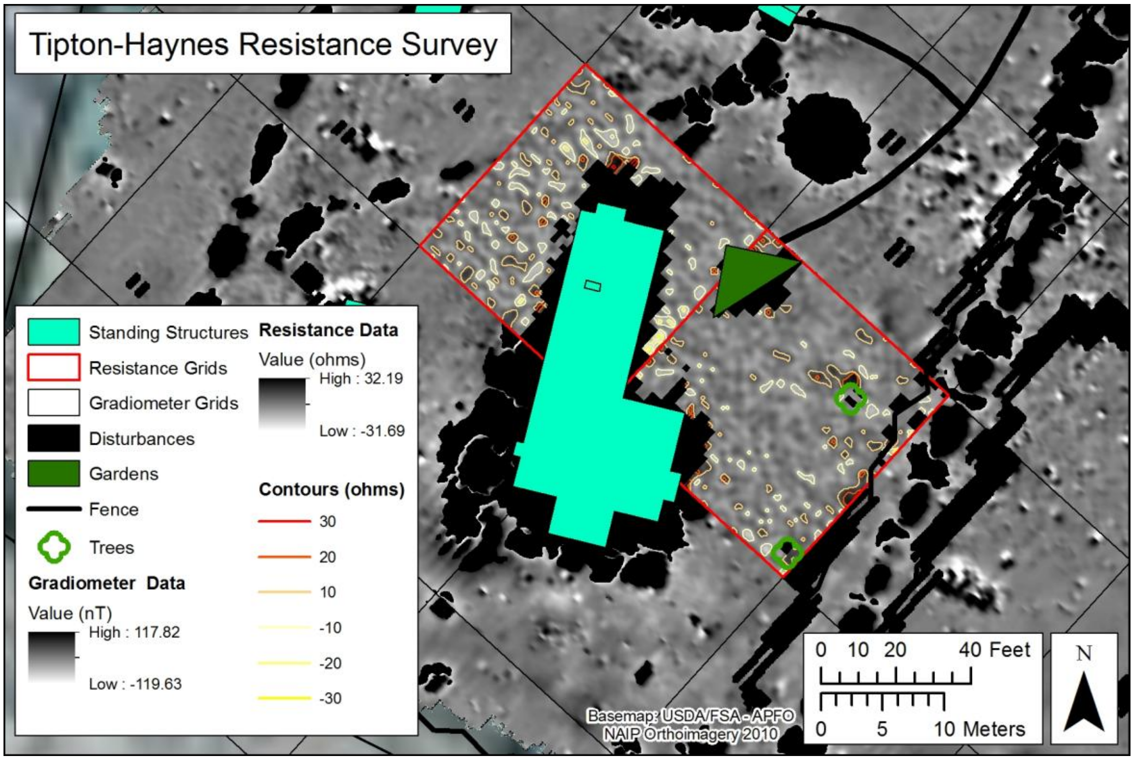

Figure IX.16. Resistance and gradiometer survey data with resistance contours.

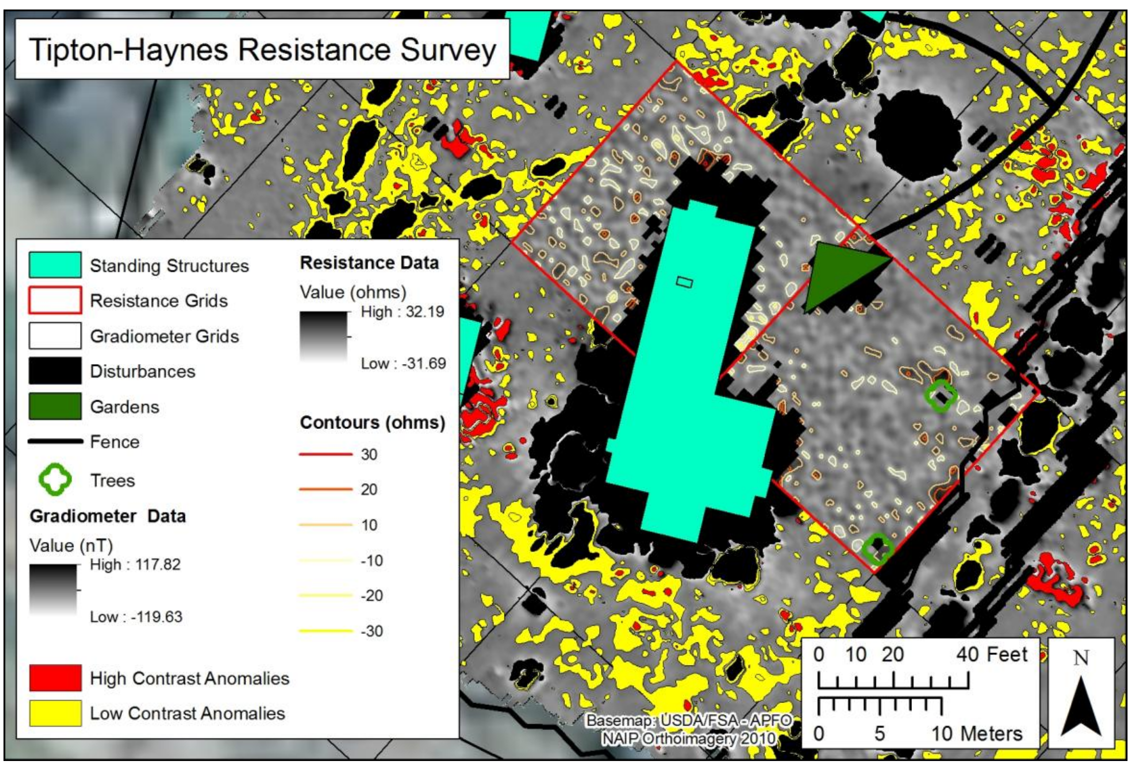

Figure IX.17. Resistance and gradiometer survey data with resistance contours and high (>50/<-50 nT) and low (-10 to 10 nT) contrast gradiometer contours.

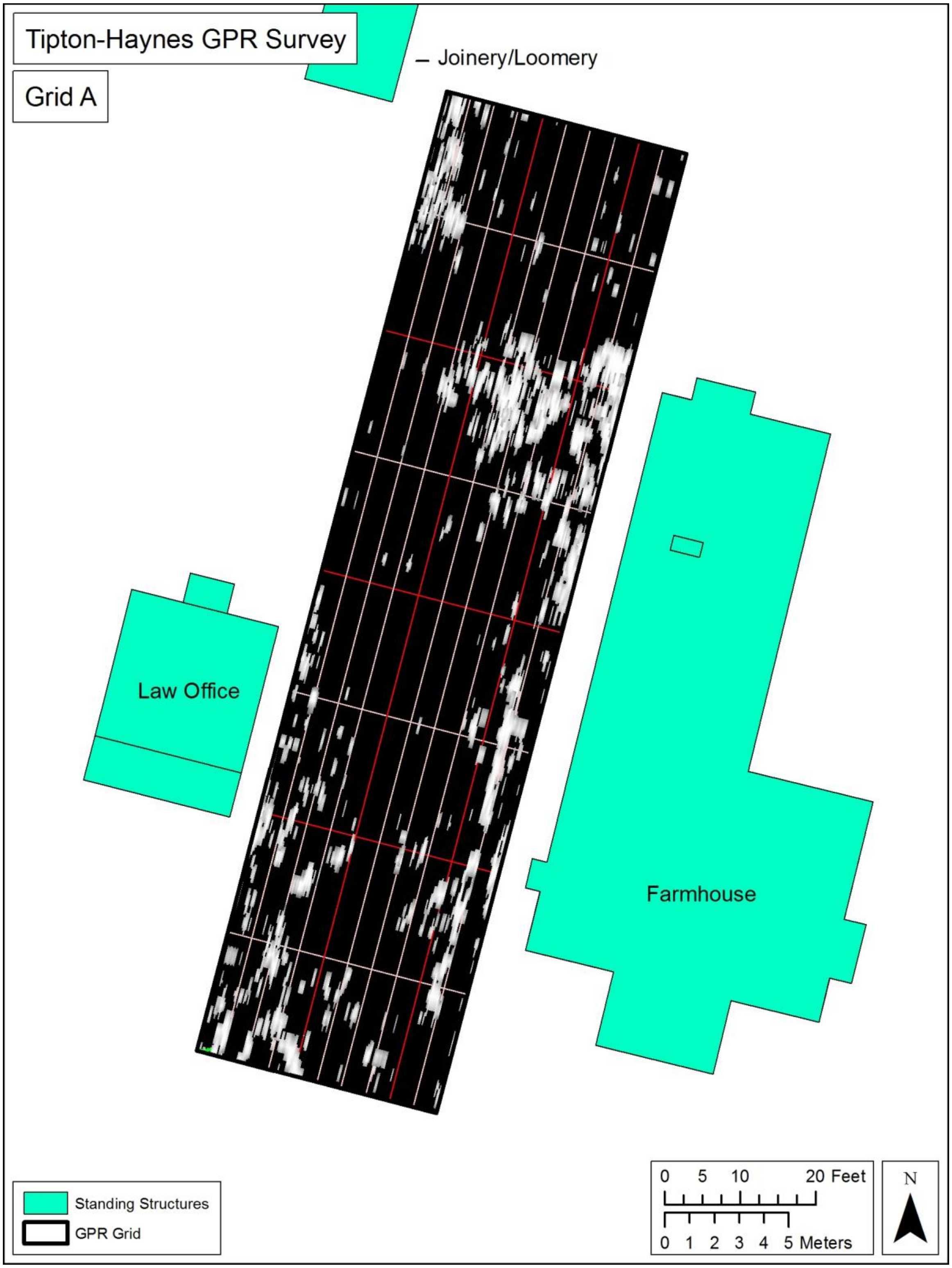

Figure IX.18. Grid A 3D transparency (Range 0.38 m/Position 0.25 m).

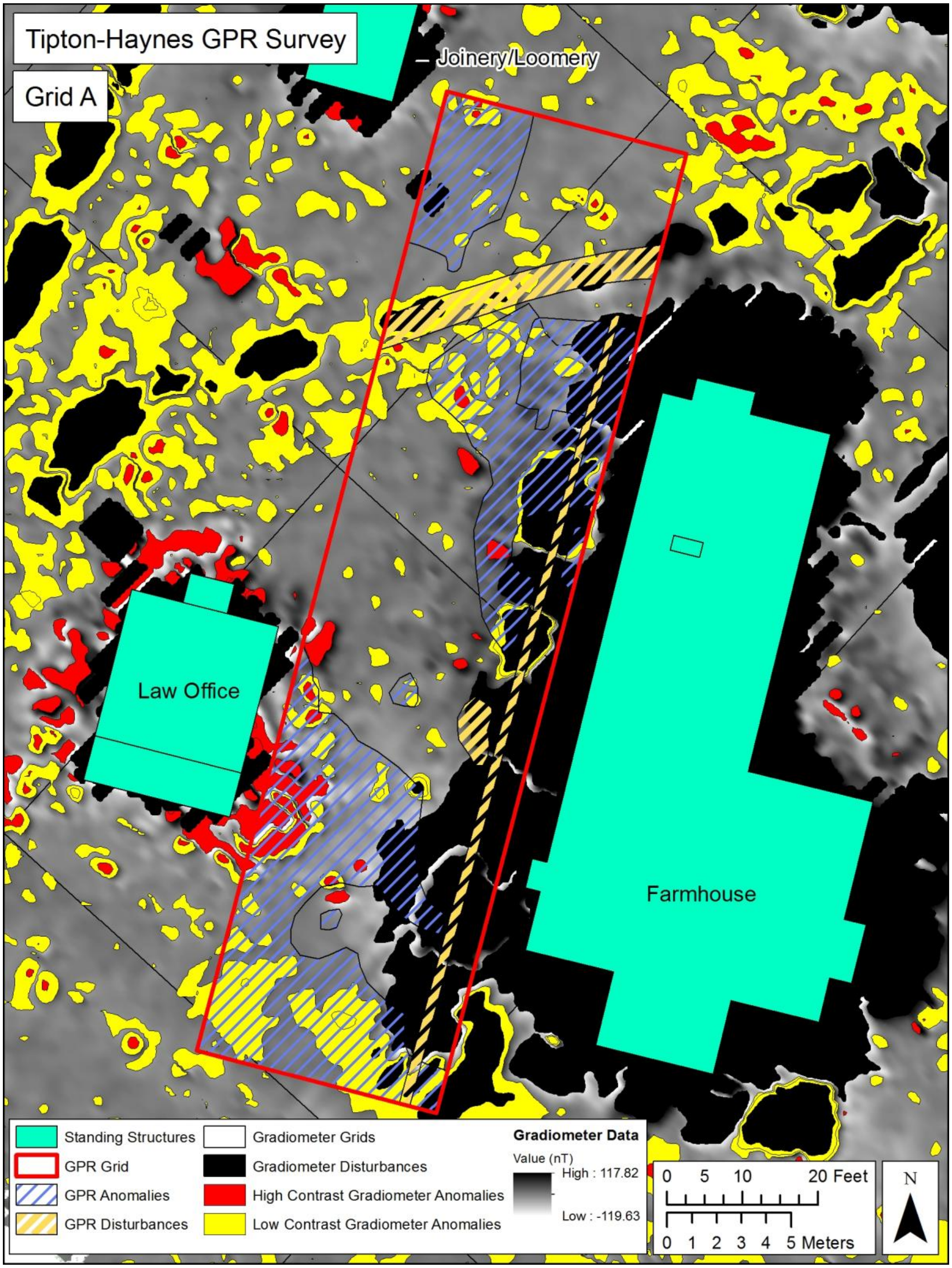

Figure IX.19. GPR Grid A with highlighted anomalies overlain with gradiometer survey data including high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

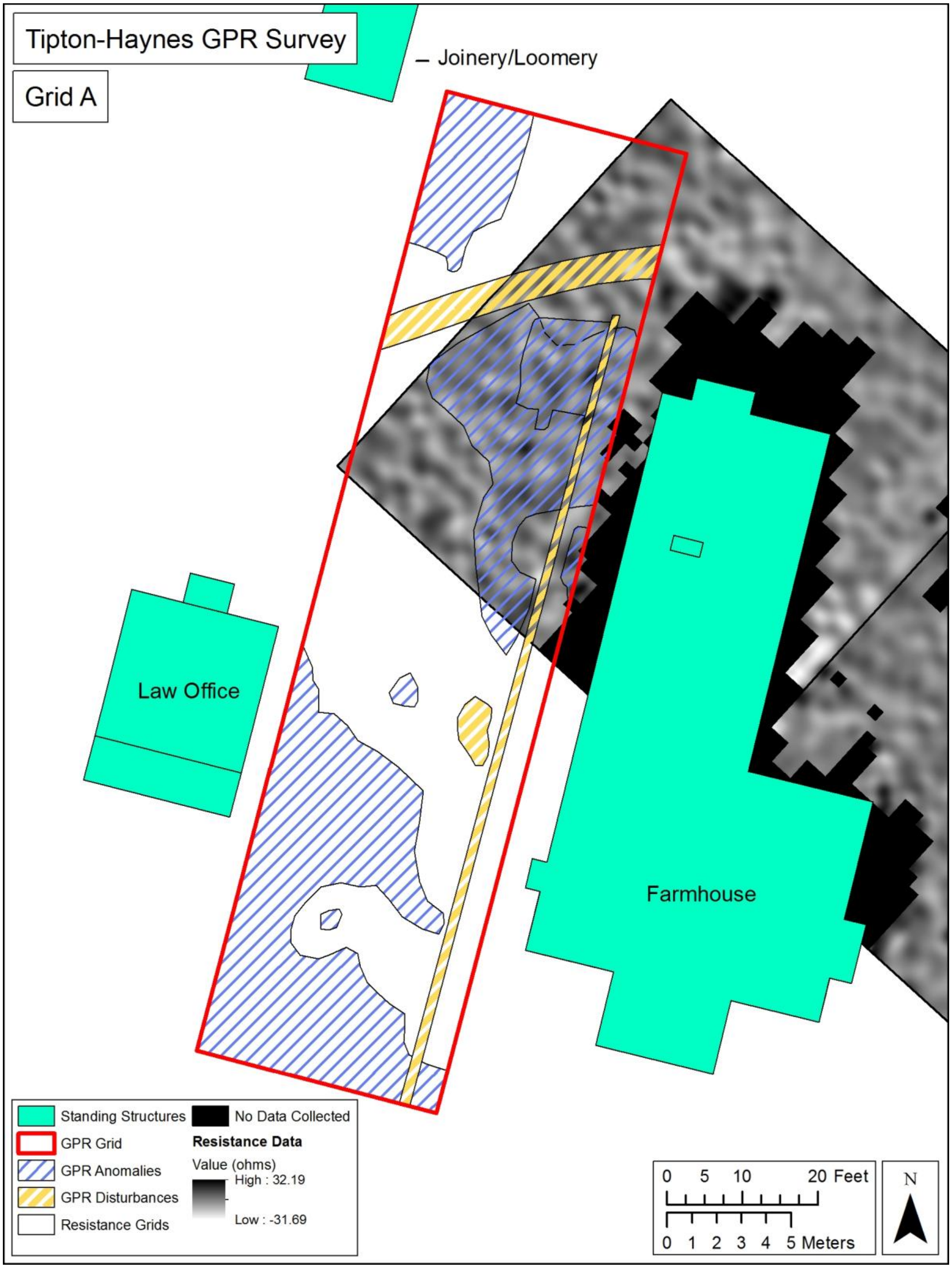

Figure IX.20. GPR Grid A with highlighted anomalies overlain with resistance survey data.

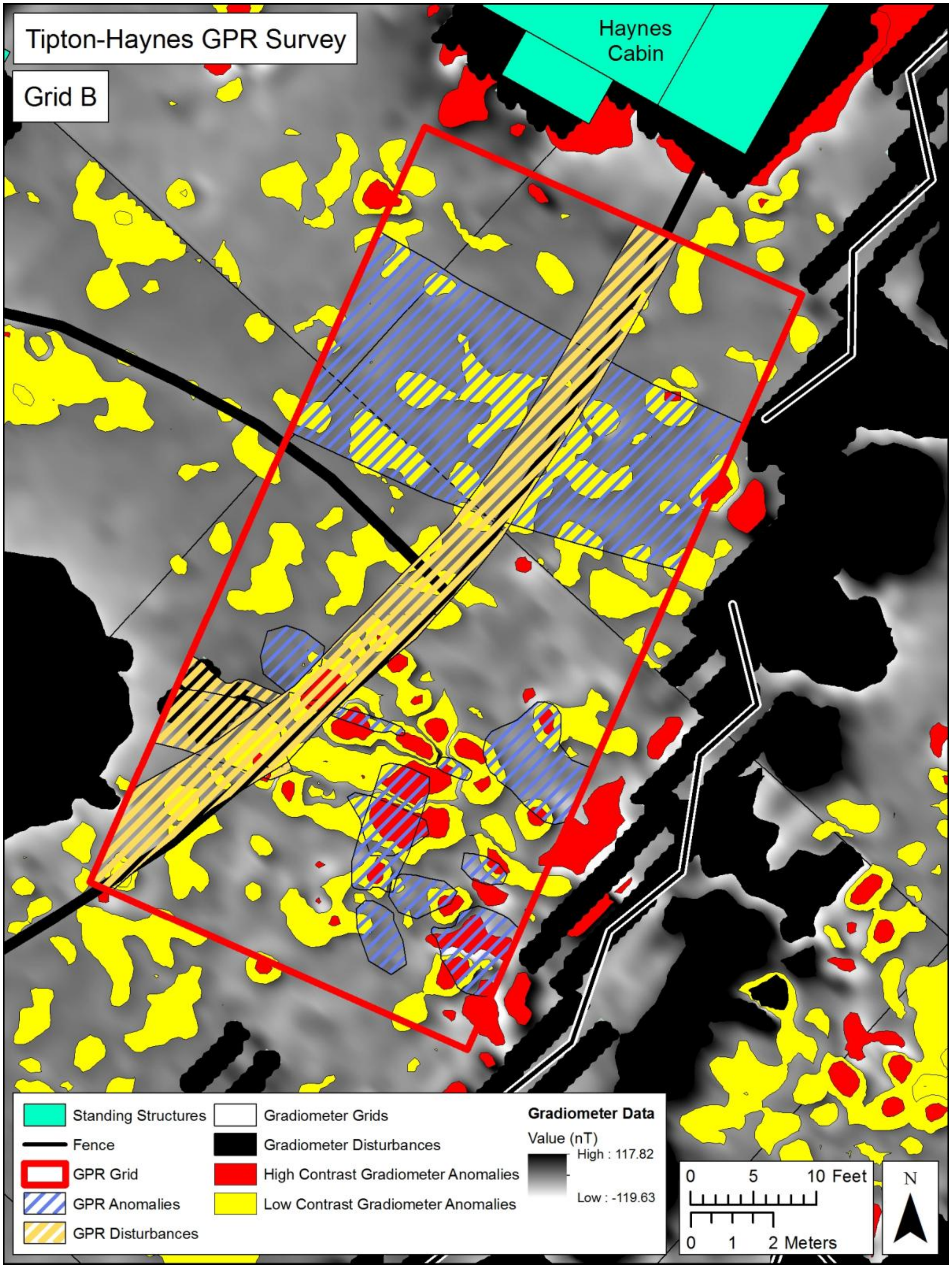

Figure IX.21. GPR Grid B with highlighted anomalies overlain with gradiometer survey data including high (>50/<-50 nT) and low (-10 to 10 nT) contrast contours.

VITA

Daniel Brock was born on December 25, 1975 in Chattanooga, Tennessee. Daniel continued to live in Tennessee during his primary education attending schools in Chattanooga, Knoxville, and Nashville. After graduating from Hillsboro High School in 1994, he then entered the workforce before continuing higher education.

Daniel attended Middle Tennessee State University (MTSU) in Murfreesboro seeking a degree in Anthropology with a minor in Geology. Interest was sparked in the field after taking an introductory archaeology class with Dr. Sarah Sherwood and an archaeological field school with Dr. Kevin Smith. Influence was also gained in the field of historical archaeology while working with Samuel D. Smith of the Tennessee Division of Archaeology at the Wynnewood State Historic Site. Daniel received his B.A. from MTSU in 2003.

After graduating from MTSU, Daniel worked in the field of archaeology for several cultural resource management firms on a variety of projects. He also served as the archaeological supervisor at The Hermitage, home of President Andrew Jackson.

With a regained interest in historical archaeology, Daniel then attended the University of Tennessee's (UT) anthropology graduate program seeking a Master's of Arts degree studying under Dr. Barbara Heath. While attending UT, Daniel was married to his wife Crystal and worked as the Research Coordinator/Archaeologist at the university's Archaeological Research Laboratory. Research interests include historical archaeology, dendrochronology, archaeological geophysics, and geospatial techniques. Daniel received his Master's degree at the University of Tennessee in December, 2012.