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## Hiwassee Island: The Research Value and Limitations of Legacy Collections

Erika Leigh Lyle

University of Tennessee, Knoxville, [evaughn5@vols.utk.edu](mailto:evaughn5@vols.utk.edu)

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To the Graduate Council:

I am submitting herewith a thesis written by Erika Leigh Lyle entitled "Hiwassee Island: The Research Value and Limitations of Legacy Collections." 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.

David G. Anderson, Major Professor

We have read this thesis and recommend its acceptance:

Timothy E. Baumann, Lynne P. Sullivan

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

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

# Hiwassee Island: The Research Value and Limitations of Legacy Collections

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

Erika Leigh Lyle  
August 2017

For my wonderful husband

Thank you for your unwavering support, now and always.

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## Abstract

This thesis examines the research value and limitations of WPA-era archaeological collections at the University of Tennessee's McClung Museum of Natural History and Culture from the Hiwassee Island site (40MG31) in east Tennessee. Excavations on Hiwassee Island were conducted from 1937–1939 and uncovered a multicomponent site with Woodland, Mississippian, and historic Native American occupations. The most common artifact from all time periods was pottery, numbering more than 80,000 sherds and 70 whole vessels (Lewis and Kneberg 1946:80). This ceramic assemblage was used to determine the research significance of the Hiwassee Island legacy collection by comparing it to modern excavation samples from this site and by applying new analytical techniques in an attempt to extract new data from old collections.

Sherds were compared for size, surface decoration, and vessel area between the 1930s legacy collection and a 1997–1999 excavation assemblage to determine data limitations caused by excavation and recovery methods. Unlike modern excavations, WPA-era investigations at Hiwassee Island did not employ screening or water flotation to recover artifacts. Instead, artifacts were hand sorted with a focus on larger or decorated sherds and an emphasis on rims, appendages, and effigies; the most prominent difference was sherd size.

The ability to collect new data with old collections was tested with pilot studies in absorbed residue and portable X-ray fluorescence analyses (pXRF). Absorbed residue analysis was conducted to determine if the avenue is worth pursuing with legacy collections. Results indicated that although interpretation can be difficult, absorbed residue analysis can provide insight into vessel use for legacy collection ceramics. The most interesting result was the presence of pine resin in most of the sherds tested.

A pXRF study was conducted to determine if paste differed between ceramic types. A discriminant function analysis revealed the ceramic types clustered in three distinct groups, suggesting that at least three separate clay sources were utilized. This research demonstrates that new technology does allow for the collection of new types of data from legacy collections that supplements, supports, and aids in the interpretation of old data sets, enhancing the research potential of these collections.

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## Chapter 1

### Introduction

This thesis examines the limitations and research value of archaeological legacy collections by addressing two questions, (1) What are the strengths and weaknesses of legacy collections when compared to more recent excavation assemblages?, and (2) Can advanced technological methods provide new insights into these old collections?

A legacy collection is an archaeological collection that has been previously excavated and stored in a repository; typically, this refers to collections created before archaeological project budgets included funds for curation, mainly before the implementation of modern excavation techniques and theoretical paradigms. Most archaeologists would argue that legacy collections are from excavations before the 1960s, the implementation of the National Historic Preservation Act of 1966 and other cultural resource management laws, and the introduction of processual archaeology (Means 2016:213; Schroedl 2016:219). However, collections created post-1960s during the Cultural Resource Management (CRM) compliance investigations, but before implementation of 1990s laws like the Native American Graves Protection and Repatriation Act (NAGPRA 1990) and regulations like 36 CFR Part 79 that mandated budgetary allocations for curation, are also considered legacy collections (Childs and Corcoran 2000 “Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79);” Sullivan and Childs 2003:18–19, 27). The main difference between pre– and post–1960s legacy collections is the field and lab methods used. Legacy collections usually carry connotations of poor curation and conservation of artifacts and associated documents, making accessibility for modern researchers difficult. A significant amount of legacy collections were excavated by amateur archaeologists, or by people who had very limited archaeological training.

The early years of archaeology in the United States (late 18<sup>th</sup> century) were largely funded by museums with an interest in curating collections, but with the implementation of the New Deal and Works Progress Administration (WPA), focus shifted to excavation over curation, frequently leaving no funds for curation in the budget (Sullivan and Childs 2003:5–12). Legacy collections resulted from these excavations and became the “victims” of the curation crisis that archaeology is facing today. Excavation methods, recovery strategies, and standards of care were not the same as today, and the collections generated were so large that repositories have run out of space to house old and new collections (Schroedl 2016:219; Sullivan and Childs 2003:32–35). In some instances, museums are starting to receive funding to properly curate legacy collections, thanks to federal regulations like 36 CFR Part 79 (1990) that requires government agencies to pay for the curation of archaeological collections they create. Chapter 2 discusses legacy collections and the curation crisis in archaeology by looking at a brief history of the discipline along with the current state of archaeological collections.

In this thesis I examine a legacy collection, housed at the McClung Museum of Natural History and Culture at the University of Tennessee, from the Hiwassee Island site (40MG31) in Meigs County, Tennessee that was recovered during excavations from 1937–1939 under the direction of Thomas M. N. Lewis and Madeline Kneberg Lewis (Lewis and Kneberg 1946). Archaeological investigations on Hiwassee Island were conducted with the University of Tennessee at Knoxville (UT) with a WPA crew as part of the Tennessee Valley Authority’s (TVA) Chickamauga Reservoir Project (Lewis and Kneberg 1946:3). Work conducted at Hiwassee Island “provided one of the first regional chronologies in the Southeast, thus laying the foundation for future work in the Tennessee Valley and a comparative base for other areas” (Sullivan 2009:182-183). Additional surveys and excavations were conducted in 1987, 1997–

1999, and 2015 (Hall 1987; Patch et al 2015; Sullivan 1998b). The site includes Woodland, Mississippian, and historic Native American components, along with non-Native historic components. The associated records and artifacts were permanently curated at the McClung Museum, which houses legacy collections from multiple Depression era excavations, as well as from later TVA investigations in Tennessee. Just over 50% of the 200+ sites whose collections are curated at the museum are legacy collections (Sullivan 2006:Table 1).

Chapter 3 provides an overview of archaeological investigations on Hiwassee Island. I evaluate the research value of this legacy collection by studying the excavation and laboratory methods used during the 1930s and compare them with a modern excavated collection recovered from this site from 1997 to 1999 by archaeological field schools from Appalachian State University and the University of Tennessee at Chattanooga (Sullivan 1998b). Chapter 4 provides a culture history of Hiwassee Island based on the archaeological investigations discussed in Chapter 3, as well as more recent research that has provided an updated interpretation of the site's history.

Prehistoric pottery is the focus of this comparative analysis to determine if any biases or limitations exist with legacy collections and to examine if newer methods and techniques can be successfully applied to old data and provide new interpretations or insights about past human behavior. Chapter 5 begins with a review of the curatorial state of the Hiwassee Island collections. A study in collection bias that examines ceramics from the WPA era excavations compared to those from the 1997–1999 excavations follows. The ceramics recovered in each excavation were compared by size, vessel area (body, rim, base, handle, etc.), and surface decoration to determine if there is a significant difference in the ceramics recovered. Chapter 5 demonstrates that WPA era collections are biased towards larger and decorated sherds, but do

not show a bias to vessel area (this term refers to what part of the vessel the sherd comprised, i.e. body, base, rim, shoulder, etc). Chapter 5 also revealed that roughly 1% of the potential ceramic yield is all that was excavated during WPA excavations of Hamilton shell middens.

Chapter 6 contains pilot studies of two modern technologies: absorbed residue analysis and portable X-ray fluorescence spectroscopy (pXRF). An absorbed residue analysis of wares found within the mound was conducted to determine any differences in use. Per Lewis and Kneberg, the Hiwassee Island Red on Buff, Red Filmed, and Complicated Stamped wares served as “non-utilitarian pottery which was used only on special occasions” (1946:94). While the sample size is too small to definitively address their statement, the analysis did provide interesting results and suggest that absorbed residue analysis on legacy collection ceramics is a promising avenue of research.

A pXRF analysis of six ceramic types from the mound was conducted to determine if there were any differences in paste used that would indicate the utilization of distinct clay sources. Although no sources from specific locations are available for comparison, test results did demonstrate at least three distinct paste groups. Cordmarked, Complicated Stamped, Plain, and Fabric Impressed wares formed the main group, while Red on Buff formed its own group, as did Red Filmed.

Chapter 7 contains conclusions drawn from the various analyses conducted. While legacy collections may be lacking in certain types of data and are not always adequately curated, they are still valuable to researchers and the public, particularly if supplemented with later excavations and analyses made possible by today’s advances in technology. Overall, this thesis demonstrates that comparing newer data to older data obtained from legacy collections and applying new methods and technologies to said collections can provide new insights in spite of



limitations caused by excavation and recovery techniques. The issues mentioned here are not exclusive to legacy collections and other projects could demonstrate research limitations caused by differing excavation methods and recovery strategies in non-legacy collections.

## Chapter 2

### Legacy Collections and the Curation Crisis in Archaeology

“As early as 1975 a consensus had emerged that there was a problem, that it would get worse, that we needed to agree upon minimal curatorial standards and ways to assess and recover real costs of curation. Today a crisis is upon us, and *something must be done*” (Marquardt et al. 1982:417, emphasis added).

This chapter defines legacy collections in more detail and explains the excavation strategies and recovery techniques used during WPA excavations in the Southeast. This chapter also discusses how legacy collections are in part a cause of the current curation crisis by tracing the history of the discipline in the United States, which includes a brief overview of influential legislation and the curation crisis.

#### *Legacy Collections*

Legacy collections are archaeological collections that were excavated before the implementation of modern excavation techniques and theoretical paradigms. Most archaeologists would argue that this refers to collections resulting from excavations before the 1960s, the National Historic Preservation Act of 1966 and other cultural resource management laws, and the introduction of processual archaeology (Means 2016:213; Schroedl 2016:219). Archaeological collections created post-1960s during the Cultural Resource Management (CRM) compliance investigations, but before federal mandates implemented in the 1990s like the Native American Graves Protection and Repatriation Act (NAGPRA 1990) and 36 CFR Part 79 that mandated budgetary allocations for curation, are also considered legacy collections (Childs and Corcoran 2000 “Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79);” Sullivan and Childs 2003:18–19, 27). The main distinction between pre- and post-1960s legacy collections are the excavation methods, recovery strategies, and laboratory methods. Poor

curation and conservation of both artifacts and associated documents are characteristics of legacy collections, which makes accessibility difficult for modern researchers. Excavation of pre-1960s legacy collections was largely done by amateur archaeologists or laborers with little to no archaeological training, or from projects where there was insufficient funding for analysis and curation.

The case for the continued study and curation of legacy collections has been made for almost four decades (e.g., Brown 1981; Christenson 1979; Marquardt et al. 1982; Sullivan 2001). Brown (1981:65) argues that “research potential depends on the integrity of a collection, which is the product of any systematic feature of observation and collection, no matter how primitive.” Differences in standards of excavation and recovery between legacy and modern archaeological investigations does not automatically mean legacy collections have no research value; it simply means that there will be limitations that must be worked around to conduct new research. In many cases, the legacy collections comprise the only archaeological data that we will ever have access to from many highly significant sites, especially on the Tennessee River where sites were inundated by TVA reservoir construction. Over 65 archaeology theses and dissertations at the University of Tennessee are based on the New Deal collections at the McClung Museum (Sullivan et al. 2011:95), which further establishes the research value of these collections. The Save America’s Treasures grant program funded a project at the McClung Museum to rehouse roughly 50,000 of the most fragile and diagnostic artifacts from WPA/TVA legacy collections for future generations of researchers, as well as the benefit of the public and to aid in cultural heritage preservation (Sullivan et al. 2011:98–99). All of these reasons demonstrate the significance of legacy collections and support their curation in perpetuity, which is why this thesis is not concerned with arguing that point.

A main concern with legacy collections in terms of research potential stems from their excavation methods and recovery techniques. Many of the excavation techniques employed in Depression era archaeological projects were influenced by the Chicago field school methods, as most of the supervising archaeologists were products of those field schools (Howe 2016:59–60; Sullivan 1995:xvii, 2016:140). In general, WPA excavations in the Southeast excavated mounds by running trenches through them in order to understand profiles, and the “vertical face of this trench [wa]s then carried forward into the mound” (Lewis et al. 1995:630; Lyon 1996:xiii). On Hiwassee Island, this vertical slicing technique was employed, but as the trenches were taken forward into the mound in two to three inch levels, excavation stopped when postmolds or floor patterns became evident and horizontal excavation, or “peeling,” of the mound occurred in order to expose each occupational level individually (Howe 2016:59; Lewis et al. 1995:xviii, 630; Sullivan 2009:185, 2016:140). This strategy “made it possible to obtain a complete series of vertical profiles along the north-south and east-west axes, and to expose an entire building level at one time” (Lewis and Kneberg 1946:29).

In all contexts, whether village or mound, digging was normally done by arbitrary levels. Natural stratigraphy was rarely used as the provenience unit on field records during WPA-era excavations. Instead, a reconciliation of arbitrary levels with observed natural levels was attempted in field reports after excavation was complete. Artifacts were associated with arbitrary levels on field forms rather than natural stratigraphy (Lyon 1996:55). At Hiwassee Island, mounds were excavated along the vertical profile of the trench in two to three in levels to ensure that postmolds were not missed before horizontal stripping began (Lewis et al. 1995:630). The village area was excavated in six inch arbitrary levels, which Lewis and Lewis noted “proved to be a snare as well as a delusion. We found ourselves entangled in an all but inextricable maze of

datum, surface, and subsoil measurements when we attempted to coordinate all of the evidence recorded and recovered” (Lewis et al. 1995:270).

New Deal archaeologists and field crews did not screen for small artifacts or employ flotation processes that would have yielded botanical materials. While lithic tools were kept, debitage was discarded. Animal bone and shell that did not appear to be worked was discarded as well (Sullivan 2016:141). This lack of screening and flotation resulted in a reduced recovery of the number of all artifact classes (Schroedl 2016:221–222). These general WPA practices were also in place at Hiwassee Island. By the late 1960s, a variety of recovery strategies were in place, including coarse and fine screening and flotation. The effect of these new strategies was a dramatic increase in the number and types of samples recovered over those recovered in previous investigations that had not employed these methods, “although in some cases WPA projects had exposed far larger areas and removed far greater volumes of deposits” (Schroedl 2016:227). Therefore, one would expect to see a bias towards lithic tools, diagnostic and large pottery sherds, and worked shell and bone in the Hiwassee Island collection, with little to no botanical remains, or small faunal remains that would be indicative of subsistence practices. The lack of certain artifact classes, the biases in those classes present, and the confusing system of arbitrary level excavation all limit the research possibilities of these legacy collections in answering questions commonly asked by the discipline today, such as subsistence practices and activity areas.

A second concern facing legacy collections is linked to the curation crisis in archaeology. In fact, it could be argued that the sheer number of artifacts and associated documents produced as a result of WPA excavations are at least in part a direct cause of the curation crisis, as “the objectives of the early New Deal excavations were aimed at conserving and preserving as much

as possible an accurate, complete, and permanent record of all significant data” (Dye 2016:7). This resulted in collections of overwhelming size that had to be housed in storage facilities.

Adding to the crisis, many legacy collections were packed in a variety of materials that are not conducive to preservation, but that may be toxic to people (such as arsenic), contain mold or animal feces, or are causing the deterioration and destabilization of the artifacts and other parts of the collection. Examples of these include paper bags, scotch tape, metal fasteners, rubber bands, newspaper, and cardboard boxes. Fragile items were not always packed separately from heavier, bulkier items that eventually caused damage, especially when boxes were stacked on top of one another. Another problem is that associated records for legacy collections are frequently not available or are in very poor condition, yet these records are vital to maximizing the research potential of these collections (Barker 2004; Sullivan and Childs 2003:36–38; Drew 2004). In some instances, the rapid nature of the reservoir projects and the onset of World War II are the reasons few records survive and that final reports were never published (Lyon 1996:4). This leads to issues of accessibility—if the records are either not available or in poor condition, modern researchers may not have access to the information necessary to properly interpret the artifact assemblages, even if said assemblages are in good condition.

Unfortunately, many legacy collections were never archivally repackaged or labelled properly into acid-free bags and boxes. Instead the artifacts remain in conditions that lead to their physical deterioration, and thus diminish their research value. The high cost of rehabilitating large legacy collections can prevent museums and other repositories from providing proper care (Childs and Sullivan 2004:12–13, Sullivan and Childs 2003:34–35). “The most serious threat to the WPA-era and other collections throughout the state [of Tennessee] is lack of or inadequate resources to properly curate them” (Schroedl 2016:232). That is why we need to address the

research limitations and potential of legacy collections for both academia and the public, to encourage the appropriation of funds for proper curation. It is also vital that associated records for legacy collections are maintained properly and digitized to guard against future deterioration and loss, so that future analysis can be conducted—without these records, the collections become just groups of loosely associated objects, and no longer useful as research materials. Costs can also be cut by deaccessioning redundant data or boxes of artifacts with presumed limited research value, such as brick samples or fire cracked rock.

Despite the many obstacles facing the study of legacy collections, they still have much to offer the field of archaeology. In fact, “scholars increasingly have turned to the New Deal-era collections to answer new research questions” (Schroedl 2016:231). The future of legacy collection curation calls us to address the not only the limitations of legacy collections, but also their research potential and value to both academia and the public. Recent “exhortations [...] to excavate existing collections in order to utilize warehoused materials [and] increase public awareness of both the material stored in institutions and the attendant issue of storage” (Kersel 2015b:78) are signs that the field is moving in the right direction. Several studies within the past two decades illustrate this point well.

Barker (2004) provides two examples of research conducted on artifacts collected during the early 20<sup>th</sup> century; both studies were made possible by well-preserved associated documents. The first was a site known as Spencer Lake Mound in Burnett County, Wisconsin, that was excavated in 1936 by the Milwaukee Public Museum (Barker 2004:26–31). Excavators discovered a horse skull in prehistoric cultural strata. They knew that it was impossible for the skull to date to the assumed pre-contact period in which the mound was constructed as European horses did not arrive until contact. The deposit in which the skull was found was determined to

be intact, so in 1936 it was concluded that the mound must have been constructed during the early contact historic era. However, the quality and preservation of the field notes allowed for a modern study to create a representation of the mound including the precise location of the horse skull as discovered in 1936. Based on soil and cultural deposit descriptions from the documents, among other information, researchers could confirm that the discovery was a hoax that had been forgotten, and rightfully situate the mound in prehistory (Barker 2004:30–31). The second case concerns obsidian discovered in the Craig Mound at the Spiro site in Oklahoma during 1933–1935 excavations. The meticulous records kept by the discoverer of the obsidian correlated with later WPA excavations and records of the mound, providing solid proof of the flake’s provenience. Barker (2004:32; Barker et al. 2002:103) sent the flake off for X-ray fluorescence analysis that confirmed the obsidian was from a source in Hidalgo, Mexico. This confirmation of interaction was only made possible due to care and preservation of the original documents (Barker 2004:32–33; Barker et al. 2002:105); without this legacy collection, the field might still be looking for evidence of Mesoamerican contact in that area.

Modern excavations can also be used to detect bias in legacy collections, and combining information can provide a clearer picture of what was going on at a site. For example, Marshall and Krus (2013:184) screened the backfill in a single WPA-era excavation block in the East Village at Angel Mounds. This approach was chosen because it was non-destructive to the parts of the site that have not been excavated. Their excavations revealed that only 80% of the ceramics and flakes found were retained for curation during the WPA excavations. Their study was based on the assumption that the backfill used was from the same area and not brought in from other parts of the site (Marshall and Krus 2013:185). Considering modern archaeological practices, this seemed a safe assumption. Marshall and Krus (2013:183–184) concluded that the



“missing” 20% was partially due to the lack of water-screening and fine screening during previous excavations. Most importantly, their data demonstrated that it is “possible to get new data from an old trench” (Marshall and Krus 2013:188), that modern excavations can evaluate what might be missing from legacy collections, and that being aware of bias could change site interpretation.

Lori Thompson’s 2016 thesis, focusing on the physical condition of a collection resulting from urban excavations conducted from 1976–1979 as the metro transit system was constructed in Atlanta, Georgia, serves as another example of the vitality of legacy collections. She analyzed the organization of the collection, the challenges that would be faced when reassessing and stabilizing the collection, and how to increase accessibility for future researchers. After analyzing the collections, she proposed a project that would use data generated from the collections to place plaques or small displays at various sites along the MARTA line where the public would come in contact with them every day. These plaques would explain the historical significance of each site, and generate public interest in the collection (Thompson 2016). Her thesis served as an example of giving legacy collections a “second ‘life’ through renewed analysis” (Thompson 2016:1) as well as ways in which to engage with the public.

Sissel Schroeder (2013) at the University of Wisconsin examined artifacts and structural features from William S. Webb’s research on the Jonathan Creek site in western Kentucky and compared them with her reanalysis to identify the research potential and significance of New Deal-era legacy collections. Schroeder argues that renewed research into New Deal collections, can “demonstrate their potential for studies that pose fresh questions, revisit the conventional interpretations derived from New Deal work, apply new analytical methods, use new inferential frameworks, and support the reworking of interpretive narratives presented to the public”

(2013:166). Schroeder's (2013) research into this legacy collection used radiocarbon dates on corn and wood supported by limited ceramic analysis to date the site to the thirteenth century. Webb had previously compared the Jonathan Creek site layout to eighteenth century Chickasaw and Natchez site layouts based on his interpretations of the architecture. However, Schroeder's (2013:180) use of modern technologies (i.e., radiocarbon dating) and reanalysis of the architectural evidence (superpositioned structures indicating that at least two wall trench foundations postdate the single post buildings in the village site) demonstrates how legacy collections still have research potential today, can still lead to and answer new questions, and that modern technology can be the key to interpreting what these collections still have to tell us.

These studies demonstrate that legacy collections can be used for current research despite their limitations, and are valuable resources that should be cared for and utilized to better understand the past. Examining legacy collections in conjunction with more recent excavations, and using new technology to study them, reveals biases in previous excavations and in the process, allows for a clearer understanding of the site and its occupants. Documenting existing biases and how to glean new information from legacy collections is what I explore in my study of the Hiwassee Island ceramic collection. After all, "the future of archaeology [...] is in excavating the collections" (Childs, in Bawaya 2007:1026).

### *History of Curation in Archaeology*

The current curation crisis with legacy collections is largely the result of a lack of responsibility among archaeologists, museums, and government agencies. The main issue within archaeology is that curation, associated records, and applied research have not been given the same priority as excavation, artifacts, and basic research (Childs and Sullivan 2004:4; Kersel

2015a:44). The lack of storage space in repositories has created a need to justify the care of long-term collections based on their potential use for professional archaeologists, students, curators, heritage communities, educators, and interpreters—in other words, collections that have not been properly curated are vulnerable because they may have less potential research value (Childs and Sullivan 2004:13; Kersel 2015b:78). What archaeologists and government agencies have failed to realize in the past is that archaeological curation includes not only making a collection, but managing and caring for that collection over time (Childs and Corcoran 2000 “What is archaeological curation?”). The issue that archaeology as a field is facing is one of accountability and credibility for archaeologists, their fieldwork, and research (Bustard 2000:10; Sullivan and Childs 2003:3). Unfortunately, in the past,

professional archaeologists believe[d] that systematic archaeological collections [we]re essential to comparative research, yet have been slow to realize that such collections represent a valuable resource only if they are properly documented, conserved, and organized in such a manner that their research value is maintained (Marquardt et al. 1982:409).

There is a trend towards more reliance on curated collections for archaeological research now than in the past (Sullivan 1992:1), making it more important than ever to ensure that these collections are properly cared for. Overall, there is a critical need for 1) archaeologists to accept responsibility for the collections they create (although many are already starting to do so), 2) the development of standardized guidelines for the curation of archaeological collections, and 3) the development of methods to realistically assess the costs of adequate curation for said collections (Christenson 1979:162; Marquardt et al. 1982:409). To do so, there needs to be a dialogue between archaeologists, curators, and museum professionals to ensure the proper care of archaeological collections (Sullivan 1992:1) as well as an emphasis on the responsibility of

everyone involved in the archaeological investigation to see to the curation of the collection post-fieldwork (Childs and Corcoran 2000 “What is archaeological curation?”; Kersel 2015b:77).

In the early history of the discipline (late 1800s–1930s) in the United States, archaeologists were more focused on curation than in later decades as a good number of them were employed by museums and government agencies, and responsible for the entire archaeological process from fieldwork through curation; this has been called the “museum era” of archaeology (Childs and Corcoran 2000 “History of US archaeology and curation;” Childs and Sullivan 2004:5–6; Sullivan and Childs 2003:5). However, as professional positions shifted to academia, curation was pushed aside and considered someone else’s responsibility (Childs and Corcoran 2000 “History of US archaeology and curation”). During these early years of the discipline the federal government began passing legislation that was meant to protect archaeological sites. The Antiquities Act of 1906 was among these early acts and its purpose was to preserve archaeological sites and protect sites from looting (Childs and Sullivan 2004:6; Childs and Corcoran 2000 “Antiquities Act”). The act established a permit process for excavations as well as fines and punishments for any unauthorized excavating or looting (Childs and Corcoran 2000 “Antiquities Act”; Childs and Sullivan 2004:6). This act also allows presidents to declare historic and prehistoric sites and associated structures to be national monuments (16 U.S.C. § 432 1906). The Antiquities Act also provides a stipulation for curation, that excavations and artifact collection may be carried out

provided that the examinations, excavation and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums (16 U.S.C. § 433 1906).

This section implies that curation should be arranged before a permit is issued but does not require it, which could be part of the reason why post-museum era archaeology did not emphasize curation.

In the 1920s, archaeology became a more recognized profession and as such required a university education. At this point, archaeological collections obtained by university departments became their property, rather than that of museums, which decreased public access. Between the 1920s-1940s, during the Depression (WPA and New Deal era), the idea that fieldwork was more valuable than curation developed among a considerable portion of archaeologists (Childs and Sullivan 2004:6). As a result, much of the discipline shifted focus to excavation and less on curation, to the point that project plans did not include curation at all, claiming that there was no budget for it. A likely explanation for the lack of curation budgets is that New Deal programs were created with the goal of putting as many people to work as possible, and field work is more labor-intensive than laboratory work (Sullivan and Childs 2003:11–12). At this point, curation based graduate research or work with existing collections was discouraged, and most programs did not (and many still don't) teach basic collections management (Bustard 2000:14; Childs and Sullivan 2004:7; Longford 2004:149–151).

During the post-WWII era, a “New Archaeology” arose with interests placed on processes of culture change and aspects of human behavior. This research refined collection strategies to recover many small artifacts, such as botanical and faunal remains and chipping debris, that previously was not recovered or curated. The research goals of “New Archaeology” in conjunction with a focus on salvage archaeology during the construction of dams and interstates pushed curation even further out of mind (Sullivan and Childs 2003:18–19). Several university museums were created to care for the massive collections, like the McClung Museum

of Natural History and Culture at the University of Tennessee, which was founded in 1963 (Sullivan et. al 2011:68,70; <http://mcclungmuseum.utk.edu/about/history/>).

The National Historic Preservation Act of 1966 (NHPA), National Environmental Policy Act of 1969 (NEPA), Archaeological and Historic Preservation Act of 1974 (AHPA), and the Archaeological Resources Protection Act of 1979 (ARPA) were implemented beginning in the late 1960s to provide additional protections for archaeological sites and their management (Childs and Sullivan 2004:7). While the importance of curation was recognized in some of these laws (16 U.S.C. § 470cc(b) 1979; 16 U.S.C. § 469a-1(a) 1974; 16 U.S.C. § 470a-101(e)(3)(iii) 1966; 16 U.S.C. § 470a-112(a)(1)(B) 1966), more funds were provided for excavating the locations of dams and roads where sites would be destroyed than to repositories for the curation of the resulting collections (Childs and Sullivan 2004:7). The massive amount of archaeological data collection immediately resulting from these new laws resulted in even more issues with curation, such as the inadequate care and deterioration of objects, a lack of professional staff, funding deficiencies, inadequate storage, little to no security, the inaccessibility of collections, and that many archaeologists were taking little to no responsibility for the curation of said collections (Childs and Sullivan 2004:7–8).

The Archaeological and Historic Preservation Act of 1974 was the first to call for federal regulations for archaeological curation (Childs and Corcoran 2000 “Cultural Resource laws into the 1970s”):

The Secretary shall consult with any interested Federal and State agencies, educational and scientific organizations, and private institutions and qualified individuals, with a view to determining the ownership of and the most appropriate repository for any relics and specimens recovered as a result of any work performed as provided for in this section (16 U.S.C. § 469a-3(b)).

The Archaeological Resources Protection Act of 1979 (ARPA) provides the most explicit support for curation by recognizing that objects excavated from federal lands are federal property and therefore their curation is a federal responsibility (16 U.S.C. § 470aa-b 1979; 16 U.S.C. § 470cc(b)3 1979). ARPA also requires that objects and associated records be preserved in an appropriately equipped institution, prohibits disclosing information to the public regarding the locations and other details of archaeological sites, and allows the Secretary of the Interior to issue regulations providing for the care and management of federal archaeological collections (Childs and Corcoran 2000 “Archaeological Resources Protection Act (ARPA) of 1979”). A written agreement with a repository must be submitted as part of the permit application under ARPA (16 U.S.C. § 470cc(b)3). This legislation, while admirably intentioned, only worsened the curation crisis: “compliance driven excavation and survey has produced millions of records and artifacts associated with pre-development mitigation that are routinely deposited in local, state, and national museums, archives, libraries, and institutions to be ‘curated in perpetuity’” (Kersel 2015a:44), causing storage facilities to fill up and alternative storage solutions sought after that may not be the best for preservation. In the 1970s, the implementation of these new laws revealed even more issues with curation, such as inadequate care and deterioration of objects, the lack of professional staff, funding deficiencies, inadequate storage, little to no security, and inaccessibility of collections.

36 Code of Federal Regulations (CFR) Part 79 (1990), a more recent addition, clearly states the obligations of federal agencies to pay for curation of their collections, both new and preexisting, as well as the data generated as a result of the excavations: “The Federal Agency Official is responsible for the long-term management and preservation of preexisting and new collections” (36 CFR § 79.5 1990). This regulation covers excavations conducted either with the

authority of or in connection to Federal agencies, laws, and permits. 36 CFR Part 79 also covers the collections management responsibilities of Federal agencies: 1) review and evaluate all preexisting collections as well as their managing repositories, 2) work with federal and non-federal repositories to either correct inadequate care at that location or move said collections to a location properly equipped to care for them, 3) new collections must be sent to properly equipped repositories, 4) a copy of all administrative records concerning a collection and excavations should be kept at the agency location, including but not limited to contents of the collection, contracts, and reports, and 5) the burden of financial responsibility falls on the federal agency (36 CFR § 79.5a-c 1990). 36 CFR Part 79 provides that Federal agencies may use funds set aside annually by Congress to “purchase [and/]or maintain their own repository; enter into a cost-sharing agreement with a repository; reimburse a grantee for curatorial costs; reimburse a state for curatorial costs; and conduct inspections and inventories” (Childs and Corcoran 2000 “Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79)”; 36 CFR § 79.1a 1990). If the time comes that a repository is no longer able to care for a collection, a federal agency may provide funds to correct any deficiencies or it has the option to transfer said collection to another repository (36 CFR § 79.7a-6 1990). In turn, a federal agency may charge curation costs for collections generated by excavations on federal land directly to those permitted to excavate (36 CFR § 79.7b 1990; Childs and Corcoran 2000 “Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79)”). Funds paid to a repository should include enough for initial processing, cataloguing, and accessioning as well as storage, inspection, inventory, maintenance, and conservation (36 CFR § 79.7d1-3 1990) and providing access to collections on a short and long-term basis (Childs and Corcoran 2000 “Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79)”).



The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) changed collections management in that it required detailed inventories of collections that in many cases had yet to be properly inventoried (25 U.S.C. § 3003); in doing so, it directed more attention to the collections, the state they were in, and the care they required (Sullivan and Childs 2003:27). Together with NAGPRA, 36 CFR Part 79 provided new requirements for inventories and minimum standards for collections care and management by recognizing the costs of curation, and placing that responsibility on the government agency on whose lands the collections were excavated (Childs and Sullivan 2004:8).

As a response to federal legislation and implementing regulations, professional organizations created curation committees and task forces in the 1990s meant to enforce these standards (Childs and Sullivan 2004:9). The Register of Professional Archeologists (RPA) was slightly ahead of the curve. The RPA (formerly known as the Society of Professional Archaeologists) was likely the first such organization to publish regarding curation and professional standards with its "Standards of Research Performance" in 1981 (Childs and Corcoran 2000 "Ethics"). These standards (1) hold the archaeologist(s) responsible for ensuring adequate and competent staff and support facilities to enable them to complete a project, along with sufficient curatorial facilities to house artifacts and records; (2) state that the archaeologist(s) are responsible for ensuring that a correlation between artifacts and field records is maintained during accessioning, analysis, and storage; and (3) require the archaeologist(s) to select a repository that can curate the collection permanently (Childs and Corcoran 2000 "Ethics"). The Society for Historical Archaeology (SHA) and the Society for American Archaeology (SAA) also created curation committees and task forces to aid in this endeavor (Childs and Sullivan 2004:8).

In spite of these efforts, the gap between excavation and curation is growing ever larger as collections management and curation become more specialized fields and some, if not most, of these professionals are not trained archaeologically (Sullivan and Childs 2003:20). On the positive side, this means that archaeological collections are being cared for by those specifically trained to care for artifacts based on material type. However, individuals without archaeological training may not maintain the collection in a way that is conducive to archaeological research. Overall, what the field is facing now is how to manage collections growth so that all archaeological materials from both old and new collections can still be properly cared for and used by modern researchers, as good curation costs money, and money is not abundant in archaeology (Sullivan and Childs 2003:21).

#### *Key Elements of the Curation Crisis*

Legacy collections that do not have proper documentation or that have not yet received proper care can be devalued by researchers because of the current curation crisis facing archaeological collections. There are several key elements of the current curation crisis that are either ongoing in the field or are past problems that need to be rectified: 1) often, no responsibility is taken for collections by archaeologists (this may be one of the few elements that is changing quickly), 2) no courses are offered for graduate or undergraduate students in archaeological curation, 3) the limited publication and distribution of reports, 4) issues of ownership, 5) standards of management and care, 6) what the profession deems to be its professional responsibilities, 7) curation costs, and 8) information management, to name a few of the major culprits (Bawaya 2007; Bustard 2000; Childs and Sullivan 2004:11–17; Drew 2004; Kersel 2015b; Longford 2004; Marquardt et al. 1982; Sonderman 2004; Sullivan and Childs

2003:28–29). While improvements in standards of care have been made (Childs and Sullivan 2004:8–9, Sullivan and Childs 2003:24–28, 32–33), the issue of properly curating archaeological collections is ongoing and must be understood, and dealt with if valuable collections are to be maintained. As for professional responsibilities, curation is still in many cases not seen as the responsibility of archaeologist(s) (Sullivan and Childs 2003:28). The problem is, for many within the archaeological profession, digging has always been more valued than curating, objects more valued than records, and basic research more important than applied research (Childs and Sullivan 2004:4; see Gero 1985 for an interesting discussion of gender roles within archaeology that parallel the above contrasts). To rectify this, three things need to happen: the first is that a course on archaeological collections management should be required at the graduate level, in order to instill the idea into future archaeologists; the second is to increase the number of jobs at repositories and CRM companies dedicated to collections management—the more jobs there are in the field, the more of a demand there will be for archaeologists to be trained properly; finally, there should be more interaction between archaeologists and repository staff, so that archaeologists can better understand how to care for objects in the field, and transfer them to the repository in the best condition possible (Longford 2004:149–151; Sonderman 2004:107; Sullivan and Childs 2003:34). In spite of this history and the need for change in the future, there has been more use of curated collections for archaeological research in recent years than in the past (Barker 2004; Barker et al. 2002; Marshall and Krus 2013; Schroeder 2013; Sullivan 1992:1; Sullivan et al. 2011:95–97; Thompson 2016), emphasizing the need for communication between archaeologists and museums to ensure proper care of archaeological collections. Museum professionals and archaeologists must also determine whether curated collections have

future research potential, and if so, ensure that their repositories are properly equipped to maintain their research integrity (Sullivan 1992:3).

It is often difficult to determine ownership of archaeological collections, but should be done for budgetary purposes as well as to create an inventory with accurate storage locations (Sullivan and Childs 2003:29–31). In general, collections belong to the owner of the land where excavations were conducted, whether that be a private individual, university, repository, museum, or government agency; university collections obtained by graduate students or faculty may seem to belong to them, but in reality may belong to a federal agency or the university with which they are affiliated (Childs and Sullivan 2004:9–10). Archaeologists need to advocate for clear understandings of ownership *before* excavations are conducted and assist in identifying the owner when collections are transferred to a repository (Childs and Sullivan 2004:11; Sonderman 2004:112). In theory, to save money and be able to devote time and effort to other collections, repositories should refuse collections without a specified owner (Childs and Sullivan 2004:11). Standards of management and care were provided in 1990 by 36 CFR Part 79 (36 CFR § 79.5) that apply to all federal agencies and their repositories, but are interpreted differently across agencies, which is problematic (Sullivan and Childs 2003:33). These guidelines need to be standardized across the board, so that all collections are handled in the same way, and all professionals know what is expected from them. Repository fees should also be standardized in a way that aids archaeologists in allocating a portion of their budget to curation; project managers would also benefit from a system of accreditation for repositories, ensuring that the repository chosen to house their collections will provide the proper care (Christenson 1979:162; Childs and Sullivan 2004:12).

Associated records also need to be managed properly, both in the field and later at the repository. In the past this has been poorly done, resulting in the loss of vital information regarding sites and the data gathered there (Sullivan and Childs 2003:36). An emphasis needs to be placed on the importance of keeping provenience information intact and consistently associated with the appropriate artifacts, as well as keeping all artifacts from the same project or site *stored in the same repository* (Childs and Corcoran 2000 “Why is curation important?”). Field records, photos, and other associated records are also vital to the archaeological record and must be preserved; with the increased use of electronic databases to catalog, inventory, and store associated records, steps must also be taken to ensure the preservation of these databases (Bustard 2000:12; Childs and Corcoran 2000 “Why is curation important?”). Drew (2004) reiterates the lack of care for associated records in the past while pointing out that more recently the field has taken note of the problem of trying to analyze and understand collections without the proper paperwork, and as a result is trying to make a change in terms of keeping materials together. Deaccessioning should also be discussed by professional societies to create standards for determining when it is appropriate or necessary to deaccession an object or a collection to make room for more “useful” archaeological collections (Sullivan and Childs 2003:39–40). Subsequently, a regulation regarding the appropriate circumstances needs to be published under 36 CFR Part 79, and archaeologists and curators should write policies for specific repositories (Sullivan and Childs 2003:39–40).

Public access and use of archaeological collections also needs to be taken into consideration and resulting data should be structured in a way that answers the most commonly asked questions (Sullivan and Childs 2003:74). Restrictions should be put in place for physical access of collections as well as specific loan policies and agreements to protect the collections

(Sullivan and Childs 2003:74–76). Researchers should be encouraged to test new hypotheses with existing collections so that legacy collections have equal status with new excavations as “true research” (Kersel 2015a:47), and the discipline should value and promote graduate student research on existing collections (Childs and Sullivan 2004:17). As most archaeology is paid for by taxpayers, it is our responsibility to properly curate collections and make them accessible for other researchers and the general public to learn from (Bustard 2000:12; Kersel 2015a:44; Sonderman 2004:107). “If not properly cared for soon, [...], many [artifacts] will lose their educational and research value” (Bawaya 2007:1025), and the discipline owes it to the past and the future to ensure that this does not happen. What archaeologists need to know before conducting an excavation is how to properly “make” an archaeological collection.

Archaeologists need not only focus on their research questions, but their obligations to *both* fieldwork and its results, that is, *what to do* with the collections produced (Kersel 2015b:78).

Based on all the issues illuminated by the curation crisis, for any archaeological project the research design should include a curation plan, identify a repository where the collection will be stored, create an appropriate field collecting strategy, and use specialists to determine what, if any, portion of a collection is so highly redundant with little informative value that it can be culled to save space and money (Sullivan and Childs 2003:79–89). This entire process and excavation *must be documented* and these documents should be cared for by the same repository as the material culture collection (Sullivan and Childs 2003:88–89).

While it is important to understand curatorial issues within the discipline and how these issues came to be, this thesis is concerned with an analysis of the research limitations of legacy collections both in comparison to modern collections and in studies using legacy collection materials alone. The methods of excavation and recovery strategies of legacy collections as well

as their state of curation are important to this thesis because they are the direct causes of research limitations.

## Chapter 3

### Archaeological Research on Hiwassee Island

Hiwassee Island is located in Meigs County, Tennessee at the convergence of the Hiwassee and Tennessee rivers (Lewis and Kneberg 1946:1; Sullivan 2009:184; see Figure 1). The island was approximately two miles long and one mile wide with a total area of 781 acres pre-inundation. Height above sea level varies from 680' to 690'. This is a multicomponent archaeological site with Woodland Hamilton phase conical mounds and shell middens, a large Mississippian village with a platform mound and plaza, and historic Native American occupations during the 18<sup>th</sup> and 19<sup>th</sup> centuries (Lewis and Kneberg 1946:1; see Figure 2). Archaeological investigations were conducted in the late 19<sup>th</sup> and early 20<sup>th</sup> century by private individuals as well as the Smithsonian Institution (Harrington 1922; Lewis and Kneberg 1946:3; Moore 1915; Thomas 1891). A large scale excavation as part of the WPA and TVA collaboration on work relief/salvage projects was supervised by Thomas M.N. Lewis and Madeline Kneberg from 1937–1939 and uncovered an area of more than 33,000 square feet just in the village and mound excavation alone (Lewis and Kneberg 1946:3, 26; Lyon 1996:xiii; Sullivan 2009:184–185). In 1987 a reconnaissance survey was conducted of Hiwassee Island by the University of Tennessee on behalf of TVA to determine which of the archaeological features were not inundated and compare those features to those reported by the WPA excavations (Hall 1987; Patch et al. 2015:33). From 1997 to 1999 field schools were conducted on Hiwassee Island (Claassen 1998; Sullivan 1997) and in 2015 a geophysical survey of the island was conducted by New South Associates on behalf of the TVA to aid in resource management (Patch et al. 2015).



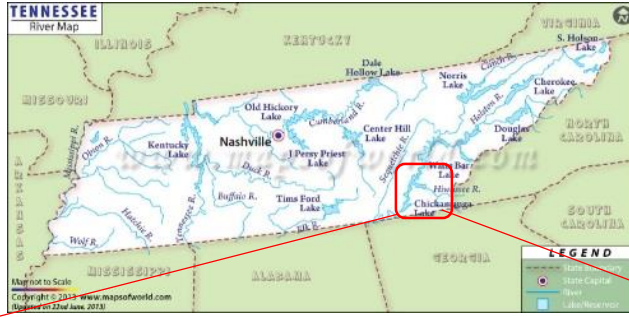
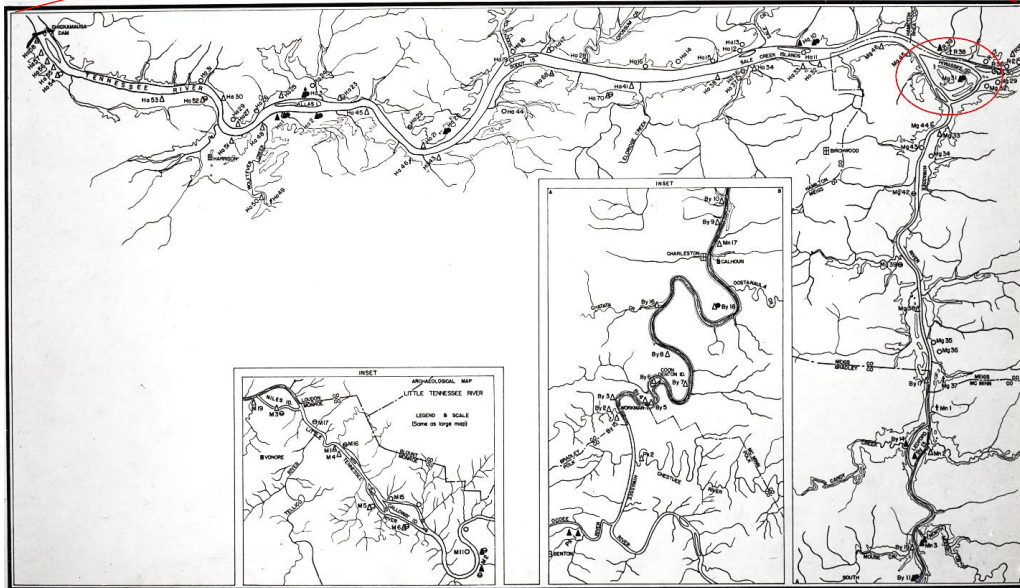
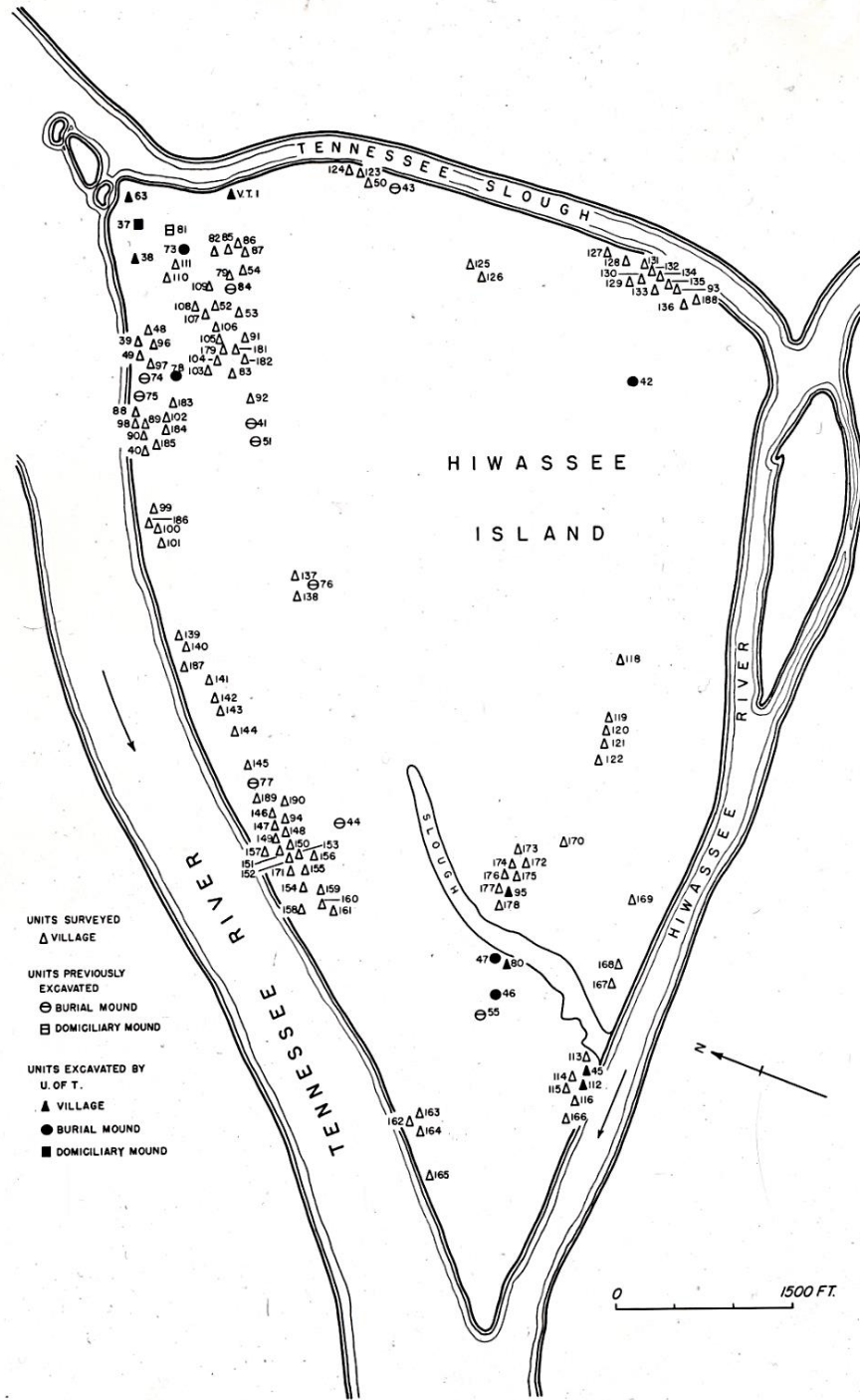


Image courtesy  
<https://www.mapsofworld.com/usa/states/tennessee/tennessee-river-map.html>



Lewis and Kneberg (1946:Map 2)  
 Image courtesy McClung Museum of Natural History and Culture, University of Tennessee

**Figure 1**  
**Location of Hiwassee Island in East Tennessee**



Lewis and Kneberg (1946: Map 1)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 2**  
**Map of Hiwassee Island**  
**WPA Excavation Units**

### *Late 19<sup>th</sup> and Early 20<sup>th</sup> Centuries*

The main excavations at Hiwassee Island resulted from the Tennessee Valley Authority (TVA) dam projects and the Works Progress Administration (WPA) efforts to create jobs during the Great Depression (Krause 2014:97; Lewis and Kneberg 1946:1–2; Sullivan et al. 2011:66–67). Various small excavations were carried out prior to the WPA era project, by J.W. Emmert, C.B. Moore, M.R. Harrington, and George D. Barnes (Harrington 1922; Lewis and Kneberg 1946:3; Moore 1915; Thomas 1891). Thomas, on behalf of the Bureau of American Ethnology of the Smithsonian Institution, reported that J.W. Emmert found twenty-four mounds on Jolly's Island (another name for Hiwassee Island, taken from the Cherokee chief John Jolly [Harrington 1922:95]) and explored five of those mounds (Harrington 1922:27; Thomas 1891:209). Collections resulting from these investigations are now curated at the Anthropology Department of the National Museum of Natural History. Moore gained permission of the current landowners, Mr. and Mrs. P.D. Benham, to investigate what he called Mound E on Hiwassee Island. He excavated a trench ten feet long by six feet wide and found one small (about one inch long) bone fragment. Nothing else was discovered until he reached the base of the mound, where he discovered a pit measuring three feet by three feet by four inches as far as he could tell, but did not determine its extent into the mound. The pit was excavated by trowel in case a burial was present, but it was not. Lithics were recovered from the pit fill. Moore also discovered that Benham's son and a friend had excavated one of the mounds and found burials and funerary objects, including pottery, a shell gorget, glass beads, and brass objects (Moore 1915:394–396). Moore's fieldnotes and other writings are housed at the Cornell University Library while his collections are curated at the National Museum of the American Indian, Smithsonian Institution. Mark R. Harrington also investigated Hiwassee Island, where he located and plotted 16 mounds

(1922:96). Harrington provided an overview of the 1911 excavations carried out by George D. Barnes, from Dayton, Tennessee, who appears to have been the friend of the Benham's son. The two excavated a mound on the lower end of the island where they found five burials and the accompanying funerary objects. They also excavated trenches near the platform mound where they located more burials that Harrington described as colonial and pre-colonial based on trade beads found with them (Harrington 1922:97–98). Harrington notes that the Barnes collection, at that point, had “been sold and scattered” (Harrington 1922:98). Harrington excavated a 15-foot-wide trench through a burial mound designated Mound 1, revealing eight burials and a shaft that had been previously excavated by Barnes. Four additional mounds and part of the village area were excavated using test pits and trenches, locating over twenty human burials and over eight dog burials (Harrington 1922:113–140). The resultant collections are curated at the National Museum of the American Indian.

### *WPA and TVA Investigations*

The New Deal policies created and enacted by Roosevelt during the 1930s implemented and created jobs across the country, with a focus on archaeology in the Southeast (see Dye 2016 and Pritchard and Ahlman 2009; Sullivan et al. 2011:66–67).

The first involvement of the federal government in prehistory was salvage oriented and the Antiquities Act was the enabling legislation [...]. Thus, when Congress passed the Tennessee Valley Authority Act (TVA) in May 1933, there were university personnel and others urging the immediate investigation of sites that would be inundated or destroyed in the construction efforts of these government projects (Haag 1985:272).

In the southeastern United States in particular, one focus of the work relief efforts was archaeology because it could employ large numbers of unskilled men (and some women) and professionals, and required relatively inexpensive equipment. The South also had a milder

winter, making archaeological work more appealing as it could continue almost year round. Over 60 percent of WPA funds given to archaeological projects were allocated to the Southeast. At this time, the TVA was working on regional development, and as a result of the construction of multiple reservoirs a considerable number of prehistoric sites were excavated through a process known as salvage archaeology (Dye 2016:6; Krause 2014:97; Lyon 1996:38,63; see Pritchard and Ahlman 2009; Sullivan 1995:xvi; Sullivan et al. 2011:66–67). Several authors (see Dye 2016; Krause 2014:98; see Pritchard and Ahlman 2009) have labeled the WPA and TVA archaeological projects as *salvage archaeology* “because TVA dams would inundate many archaeological sites, [and] a number of professionals and amateurs interested in archaeology pressured the TVA as early as August 1933 to begin a program of salvage archaeology” (Lyon 1996:38). In this instance, “salvage” referred to gathering as much information as scientifically as possible before the dams were inundated and these sites were lost forever. While the goals were to create an accurate and permanent record of the significant data from these basins in the most scientific way available at the time, in the strictest sense of the term, these WPA era excavations were salvage archaeology projects in that they were “saving” data before it was lost permanently.

WPA excavations on Hiwassee Island began in April 1937 and continued until April 1939. Charles H. Nash was the supervisor, and was assisted by Wendell C. Walker and Charles H. Fairbanks (Lewis and Kneberg 1946:3; Sullivan 2009:184–185). Lewis and Kneberg (Lewis et al. 1995:267) outlined the research objectives of all their excavations in the Chickamauga Basin as 1) to define the cultural complex(es) present, 2) to relate said complexes to others in the region, 3) to establish the chronological order of visible components, and 4) to determine the nature of the cultural processes involved in site formation. The focus of the WPA excavations at

Hiwassee Island was on the Mississippian village and the excavation of the entire main substructure mound (Sullivan 2009:185).

Excavators laid out a ten-foot grid rather than a five-foot grid on these large WPA sites due to the sheer number of workers. Sites were laid out along a north to south axis through the approximate center of the site, and to the south, an east-west base line was staked off at right angles to the north-south axis. Unit 37MG31, the substructure mound, was excavated by the WPA excavators using a stripping technique that involved excavating down to subsoil at the base of the mound and, following the soil coloration, continuing up the mound until summits were seen. Excavation moved continuously up the mound to avoid digging through postmolds but to arrive at the top layer and then excavate down the other side. After this process was complete on both axes, and all pertinent information recorded, excavation through the mound was continued, stripping one layer at a time in order to expose each summit separately (Lewis and Kneberg 1946:26–29). Horizontal stripping was used in order to accurately record house floor patterns on the mound and in the village. The entire floor pattern had to be cleared by the principal investigator before anything was recorded on the plat. Once plotted, postmolds had a stick inserted in their center, to avoid plotting the same postmold twice, especially in a slightly lower level where it may not be indicative of a distinct structure. Once potential floors were discovered, mattock use stopped and troweling began to prevent discarding portions of the floor as part of the arbitrary six inch levels. Midden and cache pits were plotted, but not necessarily described unless there were characteristics worth noting (Lewis et al. 1995:610). The Hiwassee Island mound was one of the first in the eastern US to be excavated using this “peeling” technique, exposing entire horizontal surfaces at one time to better understand occupation at each

level (Sullivan 2016:140). Using this method, multiple building plans on different summits were exposed, photographed, and mapped (Sullivan 2009:185).

The village was divided into four quadrants by two coordinate axes intersecting in the center and surface collection was conducted by quadrant. Test pits were dug at 50 foot intervals along both axes to subsoil depth and those test pits deemed worthy of excavation were connected by exploratory trenches that were three feet wide along both axes (Lewis et al. 1995:271–273). For village sites, the surface of each six-inch level was troweled rather than mattocked, so that postmolds and pits could be accurately located. All material culture discovered above the plowline was considered plowzone material; lower levels were excavated in arbitrary six inch levels and if natural stratigraphy occurred that separated deposits, those strata were excavated in arbitrary levels. The principal investigator on site (for Hiwassee Island, this could have been Nash, Walker, or Fairbanks [Lewis and Kneberg 1946:3]) then looked at artifacts from each six-inch level of all units to glean preliminary information regarding any cultural problems that may be encountered (Lewis et al. 1995:271–273). Nash (1940) discussed additional tools and methods that were useful during excavation, like using steel stakes instead of wooden ones. He also mentions that a sprinkling system was devised to use during the hot summer months. The ground would become too dry at times to notice features and postmolds causing them to be missed. The makeshift sprinkler system kept the “entire dig wetted down and in good shape to see all disturbances” (Nash 1940:162).

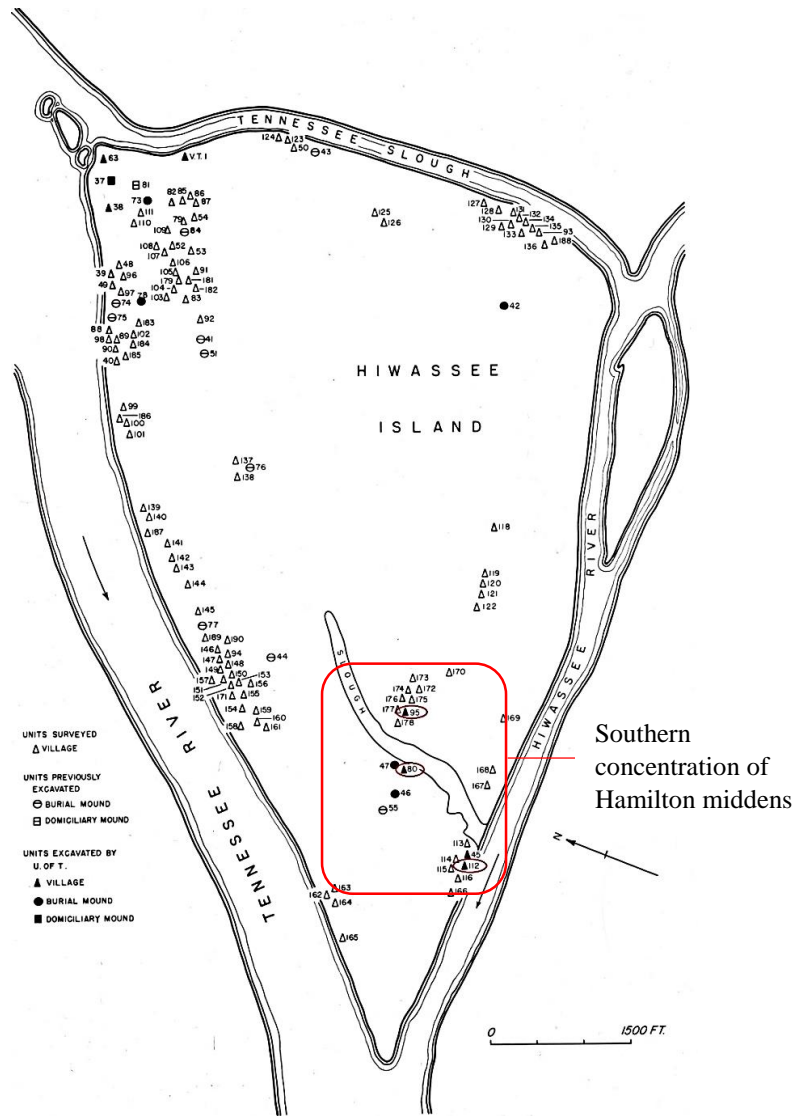
Varying techniques were used to excavate the small middens present on the island. These small Hamilton (referring to the Hamilton phase of the Woodland period) shell midden areas were regarded as refuse dumps (contained mainly mussel shell and sherds) by excavators and were located on the southern end of the island fairly close together (Lewis and Kneberg 1946:21;

see Figure 3). Unit 80 was excavated entirely while Unit 95 excavation was confined to a 20' wide by 45' long trench. Trench excavation also occurred at Units 45 and 112; for these middens the trench was 10' wide through the center and the deposits were stripped off in 3" levels. A 5' wide trench was dug at right angles between the two original trenches (Lewis and Kneberg 1946:21).

Only 5 of the 15 conical burial mounds were excavated using the same trench technique in which excavations started on both the north and south sides of the mounds and moved inwards until coming within one foot of either side of the axis going from east to west (Lewis and Kneberg 1946:22; Sullivan 2009:185). The final vertical two-foot section was used to check previously recorded profiles. Skeletons were poorly preserved for the most part and the mounds originated in the Hamilton phase occupation, although they were used by later occupations as well (Lewis and Kneberg 1946:22–23; Sullivan 2009:203, 204). The village area (Units 38, 63, and VT-1) was excavated on a grid system of ten foot squares. The plowzone was rapidly removed and subsequent layers were removed in arbitrary three inch intervals. Artifacts were recorded by six inch levels, an arbitrary division that seemed to have little use to interpretation according to Lewis and Kneberg (1946:26).

Sites were numbered using the number of the unit, two letter initials of the county, and the site number (Lewis et al. 1995:609–612)—the WPA era excavations site numbers do not start with “40” to indicate Tennessee as sites do now. Site numbers and unit numbers ran in sequence independent of the other, with site numbers serving the purpose of grouping several units excavated on the same location (Lewis et al. 1995:611-612). Skeletons were assigned a sequential number upon discovery that took the form of unit of excavation, county, and number of burial in said unit and were recorded on burial data forms (Lewis et al. 1995:612, 620).





Lewis and Kneberg (1946: Map 1)

Image courtesy McClung Museum of Natural History and Culture, University of Tennessee Knoxville

**Figure 3**  
**Hamilton Midden Units**

Photographs were also numbered and recorded in logs, and the numbers should have been part of the photograph using metal letter holders. The form of photograph numbers was photograph number, county abbreviation, site location number (Lewis et al. 1995:612). It is important to note here that the unit is not referred to in the photograph number, meaning photographs from the same *site* but different *unit* may be hard to distinguish between. Field specimens (artifacts) were numbered from “1” and continued onward for every *unit* excavated. Field specimens were recorded to the level and square where they were found on field specimen forms (Lewis et al. 1995:627).

Artifacts were handsorted without any screening. Small artifacts were not screened for and samples were not floated to look for botanical materials (Sullivan 2016:141). Some artifacts were washed and dried before packaging to be sent to the lab, while the more delicate specimens were just packaged for transport and washed at the lab (Lewis et al. 1995:607–608). Nash (1940:162–163) found that washing and cleaning as many specimens in the field as possible was not only efficient, but that it allowed the laborers to see the artifacts clearly and be better equipped to locate them in the future. In the winter months, when drying was more difficult, a pit was dug and filled with metal sheeting, metal bars, and sand. A fire was built to warm the sand and kept going all day, and washed artifacts were lain on paper that was placed on the sand to dry. Any artifact that was not harmed by heat, including animal bone and pottery, was dried in this manner (Nash 1940:163).

Wooden artifacts were wrapped in cheesecloth and loosely bound with string around the circumference, dried slightly in a shaded area, then submerged into a hot mixture of paraffin and gasoline. Finally, a tag was tied to the specimen with field specimen number and site number (Lewis et al. 1995:603, 618). Shell was soaked in water multiple times to remove any salt before

being dried and immersed in colorless nitrocellulose cement. Bone was also soaked in a thin nitrocellulose cement and wrapped in newspapers for transport (Lewis et al. 1995:619). Lithic tools were recovered, but any debitage discovered was culled (Sullivan 2016:141). Pottery disks were not assigned separate field specimen numbers, but were given the same number as the pottery fragments found with them. Pottery fragments and whole vessels, like other artifacts, were assigned an FS (Field Specimen) number based on the unit that they were excavated from and recorded on the FS log to the level and square where they were found (Lewis et al. 1995:627). Each sherd was not assigned an individual FS or catalog number, but all were given the same FS number (for example, all sherds from Feature 40 of 37MG31 Level E were assigned FS number 355). Broken artifacts (other than pottery vessels) were mended in the field, including skulls that were not too fragile. Before packing and sending artifacts to the laboratory, the archaeologist in charge of the excavation examined them and any that were too small to be classified were discarded and their corresponding number eliminated from the FS log (Lewis et al. 1995:607–608). Animal bones were among those artifacts culled at this point to remove any small unidentifiable pieces and “it [wa]s to be understood that potsherds which cannot be assigned to definite arbitrary or actual habitation levels might better be discarded than sent to the laboratory for study” (Lewis et al. 1995:610).

Catalog numbers were written as neatly as possible, but the reality is they often took up unnecessary amounts of space on the artifact. The number was to be placed on the least presentable side, and written in two parts separated by a horizontal line: FS number above the line, site number below. The field laboratory only numbered whole and mended artifacts; broken and restorable artifacts were labeled at the university laboratories (Lewis et al. 1995:613).

There are considerable limitations placed on the research potential of these collections as a result of these excavation and recovery practices. The practice of soaking wood specimens in paraffin and gasoline contaminated the samples and made radiocarbon dating impossible (Lewis et al. 1995:618; Lyon 1996:46). Newspapers were not a good choice for packaging, as they contribute to the destabilization and degradation of artifacts. The lack of catalog numbers on many of the plain and cordmarked pottery sherds makes any chronologically controlled ceramic study difficult. Although these sherds are separated by temper and unit, they are not always separated by excavation level within that unit and without a catalog number that information cannot be determined. Therefore, if a researcher should wish to conduct a study with temporal control including plain sherds, it would be difficult to obtain a large enough sample size. Finally, the lack of screening and flotation of the deposits as they were excavated prevented the collection of smaller artifacts, such as pottery sherds, small animal bones, and botanicals, that would have provided more accurate information regarding pottery manufacture and use as well as subsistence strategies. The small unidentifiable pieces of animal bone that were culled as non-diagnostic during the WPA era likely could have been identified by zooarchaeologists today and provide a more accurate interpretation of subsistence strategies. Culling of non-diagnostic pottery sherds was also common practice which could bias the collections and hinder accurate studies of ceramic use at the site.

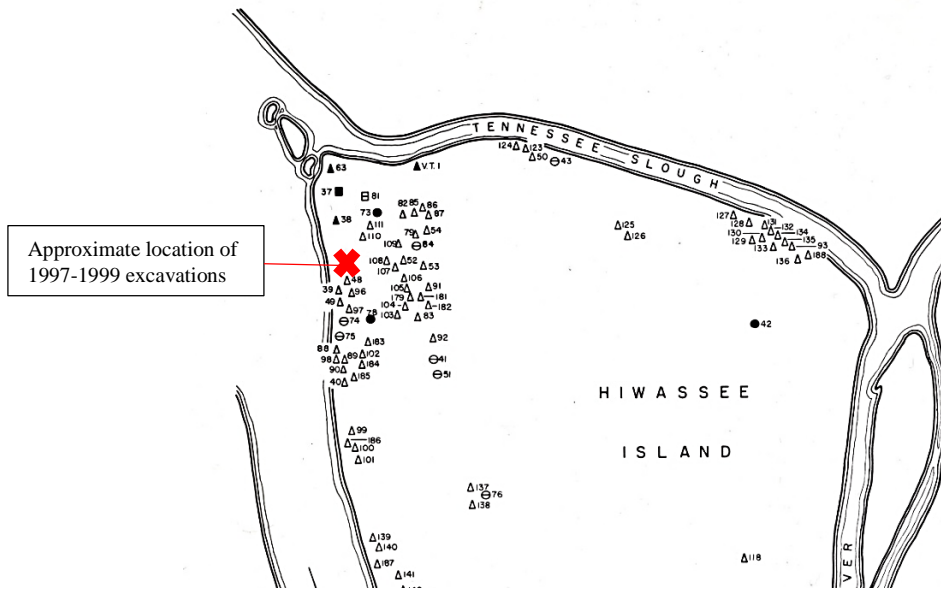
#### *1987 Survey*

In 1987, the island was revisited by Charles L. Hall, Kenneth P. Cannon, and Jefferson Chapman as the Principal Investigator (University of Tennessee) to conduct an archaeological

survey on behalf of the TVA. Portions of the island had become inundated and TVA wanted to determine the location of the any archaeological manifestations that were still above water. This survey also compared locations of units recorded during the WPA era excavations to what is still visible on the island. This survey demonstrated that the area of the island where the Mississippian village was located is still above water as well as additional extensive Mississippian village deposits and midden deposits downriver and west of the large platform mound, unit 37MG31 (Hall 1987; Patch et al. 2015:33; Sullivan 1998b:ii).

#### *1997–1999 Field School Excavations*

Field schools were conducted at Hiwassee Island in 1997, 1998, and 1999. The first field school in June 1997 was a joint effort between Appalachian State University with Dr. Cheryl Claassen and Dr. Lynne Sullivan, then at the New York State Museum. The 1998 and 1999 field schools were conducted by Dr. Nicholas Honerkamp with the University of Tennessee at Chattanooga and Dr. Lynne Sullivan. Excavations were conducted on the northwest end of the island immediately south of the WPA excavations, west of the large platform mound, within the Woodland shell middens and the Mississippian village area (Patch et al. 2015:36; Sullivan 1997, 1998b; see Figure 4). The goals of the initial testing during June 1997 were “to determine whether more extensive fieldwork could actually yield materials and information that would generate data for more detailed study of the Mississippian village on the island than is possible with the WPA collections,” (Sullivan 1998b:i) and to determine if intact cultural deposits existed adjacent to the village area excavated by the WPA investigations, along with the nature of any intact deposits encountered. The goals of the initial testing in 1997 included the identification of components and their spatial distribution in the village area, determining the nature of subsurface



Lewis and Kneberg (1946:Map 1)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 4**  
**1997-1999 Excavations in Relation to WPA Excavations**

deposits and the level of preservation of organic materials that could be used for absolute dating and subsistence studies, and the recovery of small scale artifacts that were not collected by the WPA such as chipping debris, and floral and faunal remains (Sullivan 1998a:1). These excavations also supported an ongoing project of Dr. Sullivan's that was working towards a refined Dallas ceramic chronology and that was funded by the National Science Foundation (NSF). Combining the ceramic seriation project with absolute dates obtained from these 1997–1999 investigations was the immediate goal. A much larger goal of these two projects was an understanding of chiefdom development in the Upper Tennessee Valley and supplementation of WPA collection data with modern datasets based on modern fine-scale recovery methods (Claassen and Sullivan 1997:3, 5). An additional aim of these field schools was to document intact archaeological deposits to assist TVA archaeologists in their efforts to curb riverbank erosion on the island; upon completion of the field schools, TVA rip-rapped the eroding riverbank on the side of the island where these excavations occurred (Lynne Sullivan, personal communication 2017). These investigations established that there were deposits on the outskirts of the Mississippian village and that these deposits were still intact. The results of these field schools clearly demonstrated that the remaining deposits at Hiwassee Island offer the potential to augment information gathered by the WPA excavations (Sullivan in Patch et al. 2015:36).

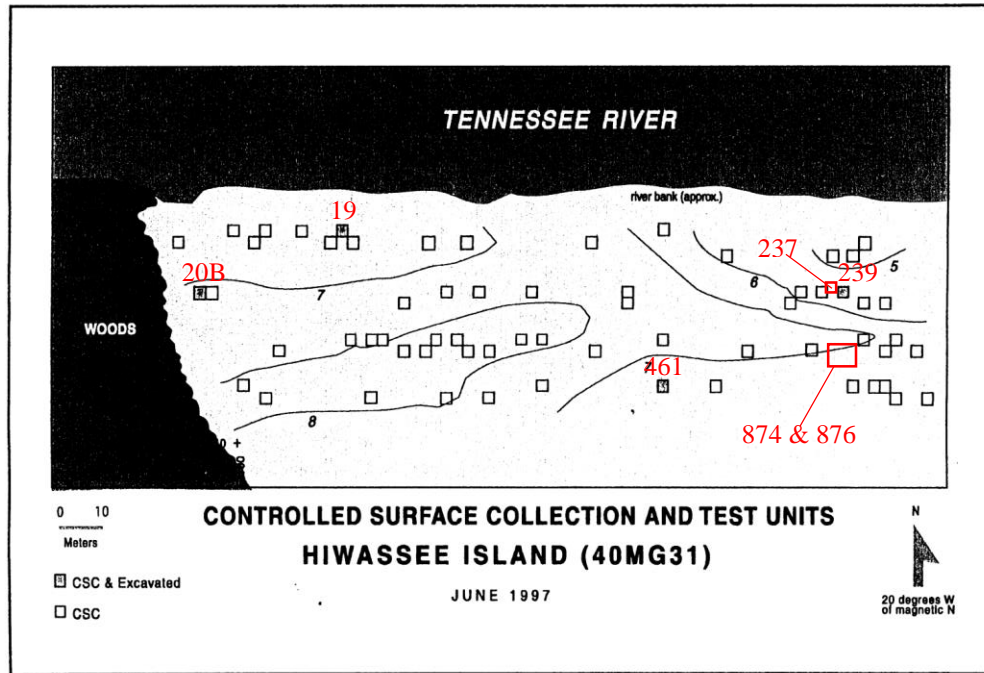
The 1997 season began with a 10-day field program, from June 9-18, 1997. Seven five-meter-wide transects were plowed and divided into 2.5 by 2.5 meter squares. A 10% random sample of the squares was chosen for the controlled surface collection using a table of random numbers, resulting in 51 squares; all findings were bagged separately by square. (Sullivan 1998a:2). Four 2.5 meter by 2.5 meter units were chosen for excavation based on the diversity of artifacts on the surface, hoping to uncover the same in the subsurface remains. These units were

continuously excavated throughout all three field seasons (Hiwassee Island Level Reports 1997–1999, on file at McClung Museum of Natural History and Culture, University of Tennessee, Knoxville; Patch et al. 2015:36).

All units chosen for excavation had soil probe samples taken prior to opening the units to understand the natural stratigraphy (Claassen et al. 1998:10; Sullivan 1997). Shovels were used first, followed by trowels when more delicate excavation was required (Claassen et al. 1998:10). Units were excavated in arbitrary levels, unless natural stratigraphy was noticed, at which point excavation followed natural changes in the soil (Claassen et al. 1998:11,14,18-20; Sullivan 1998a:4–5). Quarter-inch screens were used to screen all deposits, and flotation samples were taken from each level and feature in all units. Flotation processing was completed at the camp site after excavation ended for the day for the first year and on site during the next two years (Claassen et al. 1998:10; Sullivan 1998a:4–5). Artifact bags from each provenience were given a single, consecutive bag number (Claassen et al. 1998:10). One of the most important differences between the WPA era and these excavations is that deposits were not screened and water flotation was not conducted during the WPA investigations (Claassen et al. 1998:10; Patch et al. 2015:36).

Unit 20-B was chosen for excavation because of the amount of shell in surface collections, and most of the limestone tempered sherds recovered in excavations came from this unit; unit 20-B was designated as a Hamilton shell midden (Claassen et al. 1998:11; see Figure 5). The goals of excavating this unit were to understand spatial and stratigraphic relationships of the Hamilton component to the later Mississippian components (Sullivan 1998a:4). Features found within this unit include clusters of shell with pottery mixed in (Hiwassee Island Feature Reports 1997–1999, on file at McClung Museum of Natural History and Culture, University of





Sullivan's 1997-1999 Field Notes

Image courtesy McClung Museum of Natural History and Culture, University of Tennessee

**Figure 5**  
**Location of Excavated Units**  
**1997-1999 Field School**  
*Shows site location post-inundation*

Tennessee, Knoxville [MMNHC]). Level one was excavated in an arbitrary 15-centimeter level and the remaining four levels appear to have followed natural stratigraphy (Hiwassee Island Feature Reports 1997–1999 MMNHC).

Unit 19 was chosen due to the high concentration of lithics in the surface collection. It was determined that this unit was likely a Hamilton shell midden as well due to the clustering and scattering of shell within the northern half of the fourth level (Claassen et al. 1998:14; Hiwassee Island Feature Reports 1997–1999 MMNHC; see Figure 5). Level one was excavated in an arbitrary 20-centimeter level (plowzone) while the next three levels were excavated following natural stratigraphy. Levels five through twelve appear to have been excavated in arbitrary five centimeter levels (Hiwassee Island Level Reports 1997–1999 MMNHC).

Unit 239 had the highest density of daub in the surface collection, with a little bit of everything else, and was determined to contain the remains of a burned structure (Claassen et al. 1998:18–19; see Figure 5). The first level was excavated in an arbitrary 20-centimeter level, level two in an arbitrary ten-centimeter level, and level three in an arbitrary five-centimeter level—Feature 4, the beginnings of the burned structure, was located in this level. Once the structure was excavated, the remainder of the unit was excavated in five centimeter levels (Hiwassee Island Level Reports 1997–1999 MMNHC). Samples were processed on site using a small, portable flotation tub in order to recover small scale artifacts such as botanicals (Sullivan 1998a:4).

Unit 461 was chosen because the surface collection yielded no finds (Claassen et al. 1998:20; see Figure 5). Only the northeast quadrant was excavated due to water coverage, a 1.25 by 1.25 meter square (Claassen et al. 1998:20; Sullivan 1998a:5). Most of the charcoal from the excavations was found here due to a charcoal lens (Claassen et al. 1998:22). Level one was

excavated in an arbitrary 15-centimeter level, level two in a ten-centimeter level (Hiwassee Island Level Reports 1997–1999 MMNHC). The portion of this unit that was excavated contained a large stratified pit feature (Sullivan 1998a:5) that contained heavy pottery and charcoal concentrations as well as fire cracked rock (Hiwassee Island Feature Reports 1997–1999 MMNHC).

By the end of the 1999 field school, a total of 86 units had been surface collected (Patch et al. 2015:36). In addition to work on the four units from the 1997 and 1998 seasons, the 1999 field school opened three more units (see Figure 5). Unit 874 was only excavated down one arbitrary 29.5 centimeter level. One feature inside this unit was determined to be a looter’s pit; another small circular pit and possible post mold were noted in this unit. Unit 237 was also opened during the 1999 field school. Only one level was excavated into the plowzone. Some cordmarked pottery and 19<sup>th</sup> century pottery was recovered from this unit. Unit 876 was also opened in 1999. Only one level was opened, but its depth was not recorded (Hiwassee Island Feature Reports 1997–1999 MMNHC).

During the 1997–1999 excavations, sherds were rinsed with water, maybe lightly brushed with a toothbrush, then sorted by surface treatment. Most of this sorting for the first field school took place at Appalachian State University. The sherds were sorted in large part by students with little to no experience, likely leading to discrepancies in sorting. In fact, the report of the 1997 field season stated that temper identification was so confusing that it had to be eliminated from the sorting process (Claassen et al. 1998:94–95). In spite of challenges such as this, overall results from these excavations “clearly indicate that the remaining deposits at the Hiwassee Island site offer the potential to augment the information collected by the WPA investigations” (Claassen et al. 1998:38).

## *Geophysical Survey*

Modern technologies like geophysical survey can lead to targeted excavations that build on the legacy of previous investigators (Patch et al. 2015:23). Geophysical surveys are more common in archaeology due to the fact that “geophysics can collect enormous amounts of information about site plans for relatively minimal cost and effort, and with no destruction, as compared with excavation. The ability to ‘see’ entire site plans is revolutionizing what is known about these large sites” (Patch et al. 2015:48). Fortunately, the entirety of Hiwassee Island was not flooded after the construction of the Chickamauga Dam. A recent geophysical survey (Patch et al. 2015) conducted on the portion of Hiwassee Island that has not been inundated revealed a considerable amount of new and significant information regarding the archaeology that is still on Hiwassee Island. The Mississippian village is still largely intact, including the large plaza. Evidence of multiple ditch and palisade systems that were not noted in previous work, along with feature clusters and individual houses, were also discovered.

The survey revealed 649 anomalies that could confidently be classified as cultural. Of these, 39 were middens, 356 were pits, and 129 were structures. Seven palisades were identified and the boundary of Mound 78 was visible in the gradiometer data (Patch et al. 2015:111, Table 3). Nine bastions were discovered on the exterior of Palisade 5 and a dense cluster of buildings south of Mound 37. The plaza was likely made by filling in the pond (borrow pit) from mound construction, with hard shell deposits indicating deliberate filling activity (Patch et al. 2015:130–142). The Mississippian village followed the typical pattern of Mississippian site layout, but the palisades indicate an expansion and contraction of the village over time during the Hiwassee Island phase (contemporaneous with the construction of Mound 37) with additional shrinking during Dallas phase occupation. The bastions likely date to the Dallas phase, which is rare but

not unheard of for East Tennessee (Patch et al. 2015:174, 191). In addition to revealing information about the Mississippian village that was previously excavated, this survey revealed the location of new prehistoric loci and areas of intensive historic period activity (Patch et al. 2015:ii). New discoveries include two mounds and an archaeological area on the East Finger of the island (Patch et al. 2015:189).

#### *Additional Remarks*

There are obvious advantages to the later excavations that may help shed light on the WPA era investigations. As Sullivan observed regarding the collections from the WPA excavations, “the collections do not include many of the kinds of samples essential for producing data for basic information on the site’s occupational history and chronology, or to address today’s questions about chiefdom economics, subsistence, and sociopolitical organization” (1998b:ii). Considering that the 1997–1999 excavations did screening and flotation, while the WPA era investigations did not, it seems reasonable to expect that smaller artifacts were recovered from the later excavations than in the earlier ones. Therefore, I expected to find a higher portion of smaller ceramics in the collections from the later excavations than from the earlier. One issue that may bias the results of my study is the “culling” of artifacts. While it was written in as procedure during the WPA era excavations to cull small and non-diagnostic artifacts, culling was not done during the later excavations. Therefore, it could be possible that smaller sherds were discovered during WPA investigations and discarded, or that there were be fewer plain sherds in the collections from these excavations than it appeared there should be based on results from the later investigations. In fact, this is what I expected to find: the collections from the later excavations would have a larger percentage of smaller sherds and plain

sherds, perhaps even sherds so small it cannot be said whether they were plain or decorated, while the WPA collections would have higher percentages of larger sherds and decorated sherds relative to plain and small sherds.

## Chapter 4

### Archaeological and Historical Context of Hiwassee Island

This chapter first provides a summary of Lewis and Kneberg's (1946) ethnohistorical and archaeological interpretations of Hiwassee Island. The following section provides a summary of recent work that modifies and expands on Lewis and Kneberg's (1946) report and situates Hiwassee Island within the greater context of East Tennessee archaeology. It should be noted that Lewis and Kneberg applied the Midwestern Taxonomic System, using the term "foci" to describe components with a high number of similar traits (Sullivan 1995:xvii). However, to avoid confusion throughout the chapter, today's terminology is used, and each group is referred to with the term "phase."

#### *WPA Interpretations*

##### *Hamilton Phase*

Hiwassee Island was occupied during the Hamilton phase of the Woodland period, which Lewis and Kneberg (1946:5–6) called the Middle Valley culture. WPA investigators did not have a start date for the Woodland period, but believed that it ended in A.D. 1400 (Sullivan 2016:Table 7.1). Hamilton phase groups settled along waterways and their sites are distributed throughout the entire eastern Tennessee River Valley and its tributaries. On Hiwassee Island, the Hamilton settlement was laid out facing the Tennessee and Hiwassee Rivers, with middens placed beside the dwellings and burial mounds located in the rear of the settlement. Their dispersed settlements that were frequently separated by hundreds of yards indicated little fear of invasion. Lewis and Kneberg (1946:9, 36–37) noted that similar arrangements to that seen on Hiwassee Island were found throughout East Tennessee along the Tennessee River, indicating

this culture must have dominated the area for some time (Lewis et al. 1995:27). The considerable number of mounds with hundreds of burials seemed to indicate a longevity of occupation at each site. Lewis and Kneberg (1946:6) believed that each settlement had a group of burial mounds to which a small number of households was associated. Mounds were constructed either by beginning with one body placed onto a prepared spot and then covered with soil, or a seemingly more important burial being placed in a log tomb and covered. Subsequent burials were added until the mound reached a height of 10 to 12 feet. Burials were partly flexed (Lewis and Kneberg 1946:6; Lewis et al. 1995:29–30). A total of 173 burials were attributed to the Hamilton phase occupation (Lewis and Kneberg 1946:Table 26).

Lewis and Kneberg (1946:36–37) assumed that Hamilton household units were located near the individual refuse piles (small middens), although no archaeological remains of architecture were found from the Hamilton Phase (Lewis and Kneberg 1946:48; Lewis et al. 1995:27). The main subsistence source for Hamilton communities was assumed to be fresh water mussels that were discarded into small, household level refuse piles, rather than large shell middens (Lewis and Kneberg 1946:6; Lewis et al. 1995:27). It is likely that they exploited local flora, as stone pestles and a mortar were discovered. Projectile points were also discovered, indicative that small game may have been hunted. Lewis and Kneberg (1946:44) suggested that no archaeological evidence of this small game was recovered because either the remains were not disposed of within the shell middens or simply were not preserved. However, it is far more likely that game made up a higher proportion of the diet than what is reported, given that during the WPA excavations neither dry nor wet screens were used to collect data (Schroedl 2016:221–222; Sullivan 2016:141).



During the Woodland Hamilton phase, pottery contained a crushed limestone temper and the dominant decoration was cordmarking. The most common forms were the deep bodied jar with a short vertical neck and a wide orifice, the deep bodied vessel that was similar to a cauldron or a kettle, and the shallow bowl. Candy Creek Cord-Marked is found throughout the eastern Tennessee Valley and is characterized by a finer cord-marking with sharp impressions that are clear and distinct, made by a one to three-millimeter-thick twisted cord. Hamilton Cordmarked was more frequent on Hiwassee Island than other areas in East Tennessee, but can be found within the eastern Tennessee Valley; it was also more frequent on Hiwassee Island than the Candy Creek Cordmarked type. This type exhibits coarse cord-marking and in some instances smoothed over areas. It was made with a large and loosely twisted cord, about five to seven millimeters thick. The type Hamilton Plain appears in later contexts and may be the result of the tendency to smooth cord-marked pottery. Check-stamped pottery is not characteristic of the Hamilton phase and is found only rarely (Lewis and Kneberg 1946:80-88). Complicated-stamped ware is also rare, but when found, is similar to that from Candy Creek, or perhaps Pickwick Complicated Stamped. Cord-wrapped dowel-marked is not common among the Hiwassee Island site assemblage either, although the few sherds found were similar to Candy Creek samples of the same type, suggesting that it may have come from the Candy Creek village on the mainland (Lidberg et al. 1995). Foreign wares indicative of trade relations were of a fine sand temper, similar to Swift Creek and Napier types, while some were similar to Deptford, all Georgia types (Anderson and Sassaman 2012:137; Lewis and Kneberg 1946:80–88; Wallis 2008:255–256; Wauchope 1966:64–69). Jewelry and ornamentation made from marine shell was recovered on Hiwassee Island from this Woodland period (Lewis and Kneberg 1946:6).

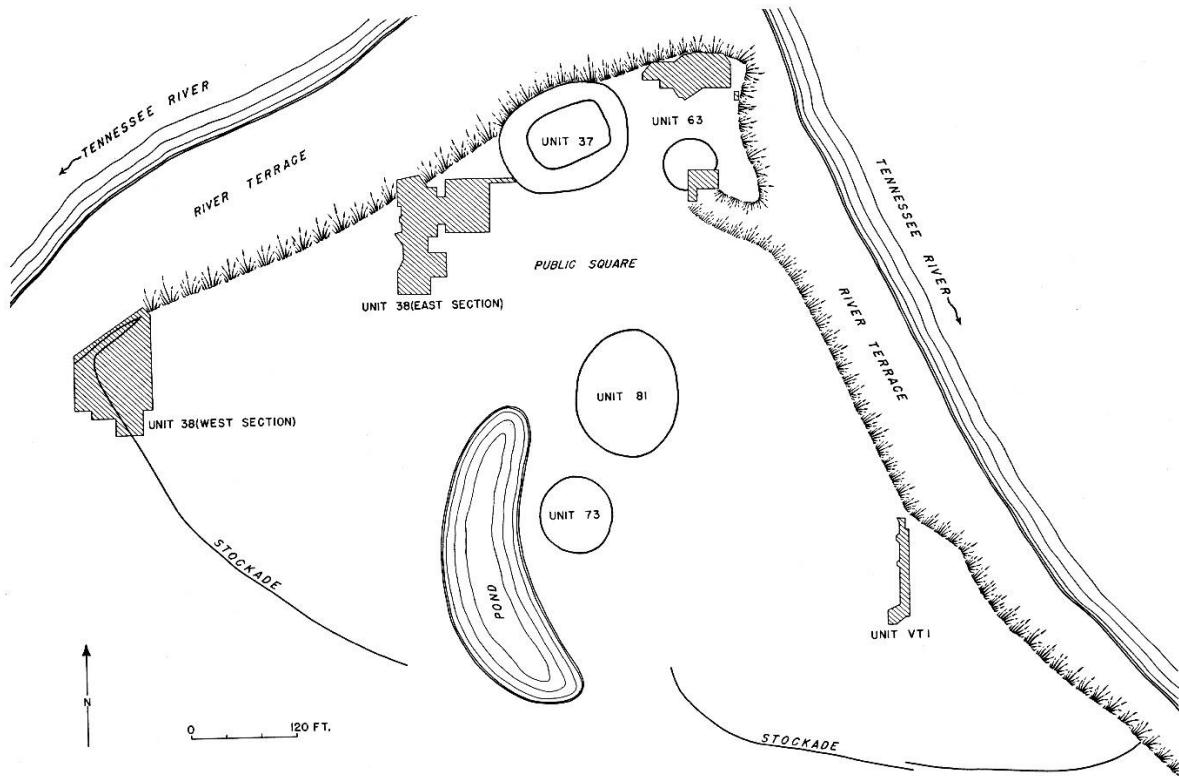
Hamilton phase groups were believed to have abandoned the upper Tennessee River, including Hiwassee Island, when Mississippian groups moved in (Lewis and Kneberg 1946:9).

### *Mississippian Occupations*

The Mississippian occupation of Hiwassee Island included both the Hiwassee Island and Dallas phases. WPA researchers dated the Mississippian period from A.D. 1400 to the historic period. There was a central plaza located in the village area that was apparently reserved for public ceremonies and perhaps ball games as there was no evidence that this area was inhabited. The north and south ends of the plaza had large structures that likely served as the meeting houses. It was on the north end that the village was constructed (Lewis and Kneberg 1946:37; Lewis et al. 1995:7; see Figures 6-9). At times a stockade surrounded the settlement, when it was constructed and its relationship to the village boundaries is unclear (Lewis and Kneberg 1946:38). The overall site layout persisted through the Hiwassee Island and the Dallas phases. Lewis and Kneberg (1946:41) suggested that Hiwassee Island peoples allowed Dallas peoples to settle on the island while they were still living there and that this was made possible because their way of life was similar.

### *Hiwassee Island Phase*

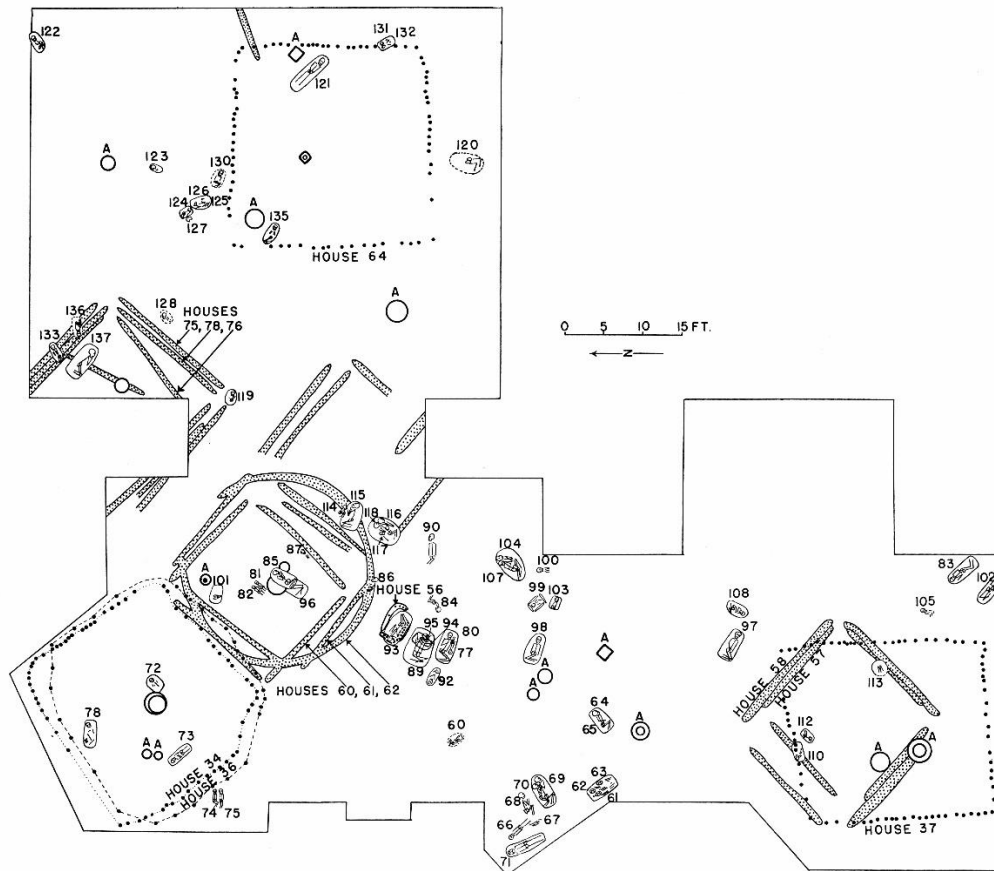
The Hiwassee Island phase of the Mississippian period was originally thought to immediately follow the Hamilton phase component and ranged from Chattanooga to the Norris Basin along the bottoms of the Tennessee River, its tributaries, and some of its islands (Lewis et al. 1995:6–7). Lewis and Kneberg argued that the Mississippian cultures of East Tennessee were the ancestors of the Muskogean peoples that migrated in and replaced the Late Woodland



Concentrated habitation area at head of island. Included are excavated units and aboriginal pond.

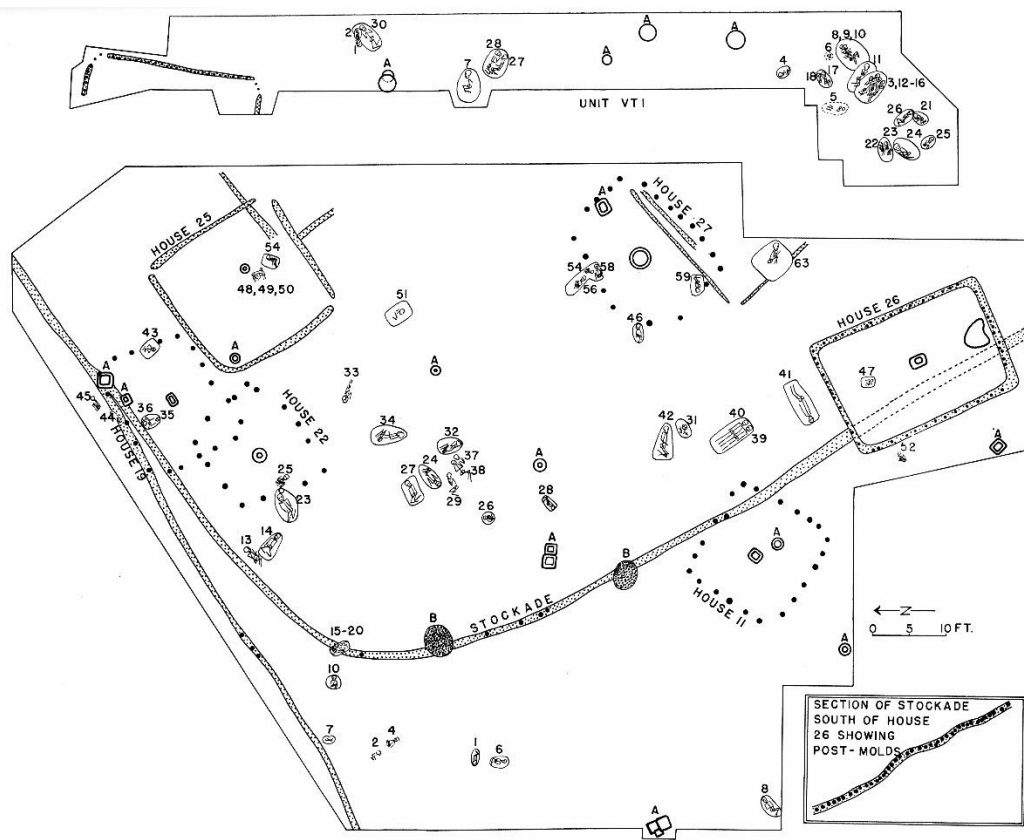
Lewis and Kneberg (1946:Plate 7)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 6**  
**Mississippian Occupation Areas at Head of Island**



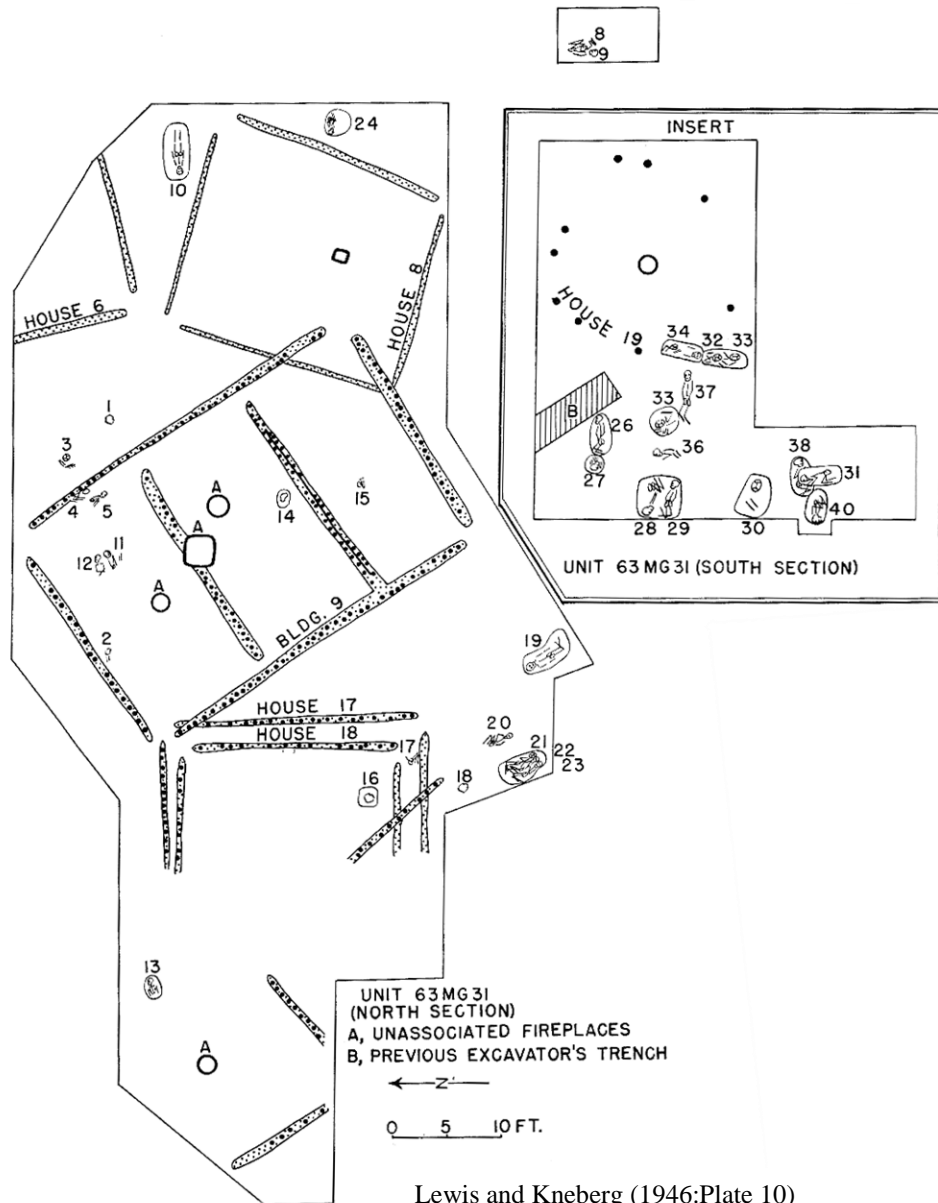
Lewis and Kneberg (1946:Plate 8)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 7**  
**East Section of Unit 38MG31-Mississippian Village Area**



Lewis and Kneberg (1946:Plate 9)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 8**  
**Unit VT1MG31 and West Section of Unit 38MG31-Mississippian Village Area**



Lewis and Kneberg (1946:Plate 10)  
 Image courtesy McClung Museum of Natural  
 History and Culture, University of Tennessee

**Figure 9**  
**Unit 63MG31-Mississippian Village Area**

Hamilton culture (Lewis and Kneberg 1946:9). The plaza and most of the platform mound was constructed during the Hiwassee Island phase. Community life revolved around the mound during the occupation of the rather extensive Mississippian village. It stood 22' high, had a basal diameter of 150', and its summit measured 60' by 90' (Lewis and Kneberg 1946:28). During the Hiwassee Island phase, there was a dual arrangement of the public buildings (Lewis and Kneberg 1946:41; Lewis et al. 1995:7–8). Hiwassee Island phase groups were sedentary agriculturalists living in compact settlements (Lewis and Kneberg 1946:9; Lewis et al. 1995:7). Their town surrounded an open plaza, with important buildings on either end, protected by stockades (Lewis and Kneberg 1946:9; Lewis et al. 1995:7, 9). Lewis and Kneberg (1946:38) did not attribute any of the burials discovered on Hiwassee Island to the Hiwassee Island phase, and argued that the same was true for all occurrences of the Hiwassee Island phase in eastern Tennessee.

Hiwassee Island phase groups marked a turn towards the manufacture of shell tempered pottery (Lewis and Kneberg 1946:9; Lewis et al. 1995:9). Some argue that the only essential development in material culture during the Hiwassee Island phase was the “elaboration of a shell tempered ceramic technology” (Schroedl et al. 2007:193). Hiwassee Island phase pottery took the form predominantly of plain wares with large, loop-handled jars as well as excurved rim jars, short necked bottles, blank-faced effigy bottles, and shallow bowls (Lewis and Kneberg 1946:90). Cordmarking as a decorative technique was not important at first but gained in frequency as time progressed, but it is now known to decline in the early to mid-1400s. Textile- or fabric-impressed salt pans were typical throughout the assemblage. Hiwassee Island Red Filmed is an early Mississippian type and taken to be indicative of the Hiwassee Island phase or component on East Tennessee sites. This type is well smoothed and filmed with a red oxide paint, sometimes thick enough to suggest a slip. Occasionally vessels were found with modeled

decoration, such as effigy heads. Hiwassee Island Red on Buff is another important ware from the site, as it is possibly representative of fully developed early Mississippian culture. As with the Red Filmed type, it is indicative of a Hiwassee Island phase component throughout east Tennessee (Lewis and Kneberg 1946:91–94). This type is well smoothed and a slip may have been applied before it was painted with red oxide paint. There are two styles of Hiwassee Island Red on Buff, those with either painted motifs or red painted rims. This ware is found in eastern Tennessee and maybe northeastern Alabama (Lewis and Kneberg 1946:104). Hiwassee Island Complicated Stamped had a well smoothed surface before stamping with a flat carved wooden paddle. The paddle impressed diamond shaped designs were formed by concentric lines cut by transverse lines that at times formed a cross (Lewis and Kneberg 1946:104). Complicated stamped pottery decorated with nested diamond motifs was found throughout the mound (Lewis and Kneberg 1946:Table 19) and is similar to the Etowah Complicated Stamped type (Wauchope 1966:64–69; Sullivan 2009:202), especially on the rims. Hiwassee Island Complicated Stamped is found in eastern Tennessee and at Etowah. Sand tempered examples of complicated stamped ware from the Georgia area were found on Hiwassee Island and may have been copied by the inhabitants on their shell tempered ware (Lewis and Kneberg 1946:92–94, 104). What was unique about Hiwassee Island pottery was the Hiwassee Island Complicated Stamped, Hiwassee Island Red on Buff (painted) and Hiwassee Island Red Filmed (painted) varieties. Nothing exactly like the painted wares had been created anywhere else in the Southeast at this time (Lewis and Kneberg 1946:9; Lewis et al. 1995:11; Schroedl et al. 2007:188).



### *Dallas Phase*

The Dallas phase consisted of a Middle Mississippian culture that followed the Hiwassee Island phase as the dominant culture in East Tennessee. Many Hiwassee Island phase sites have material evidence that they were followed by a Dallas phase occupation. In fact, evidence from Hiwassee Island suggests that Dallas peoples merged with Hiwassee Island peoples (Lewis and Kneberg 1946:10; Lewis et al. 1995:13; Sullivan 2009:183). Lewis and Kneberg (1946:10) suggested that the Dallas phase peoples were ancestors of the Muskogee (Creek) Indians. Dallas phase components include substructure mounds, large log construction of dwellings and community buildings, burials in substructure mounds and village area, shell gorgets, earpins, and repoussé copper work (Lewis and Kneberg 1946:10; Lewis et al. 1995:13–20). A total of 188 burials were attributed to the Dallas phase, mostly located in the village (Lewis and Kneberg 1946:143; Table 26). Over time, Dallas culture superseded Hiwassee Island culture, and the two community buildings were replaced with one (Lewis and Kneberg 1946:41).

Pottery from the Dallas phase was shell tempered and mostly utilitarian. It is found throughout East Tennessee and adjacent states. Plain surfaces are the most common, followed by shell tempered cordmarked, which is the distinguishing Dallas surface treatment (Lewis and Kneberg 1946:10; Lewis et al. 1995:16). Textile-impressed salt pans are typical of Dallas phase assemblages. Vertical rims on jars became a frequent aspect of vessel form and strap and lug handles became more frequent than loop handles. Typical decorations include modeled appliqué, incising, and notched filleting. Negative painting also appears during the Dallas phase (Lewis and Kneberg 1946:94–100). Several types of Dallas phase pottery were recovered from Hiwassee Island. Dallas Incised is characterized by decorations made with narrow, sharp incisions to create hachured triangles on jar rims; strap handles are also frequently decorated this

way. Bowl rims will frequently have incised scroll motifs. Dallas Modeled refers to vessels with effigies of various types, usually four equally spaced human heads on bowl rims. Frog, fish, and blank faced effigies are also common, although these modeled vessels only have one head, with a lug or “dimple” indicating a tail on the opposite side of the vessel. Dallas Punctate usually occurs in conjunction with some other form of decoration on the shoulders of jars. Dallas Filleted, Notched, and Noded rims consist of an appliquéd fillet that is notched with a fingernail or sharp object most commonly, usually found on the exterior rims of bowls; noded rims are rare (noded referring to “nodes” or small pointed pieces of clay applied to the exterior of a vessel), and frequently all three of these decorative techniques occur on the same vessel (Lewis and Kneberg 1946:105).

#### *Hiwassee Island Phase and Dallas Phase Architecture*

In Mississippian architecture, clay was used to coat floors, fireplaces, earthen platforms, and seats in structures built on the mounds, but dwelling floors were not coated. Community buildings had raised clay seats, most likely for higher ranked individuals. Buildings had thatched roofs and were either small wooden posts framed by pole construction in which thin saplings were bent to form the roof, or log construction (Lewis and Kneberg 1946:48; Lewis et al. 1995:55, 60–63, 68–70). Walls were made using wattle and daub placed on cane. There were 32 examples of pole construction community buildings, with all but one being present on various levels of the substructure mound. They were quadrilateral in shape and fireplaces of differing shapes were present in the majority; there were only four circular community buildings. Only 30 partial and complete pole construction dwellings could be discerned at the site, all of which were located at the head of the island and mostly quadrilateral in shape with circular fireplaces,

ranging from small to medium in size. Wall trenches were commonly seen in these Hiwassee Island phase pole construction buildings and is a characteristic of the Hiwassee Island phase throughout the Chickamauga Basin (Lewis and Kneberg 1946:48,60; Sullivan 2009:203). Single post log construction community buildings date to the Dallas phase occupation, as do log construction dwellings. The Dallas dwellings were also quadrilateral in shape but were smaller than the Hiwassee Island phase pole construction dwellings (Lewis and Kneberg 1946:74; Lewis et al. 1995:67–70, 73). Two types of stockades were used during the Hiwassee Island phase, one heavily constructed that was used as fortification, and still in use for some time after Dallas peoples arrived. The other type of stockade used was lightly constructed and surrounded a courtyard behind a community building, meant more for privacy than for protection (Lewis and Kneberg 1946:78–79; Patch et al. 2015:133, 136).

Substructure earthworks were used as foundations for buildings. Pyramidal shaped bases were common during the Hiwassee Island phase, but as the dominant culture transitioned to the Dallas phase, additions to the substructure mounds became less angular (Lewis and Kneberg 1946:57). The stratigraphic sequence of the Hiwassee Island mound follows. On the initial ground floor were several large wall-trench buildings that were later replaced by two small pyramidal mounds and more wall-trench structures; this section was named Mound Level G during WPA excavations. Mound Level F consisted of a single, weathered summit with two large, rectangular wall trench structures (Lewis and Kneberg 1946:75; Sullivan 2009:192). On Mound Level E-2 a circular structure with small single posts appears, and Mound Level E-1 is similar to the previous level, but missing the circular structure. Both this and the previous level of the Hiwassee Island mound were the first to contain significant percentages of Hiwassee Island Red on Buff and Hiwassee Island Red Filmed pottery sherds (Sullivan 2009:194). Level D

was designated as the split between the Hiwassee Island and Dallas components of the site by Lewis and Kneberg (1946:77). Changes between these two levels include the application of a thicker earthen mantle than in earlier levels, the presence of Dallas Decorated sherds in the mound fill, and the presence of burials. Level C is similar to Level D, but the structures on the mound now have large rotundas. Level B merely represents two feet of fill added to the western end of the mound summit. Level A was the only stage with just single post structures. It also contained more than four times the amount of Dallas Decorated pottery when compared to preceding levels and four burials, although there were no artifacts of note associated with the human remains (Sullivan 2009:194).

#### *Historic Occupations*

Lewis and Kneberg (1946:11) believed that historical documents along with archaeological evidence placed the Muskogee (Creek) and the Yuchi in the east Tennessee area by A.D. 1540. Lewis and Kneberg (1946:, 149-152, Table 26) attributed a total of 54 burials to historic Native American and Euro-American groups, including bundle burials, partly flexed, and fully extended primary burials. In their report, the Dallas phase was considered the ancestor group to the Muskogee (Creek) people and the Mouse Creek phase as Yuchi ancestors (Lewis 1943:311; Lewis and Kneberg 1946:10, 13–15). Lewis and Kneberg (1946:12) stated that the Cherokee were present along the upper Hiwassee River in A.D.1540 and that they encountered Muskogee (Creek) and Yuchi already in the area at the time of their settlement, meaning that the Muskogee (Creek) preceded the Cherokee in settlement of the area, making Dallas culture earlier than A.D. 1540 (Lewis and Kneberg 1946:12).

Lewis and Kneberg (1946:18) believed that the Muskogee (Creek) remained at Hiwassee Island until the early 18<sup>th</sup> century and that after their departure, Hiwassee Island remained unoccupied until a Cherokee community was established in the late 18<sup>th</sup> century. Most European trade goods on the island date to the early 18<sup>th</sup> century (Baumann et al. 2014:9; Lewis and Kneberg 1946:41). Historic documents indicate that that Cherokee component was established in the early 1780s, and therefore it likely does not contribute much to the archaeology of the island. John Jolly was Chief of the Cherokee settlement, and the island was known as “Jolly’s Island” during his tenure (Lewis and Kneberg 1946:18; Lewis et al. 1995:6). Jolly was born around 1770 on the banks of the Hiwassee River and became principal chief of the Cherokee in 1820 when his older brother died. Lewis and Kneberg (1946:41) state it was likely that the substructure mound was used by Chief Jolly, although there were no archaeological traces. However, Sullivan (2009:194) states that the current top of the mound did yield evidence of the historic period occupation as well as intrusive burials with European trade goods. The last inhabitants of the island, consisting of a small group of families that were led by Chief John Jolly, left in February 1818; it was assumed that all historic Native American burials recovered belonged to the Cherokee occupation (Lewis and Kneberg 1946:18–19).

*Current Understandings: Hiwassee Island in Relation to Other East Tennessee Sites*

Since Lewis and Kneberg’s (1946) report, the cultural chronology of the groups described in their work has been more precisely defined. The corrected chronology is as follows: Hamilton phase from A.D. 600–1000, Hiwassee Island phase from A.D. 1100–1300, and Dallas phase from A.D. 1300–1550 (Sullivan 2016:Table 7.1).

Recent work (Sullivan 2007, 2009, 2016) has clarified the temporal relationships between Hiwassee Island and the Davis, Sale Creek, Hixon, and Dallas sites, all about 15 miles downriver from Hiwassee Island. This work has led to a better understanding of the chronology and cultures that occupied Hiwassee Island by comparing the archaeological sequence at these sites to that of the mound on Hiwassee Island. Additional work (Schroedl 1973, 1978; Schroedl et al. 2007) has clarified the culture history of Hiwassee Island within the greater context of East Tennessee. Together these studies have provided a clearer and more accurate interpretation of life at Hiwassee Island than that originally put forward by Lewis and Kneberg (1946).

Although per Schroedl et al. (2007:182), “a comprehensive Late Woodland period settlement-subsistence model is still far from completely developed,” some changes in current understandings of the Late Woodland period in East Tennessee have occurred. After the publication of the initial Hiwassee Island report (Lewis and Kneberg 1946), Kneberg (1961) published an article adding a new ceramic complex to the Late Woodland period in East Tennessee, called the Roane-Rhea complex, that was considered culturally distinct from the Hamilton focus seen on Hiwassee Island (Schroedl et al. 2007:178). The Roane-Rhea complex (named after the two counties where it is most prominent) refers to sites where the ceramic assemblage is dominated by Hamilton Plain sherds, in contrast to the Hamilton complex seen on Hiwassee Island, which was dominated by limestone tempered cordmarked sherds (Kneberg 1961:7–8). According to Kneberg (1961:8), the Roane-Rhea complex represents the latest Woodland phase in East Tennessee, and she noted similarities between the vessel morphology of this complex and Early Mississippian vessel morphology that supports later assertions of a Woodland-Mississippian transition rather than replacement (Schroedl et al. 2007:178, 188).

Another significant change in current understandings of the Late Woodland period concerns Hamilton burial mounds. Perhaps the best documented aspects of the Late Woodland period are the burial mounds, as these features have become a diagnostic trait of the Hamilton phase in East Tennessee. Their exclusivity to the Hamilton phase was not questioned until radiocarbon dates were obtained for their use at the nearby McDonald site (40RH6) in the Watts Bar Reservoir (Schroedl 1973:8, 1978:190). Whereas Lewis and Kneberg (1946:23–26) dated the mounds solely to the Hamilton culture and were therefore surprised that no burials were evident from the Hiwassee Island phase, radiocarbon dates demonstrate that the Hamilton burial mounds were used from A.D. 700 to A.D. 1200. A radiocarbon date of A.D. 1100±100 from a wall trench structure with Hiwassee Island ceramics at the Leuty site (40RH7), located less than 1,000 feet from Mound D at the McDonald site, supports the fact that Late Woodland burial mounds and emergent Mississippian groups were contemporaneous and that Early Mississippian peoples utilized these mounds (Schroedl 1973:10; 1978:73–74, 190,193). In light of this, Hamilton mounds are no longer considered to be exclusively associated with the Late Woodland period, but are known to contain Hiwassee Island phase burials on Hiwassee Island and throughout East Tennessee (Schroedl 1973:8–10, 1978:73–74, 190, 193, 199; Schroedl et al. 2007:183; Sullivan 2009:183).

More recent research (Baumann et al. 2014; Riggs 2012; Sullivan 1995, 2016) has called Lewis and Kneberg's (1946) assumptions regarding the ethnic affiliations of the historic burials from Hiwassee Island into question. In fact, Sullivan states that “one interpretive change [since Lewis and Kneberg's (1946) report] is that the ethnic identifications of the foci defined by the Chickamauga researchers are no longer accepted” (1995:xix). Lewis and Kneberg used the Direct Historical Approach, which used earlier written accounts of cultural traits and worked

backwards based on the “rather naïve assumption that similarities in material culture equate directly with shared cultural origins” (Sullivan 1995:xix). This method led to their erroneous labelling of the Dallas as ancestors to the Muskogee (Creek) and the Mouse Creek as ancestors to the Yuchi (Lewis and Kneberg 1946:10, 13–15). Using the Direct Historical Approach is problematic when no direct connections between an archaeological site and historically known groups can be made, as similarities in cultural traits can be the result of many factors, including trading networks, the diffusion of ideas, similar constraints caused by similar raw materials and technology levels, and independent invention (Riggs 2012:48–49; Sullivan 1995:xix).

The assumption made by Lewis and Kneberg (1946:149–152) that all historic burials recovered from Hiwassee Island date to the early 18<sup>th</sup> century is flawed because “no one until now has undertaken a serious study of the European trade items to determine a more precise cultural age” (Baumann et al. 2014:9), which is why it was seen as problematic that 33 of these historic burials were repatriated to the Muskogee (Creek) based in part on the ethnological affiliations put forward by Lewis and Kneberg (1946:10, 13–15). Baumann et al. (2014:6–8) were correct in calling for a more thorough examination of the European trade items before repatriation in the future in order to reevaluate cultural affiliations based on today’s corpus of knowledge, rather than rely on a 70-year-old interpretation.

Although much has changed since Lewis and Kneberg’s (1946) report was published, distinguishing between the Hiwassee Island phase as early Mississippian and the Dallas phase as late Mississippian is still used to discuss sites in the Upper Tennessee River Valley. Currently, there are four agreed upon Mississippian phases in the Upper Tennessee River Valley. The first is the Martin Farm phase, from A.D. 1000–1100; this phase is sometimes referred to as an “emergent Mississippian” phase and marks the Late Woodland/Early Mississippian transition in



East Tennessee (Patch et al. 2015:38; Schroedl 1973:10, 1978:193, 199; Schroedl et al. 2007:185; Sullivan 2007:90, 2009:183, 2016:143). Martin Farm culture includes shell and limestone tempered ceramics, along with Mississippian style structures and the earliest evidence of platform mounds in this region; in fact, a Martin Farm substructure mound has been dated to before the widespread use of substructure mounds in Hiwassee Island contexts (Schroedl et al. 2007:188, 191). The discovery of the Martin Farm phase as a transitional phase supports an alternative view of culture change on Hiwassee Island. Lewis and Kneberg (1946:9) claimed that Hiwassee Island phase peoples ousted the Hamilton phase occupants of Hiwassee Island, but the Mississippianization model proposes that new ideas were diffused into existing populations rather than populations being replaced (Schroedl et al. 2007:189–190). A Martin Farm component has been located on Hiwassee Island, and explains the “mixing” of limestone and shell tempered ceramics in the deposits as the result of gradually increasing frequencies of shell tempered ceramics as they gained in popularity during the emergent Mississippian period (Schroedl et al. 2007:188–189). Martin Farm and Hiwassee Island phases are mostly distinguished by the composition of their ceramic assemblages.

Martin Farm assemblages are characterized by predominantly limestone tempered plain (30-35%) and cordmarked (20-25%) and shell tempered plain (35-40%) sherds while Hiwassee Island assemblages consist of mainly shell tempered plain sherds (65-85%) with a small percentage (5-11%) of limestone plain and (3-5%) cordmarked (Schroedl et al. 2007:185; Sullivan 2007:90). This ceramic assemblage indicates a gradual transition from Late Woodland traditions to Early Mississippian, rather than an immediate replacement as suggest by Lewis and Kneberg (1946:9) (Schroedl 1973:10). The argument for a Mississippianization model (Schroedl et al. 2007:189–190) in East Tennessee is at least in part a result of the discovery of this phase.

This model posits the idea that culture groups gradually changed from within due to factors like agricultural intensification, food storage, and population growth (Schroedl et al. 2007:189–191) rather than being replaced entirely as suggested by Lewis and Kneberg (1946:9). It is supported by multiple lines of evidence, one of which is “that the systematic exploitation of river mussel resources remained virtually identical during Late Woodland and Early Mississippian times” (Schroedl et al. 2007:182). The discovery of Hamilton burial mound use by Early Mississippian groups also supports continuity of groups within the same area rather than replacement (Schroedl et al. 2007:183). In fact, Schroedl (1978:193) concludes from the radiocarbon dates that “the Martin [Farm] phase, the Hamilton burial mound complex, and the Hiwassee Island focus share a considerable amount of time” rather than one replacing the other.

The second phase is the Hiwassee Island phase, encompassing the time period A.D. 1100–1300 (Patch et al. 2015:38; Sullivan 2016:Table 7.1). The Hiwassee Island phase is characterized by small poles as opposed to logs for wall supports that were either single set or placed in wall trenches, which was similar to Martin Farm phase construction (Sullivan 2007:90–92). A lack of burials in platform mounds or residences which is correlated with continued use of the Hamilton burial mounds is also characteristic of the Hiwassee Island phase throughout East Tennessee (Schroedl et al. 2007:188–189). The Hiwassee Island phase also exhibits more elaborate platform mound construction than the previous Martin Farm phase in that it has multiple summits with multiple buildings. This phase sees the use of almost exclusively shell tempered pottery. During this time, the people practiced subsistence patterns that utilized diverse local flora and fauna as well as an increased use of maize (Schroedl et al 2007:186; Sullivan 2009:204). Finally, the motifs on the Hiwassee Island Complicated Stamped pottery are indicative of interactions with groups in northern Georgia (Sullivan 2009:204). This early

Hiwassee Island phase predates Southeastern Ceremonial Complex (SECC) items (Sullivan 2007:94, 2009:203). Shell tempered stamped sherds with stamped “9”s found at the Hixon site in Hamilton County date to the Wilbanks Period in northern Georgia (Sullivan 2009:202). Shell tempered concentric circle stamped sherds similar to those of the Savannah phase in Georgia were incorrectly identified by Lewis and Kneberg as Overhill Cherokee Complicated Stamped when found at Hiwassee Island (Sullivan in press).

The third phase is the Dallas phase that lasts from A.D. 1300–1550 (Patch et al. 2015:38; Sullivan 2016:143, Table 7.1). The Dallas phase is characterized by single post large log structures and Dallas Decorated pottery. Burials occur in the platform mound as well as around village structures (Sullivan 2009:190).

The fourth phase is the Mouse Creek phase (A.D.1450–1550). It follows the Dallas phase in the Chickamauga Basin and southern Watts Bar Reservoir while the Dallas phase continues until protohistory elsewhere in East Tennessee (Patch et al. 2015:38; Sullivan 2016:143, Table 7.1).

Recently obtained AMS dates place occupation at Hiwassee Island during the Hiwassee Island phase in the 12<sup>th</sup> century, as well as at the Davis site (40HA2) in Hamilton County. Mixed Late Woodland and Early Mississippian ceramic assemblages at both sites indicate a Martin Farm phase occupation (Schroedl et al. 2007:188–189; Sullivan 2016:143) At both sites, the platform mounds were preceded by sets of at least three buildings, one being larger than the others. The first mound stages were comprised of two low platforms that were later transformed into one mound (Sullivan 2007:93, 2009:186–187, 2016:145). There is limited evidence for residential occupations during the early Hiwassee Island phase stages of the mound (Lewis et al. 1995:419–432; Sullivan 2016:145). At the Davis and Sale Creek (40HA10) sites, Hamilton

burial mounds were likely still in use during the early Hiwassee Island phase as at Hiwassee Island (Sullivan 2007:94, 2016:146). All three sites show evidence of wall trench construction and single post construction buildings. Between A.D. 1200 and A.D. 1300 use of the Davis and Sale Creek sites declined while the Hiwassee Island mound experienced periodical use and disuse (Sullivan 2007:105, 2016:147).

Hiwassee Island served as a hub of interactions between Chickamauga populations and those in northern Georgia (Etowah) during the thirteenth century. People moved from more “rural” locations to live on the island. As relations with Etowah continued, burial mound use declined and use of the Hiwassee Island mound declined, from about A.D. 1250 to A.D. 1300 (Sullivan 2016:162–163). The early to mid-thirteenth century was the end of the early Hiwassee Island phase and marks a hiatus in use of the Hiwassee Island mound (Sullivan 2009:201).

While Hiwassee Island experienced its hiatus, the Hixon mound was experiencing its most elaborate and intensive use (Sullivan 2009:201, 2016:147, 149). The Hixon site (40HA3), located in the same river bend as the Davis site, became the dominant site in the thirteenth and early fourteenth centuries, although there is little evidence of a residential population (Sullivan 2007:94–99,106, 2009:188). The ceramic assemblage (majority shell tempered), architecture (shift from wall trench to single post structures), and new custom of interments within platform mounds rather than Hamilton burial mounds at the Hixon site place it in the later Hiwassee Island phase through the early Dallas phase (Sullivan 2007:96, 2009:203). Complicated stamped pottery identical to thirteenth century types from northern Georgia support the assertion that these two areas interacted; the Hixon mound was contemporaneous with the Wilbanks phase at Etowah and it has been suggested that changes seen at Hixon were related to new developments at Etowah (Sullivan 2009:204–205). The Hixon mound is well known for the various SECC

items recovered from it (Sullivan 2009:189). Radiocarbon dating on a wooden grave covering from Floor O of level B<sub>1</sub> of the Hixon mound revealed that a shell gorget associated with a burial on this floor dated to A.D. 1235, suggesting that SECC items date to the late Hiwassee Island phase as it transitioned to the Dallas phase (Sullivan 2007:99). A late Hiwassee Island phase component is also evident at the Citico site (40HA65, near downtown Chattanooga), where sherds of Hiwassee Island Red on Buff, Red Filmed, and Complicated Stamped pottery as well as SECC objects similar to those at Hixon were found, indicating its occupation was contemporaneous with the Hixon site (Hatch 1976; Sullivan 2016:149, 151). The Hixon mound declined by the mid-fourteenth century as the Etowah site declined (Sullivan 2016:149).

After the decline of Etowah, the Hiwassee Island mound was once again in use, but rather than two buildings, there was only one on its summit, and the mound was surrounded by residences (Sullivan 2009:205, 2016:148–149). Similar configurations occurred at other Chickamauga Basin sites, like Dallas and perhaps Citico, indicating that the decline of Etowah led to the development of a new social order (Sullivan 2016:163).

The Dallas (40HA1) site has been dated to the mid-fourteenth to early fifteenth centuries and experienced two distinct occupations, and the mound, palisade, and most of the village structures were associated with the later of the two; almost all of the buildings associated with this later occupation were burned and the site subsequently abandoned (Lewis et al. 1995; Sullivan 2007:101, 2009:190). Shell gorgets were found with several burials at this site, two of which belong to the earlier occupation and six to the later; motifs on the later gorgets include rattlesnakes, triskeles, and “spaghetti” figures while those on the earlier gorgets have circular crosses and triskeles that correspond to the upper levels of the Hixon site mound (Sullivan 2007:102). The sequence of the Davis, Hixon, and Dallas sites demonstrate that dating for the

majority of SECC objects is between A.D. 1200 and 1300 in eastern Tennessee, which corresponds to the span of time in which the Hixon mound was in use (Sullivan 2016:147–149). Following the burning of the Dallas site just before A.D. 1400, Mouse Creek phase occupations appeared on the lower Hiwassee River and close sections of the Tennessee River; these sites were similar to the Dallas site but lacked platform mounds (Sullivan 2016:156–157). Mouse Creek towns likely declined at the same time as initial Spanish contact, as evidenced by the fact that no European trade items have been recovered from any Mouse Creek phase sites (Sullivan 2016:157). The southern portion of the Chickamauga Basin and nearby portions of the Nickajack Basin experienced a significant decline in occupation during the fifteenth century (Sullivan 2016:155), although a cluster of sites with European trade items and absolute dates in the sixteenth century indicate that these sites may have been encountered by Spanish *entradas* (Sullivan 2016:161).

The comparison between the Hiwassee Island mound sequence to that of the Hixon and Dallas site mounds has led to a new understanding of the mound levels at Hiwassee Island. Level E<sub>1</sub> is considered the terminal Hiwassee Island phase level before a hiatus while the Hixon mound reached its apex in use. Levels B, C, and D of the Hiwassee Island mound require further investigation because they are neither classic Hiwassee Island phase or Dallas phase. Sullivan (2009) concludes that these mound levels likely represent an early incorporation of new Dallas style pottery, as these levels still showed evidence of wall trench structures, which would mean that the majority of the Hiwassee Island platform mound dates to the Hiwassee Island phase, rather than the shift between mound levels E<sub>1</sub> and D as proposed by Lewis and Kneberg (1946:101). Mound level A is the only level that contains similar structural components to the

Dallas site in addition to the Dallas Decorated pottery, thus dating it to the fourteenth and fifteenth centuries (Sullivan 2009:201, 203).

Overall, while Hiwassee Island is unique in many ways, it can be better understood and the archaeology can be better interpreted when it is contextualized within the greater regions of the Chickamauga Basin and East Tennessee.

## Chapter 5

### Curation Status and Pottery Bias Study

This chapter reviews the archaeological collections from the Hiwassee Island site that are curated at the McClung Museum. The primary goal of this study was to determine if the ceramic assemblage of the legacy collection is biased and to analyze and compare the collection strategies between the WPA and modern excavations that may have contributed to said bias. This analysis focuses on pottery from the Woodland Hamilton shell middens on Hiwassee Island.

#### *Quality of the Collections*

As is the case for most of the legacy collections at the McClung Museum, the ceramics from the WPA era excavations on Hiwassee Island are in mixed states of curation. Fortunately, it appeared that all the ceramics from these excavations were at the very least removed from the brown paper bags and other storage materials that they may have been in immediately after excavation. A fair portion of them had been washed and labeled, and rebagged in proper archival quality bags. However, most of the labeling was done in the 1930s, and as such is not to today's standards in terms of placement, size, and materials used. The National Park Service's Museum Handbook (NPS 2000: J1-J2) instructs that labels are to be durable yet not cause any damage to the artifact or cover any diagnostic/testable feature and that they should be reversible. The same handbook instructs against the use of nail polish, white out, rubber cement, and tapes as labeling materials. The use of tape, nail polish, and white paint (possibly nail polish) appeared to be common practice when labeling these early Hiwassee Island collections. The ceramics from the Hamilton middens examined in this thesis were placed in labeled boxes, mostly sorted by temper type and surface decoration, but without being placed in archival bags or given individual labels indicating field specimen numbers or any other means of identifying a more specific



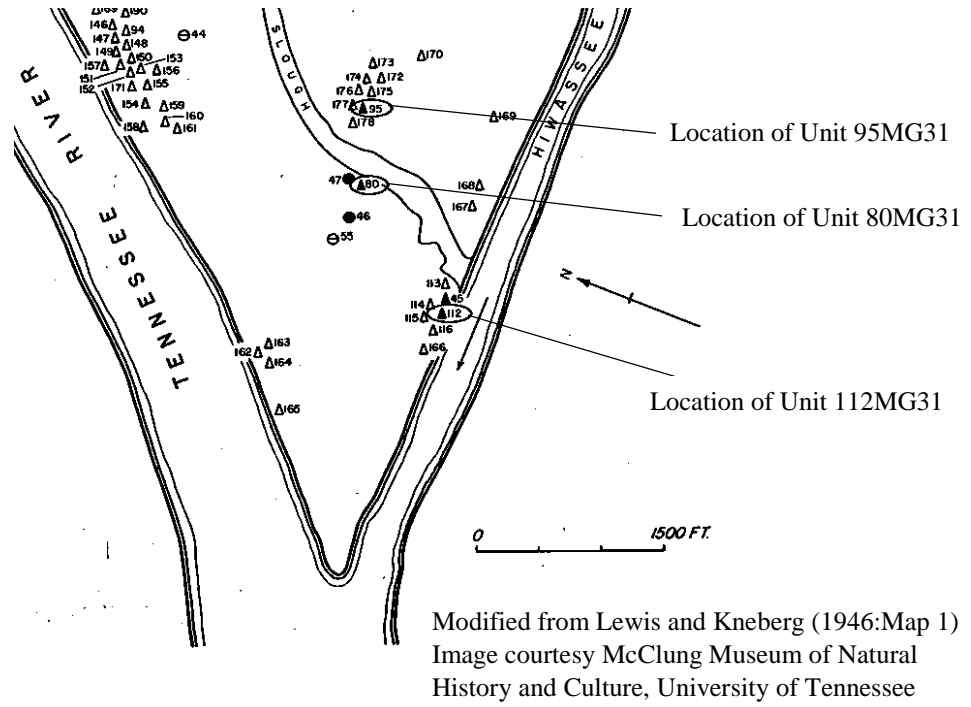
provenience. The boxes for the Hamilton midden ceramics are labeled with unit numbers, but very few of the sherds themselves have labels; the ones that did were in mixed unit boxes. Unfortunately, the funds to properly care for this and other legacy collections are not readily available, one of the problems discussed in a previous section regarding the curation crisis in archaeology. The previous curator of archaeology at the McClung Museum, Dr. Lynne Sullivan, obtained a grant from Save America's Treasures (Sullivan et al. 2011:98) that allowed for the purchase of Delta cabinets and storage supplies to house the WPA era artifacts that required acid free storage, inventory of these objects, and installation in the cabinets, as well as another grant from the Institute for Museum and Library Services (ILMS) to archivally digitize the WPA photos. The WPA site maps were digitized and the originals placed in archival storage as a result of a practicum project by Greg March (now map librarian at UT Libraries) for his MLS degree, with technical assistance from TVA and the UT Libraries paper conservations lab, and a private donation made to the McClung Museum that purchased a large map case. During her tenure, almost all of the original paper bags in which artifacts were placed immediately after excavation were discarded (Lynne Sullivan, personal communication 2017). The collections created by the 1997–1999 field schools were washed, sorted, and placed in archival quality bags. The bags were marked with provenience information, but individual sherds were not, regardless of size.

In examining sherds from both collections, I expected to find a higher portion of smaller ceramics from the 1997–1999 excavations than from the WPA excavations because screening was consistently done during the more recent excavations. I also expected to find that the collections from the later excavations have a larger percentage of plain sherds, while the WPA collections should have higher percentages of decorated sherds, due to selection bias in the field and in the lab for large or decorated artifacts and the fact that plain body sherds were disposed

of. I also anticipated earlier excavations to have proportionally more rim sherds in their collections given their diagnostic nature, as well as a result of the disposal of plain body sherds.

### *Methodology*

I decided to examine sherds from the Hamilton phase middens because these features were investigated by both the WPA field crew as well as the 1997–1999 field schools, allowing me to compare samples from the same feature type and age. In doing so, I was able to control for differences that would be caused by time period or context, making any differences explainable by either excavation or laboratory methods. Given that these feature types received less attention in both the Lewis and Kneberg (1946) report and more recent studies, I thought it would be interesting to focus on these features. Pottery from WPA Units 80, 95, and 112 (see Figure 10) were selected for study and comparison with the 1997–1999 Unit 20B sample because they all investigated Hamilton shell middens. The WPA midden excavation units were described as having an old humus overlaid by refuse deposits of mussel shells and pottery sherds mixed with soil darkened by organic inclusions. None of these WPA units had any evidence of Mississippian period deposits (Lewis and Kneberg 1946:21). Unit 95MG31 was deemed of greatest importance because it was described as the only WPA midden to be excavated systematically (Walker 1938a:2). A 20-foot trench was run along the center line and another trench was run west. The plowzone was removed one square at a time down to subsoil, apparently following natural levels. Pottery sherds were separated into plowzone and subsoil groups (Walker 1938a:5). Unit 80MG31 was cross sectioned with a 20-foot trench from the river bank upwards through the midden between the 1 and 3 lines (24 feet east of the center line) (Walker 1938b:1). Pottery sherds were separated into “all levels” for the preliminary trench, and present humus or old



**Figure 10**  
**Map of Selected Hamilton Shell**  
**Midden Units**

humus from other areas (Walker 1938b:2). A ten-foot trench was run through the center of Unit 112MG31 and was excavated down in six inch arbitrary levels into an undisturbed deposit (Walker 1938c:2). Therefore, it would appear that all of these units were systematically excavated in one way or another; it is likely that Walker's (1938a:2) statement is only in reference to Unit 95MG31 compared to the other middens in its vicinity that were simply tested: Units 172, 173, 174, 175, 176, 177, and 178 (see Figure 5) rather than a statement regarding all of the shell middens that were excavated.

Sherds were examined one unit at a time. Sherds were first sorted by temper, then by surface decoration, then vessel area. Rims were used to determine vessel form when possible. Approximate sherd diameter was recorded for each sherd. Separate counts were taken for each category within surface decoration, temper (if different tempers present), vessel area, vessel form, and sherd diameter, as can be seen in the tables in the analysis section of this chapter. Sherds were weighed by group and total weight was determined upon completion of all data collection. Initial sorting and counting of the sherds from Unit 95MG31 indicated that no culling took place because of the high number of plain sherds recovered from this unit, as well as the visual range in size. If this were true, it would mean that excavation was more thorough than expected based on the field methods manual written by Lewis and Kneberg (Lewis et al. 1995:Appendix C), in which specific instructions were given to throw out non-diagnostic sherds. Unit 80MG31 was also included to determine if culling in the field did occur, which would be seen by comparing the number of sherds curated and the number recorded in the associated field notes. Unit 112MG31, another midden located closer to the edge of the island (see Figure 5) was selected for analysis because of the differences between Units 85 and 90MG31, to add in another data set. Unit 20B from the 1997–1999 excavations was included in this analysis because of its

concentration of limestone tempered sherds and its designation as a shell midden (Claassen et al. 1998:98), making it appropriate for comparison to the Hamilton shell middens from the WPA excavations.

#### *WPA Excavations*

The volume of dirt excavated from unit 95MG31 was approximately 78.37 cubic meters. Plat maps and profile drawings on file at the McClung Museum were consulted to determine the *approximate* volume of excavated dirt from all WPA units, taking an average of the profile depth to use for height. All sherds were limestone tempered, with a total of 726 sherds excavated (Lewis and Kneberg 1946: Table 16; Table 1).

**Table 1**  
**Sherd Counts for Hamilton Middens**  
(adapted from Lewis and Kneberg 1946: Table 16)

<b>Units</b>	<b>Sherd Count</b>
80MG31	2207
95MG31	726
112MG31	1267
<b>Total</b>	<b>4200</b>

According to the field records on file at the McClung Museum, there should be 93 Candy Creek Cord Marked sherds, 268 Hamilton Cord Marked sherds (for a total of 361 Cord Marked sherds), and 365 Hamilton Plain sherds. Based on these data, approximately nine sherds per cubic meter were recovered from this unit. The reanalysis recorded a slightly higher count of 733 sherds, but this difference is most likely due to breakage over time. The average weight per sherd

was approximately 6.48 grams, with cordmarked sherds being the most common surface decoration by weight (62.51%) and by count (55.66%) (Table 2). Body sherds were the most common area of the vessel recovered (90.45%) (Table 3). Based on the rims recovered, bowls were the most common form (48.84%) (Table 4). The most prevalent sherd size was three centimeters in diameter (52.25%), followed by four centimeters (23.74%) (Table 5).

Interestingly, a very small portion of sherds came in at one centimeter in diameter (0.14%) and none less than one centimeter in diameter. The most important finding from the analysis of this unit is that it appears that no sherds were culled from what was collected.

The volume of dirt excavated from 80MG31 was approximately 63.71 cubic meters. I decided to analyze this unit after 95MG31 yielded the following unexpected results: all plain sherds appeared to have been collected and kept as well as all parts of the vessel; the smallest sherds were roughly two centimeters in diameter. To determine whether unit 95MG31 was an anomaly, at least one more unit needed to be examined. All sherds from 80MG31 were limestone tempered and totaled 2,207 (Lewis and Kneberg 1946:Table 16; Table 1). According to field records, this total was comprised of 160 Candy Creek Cord Marked, 849 Hamilton Cord Marked (for a total of 1,009 Cord Marked sherds), and 1,198 Hamilton Plain sherds. One steatite body sherd was listed in the field records, but could not be located in the ceramic collection; it is likely located in another area of the lab, perhaps in the cabinets or placed in boxes containing lithic materials. Using WPA era data, there were approximately 35 sherds per cubic meter in this unit. The reanalysis recorded 250 fewer sherds, resulting in an average of only 31 sherds per cubic meter. It is likely that these sherds were thrown out because of small size or lack of diagnostic characteristics. The total weight was 11,327.8 grams with the average weight per sherd coming

**Table 2**  
**WPA Units Surface Decoration**

<b>Unit</b>	<b>Surface Decoration</b>	<b>Count</b>	<b>Percentage</b>	<b>Weight (g)</b>	<b>Percentage by weight</b>	<b>Average weight per sherd (g)</b>
95MG31	Cordmarked	408	55.66%	2986.7	62.51%	7.32
	Plain	325	44.34%	1791.5	37.49%	5.51
80MG31	Cordmarked	1103	56.25%	7353.9	64.92%	6.67
	Plain	858	43.75%	3973.9	35.08%	4.63
112MG31	Cordmarked	1087	77.98%	9005.2	79.36%	8.28
	Plain	276	19.80%	2178	19.19%	7.89
	Brushed	3	0.22%	45.1	0.39%	15.03
	Sand Plain	2	0.14%	11.1	0.10%	5.55
	Checkstamped	13	0.93%	82.8	0.73%	6.37
	Unidentifiable	13	0.93%	25.6	0.23%	1.97

**Table 3**  
**WPA Units Vessel Area**

<b>Unit</b>	<b>Vessel Area</b>	<b>Count</b>	<b>Percentage</b>
95MG31	Base	11	1.50%
	Body	663	90.45%
	Rim	43	5.87%
	Neck/Shoulder	16	2.18%
80MG31	Base	25	1.27%
	Body	1838	93.73%
	Rim	82	4.18%
	Neck/Shoulder	16	0.82%
112MG31	Base	9	0.65%
	Body	1270	91.10%
	Rim	85	6.10%
	Neck/Shoulder	30	2.15%



**Table 4**  
**WPA Units Vessel Type**

<b>Unit</b>	<b>Vessel Type</b>	<b>Count</b>	<b>Percentage</b>
95MG31	Jar	15	34.88%
	Bowl	21	48.84%
	Unidentifiable	7	16.28%
80MG31	Jar	30	36.59%
	Bowl	30	36.59%
	Unidentifiable	22	26.83%
112MG31	Jar	52	61.18%
	Bowl	12	14.12%
	Unidentifiable	21	24.70%

**Table 5**  
**WPA Units Sherd Diameter**

Unit	Sherd Diameter	Count	Percentage	Unit	Sherd Diameter	Count	Percentage	Unit	Sherd Diameter	Count	Percentage
95M G31	<1 cm	0	0.00%	80M G31	<1 cm	0	0.00%	112M G31	<1 cm	0	0.00%
	1 cm	1	0.14%		1 cm	11	0.56%		1 cm	7	0.50%
	2 cm	116	15.83%		2 cm	476	24.27%		2 cm	150	10.76%
	3 cm	383	52.25%		3 cm	946	48.24%		3 cm	604	43.33%
	4cm	174	23.74%		4cm	394	20.09%		4cm	421	30.20%
	5 cm	40	5.46%		5 cm	106	5.41%		5 cm	133	9.54%
	6 cm	10	1.36%		6 cm	26	1.33%		6 cm	51	3.66%
	7 cm	6	0.82%		7 cm	2	0.10%		7 cm	19	1.36%
	8 cm	2	0.27%						8 cm	4	0.29%
	9 cm	1	0.14%						9 cm	3	0.22%
						10 cm	0	0.00%			
						11 cm	2	0.14%			

in at 5.78 grams. As with 95MG31, cordmarked sherds made up the majority both by count (56.25%) and weight (64.92%) (Table 2). Body sherds were the most common area of the vessel collected (93.73%) (Table 3) and rims for jars and bowls were equally the most common vessel form (both 36.59%) (Table 4). Most the sherds were three centimeters in diameter (48.24%), followed by two centimeters (24.27%) (Table 5).

The volume of dirt excavated from unit 112MG31 was 51.40 cubic meters. According to WPA records, there should have been 1,057 cordmarked sherds, 2 brushed, 200 plain, 8 checkstamped (all of them limestone tempered) and 3 potential (presumably sand tempered) Swift Creek sherds for a total of 1,270 sherds. The reanalysis counted 1,394 sherds, including 1,087 cordmarked, 3 brushed, 276 plain, 13 checkstamped, 2 sand tempered plain sherds, and 13 limestone unidentified (Table 2). The Swift Creek sherds could not be located, although these sherds could have become part of the ceramic type collections, and the only sand tempered sherds identified were plain. With 124 additional sherds counted, the average number of sherds per cubic meter was approximately 27. The WPA counts only had 21 sherds per cubic meter. The average weight per sherd was 8.14 grams with an overall weight of 11,347.8 grams. Cordmarked sherds were again the most common by surface decoration (77.98%) and weight (79.36%) (Table 2). Body sherds were the most frequent (91.10%) vessel area recovered (Table 3) and jars were the most prevalent vessel form based on rims (61.18%) (Table 4). The majority of the sherds recovered were three centimeters in diameter (43.33%), followed by four centimeters (30.20%) (Table 5).

### *1997–1999 Excavations*

The volume of dirt excavated from Unit 20B was 2.81 cubic meters. All the sherds were limestone tempered and totaled 4,207. According to these data, there were approximately 1,497 sherds per cubic meter in this unit. Some sherds were mislabeled either in terms of surface decoration or temper type, (i.e., in a bag marked “shell tempered” when really limestone tempered), so I recategorized them accordingly during my analysis. I expected to find some problems like this given that the report of the first field season explicitly mentioned that students had difficulty sorting, especially when it came to temper (Claassen et al. 1998:95). The most common surface decoration, not taking into account the unidentifiable sherds, was plain (20.56%), followed by cordmarked (5.37%) (Table 6). The average weight per sherd is 1.14 grams with an overall weight of 4,811 grams. Plain sherds were the most prevalent surface decoration by weight (41.41%). Body sherds were the most common vessel area recovered (98.79%), likely because sherds labeled as “sherdlets” were included as body sherds. Based on the small number of rims present (0.86%), jars were the most common form represented (27.78%). The majority of the sherds recovered were approximately one centimeter in diameter (38.82%), followed by approximately two centimeters in diameter (26.62%). Interestingly for this unit, the third most common diameter was less than one centimeter (23.89%). Based on sherd counts and the total volume of dirt excavated alone, there appears to have been a significant bias in sherd collection. I totaled the sherds from the WPA era units and divided that by the total cubic meters of dirt excavated from WPA era units, coming up with approximately 22 sherds per cubic meter discovered during WPA excavations. Just one unit from the 1997–1999 excavations of the same type but a much smaller excavation (2.81 cubic meters) yielded approximately 1,497 sherds per cubic meter. Assuming the 1997–1999 excavations collected

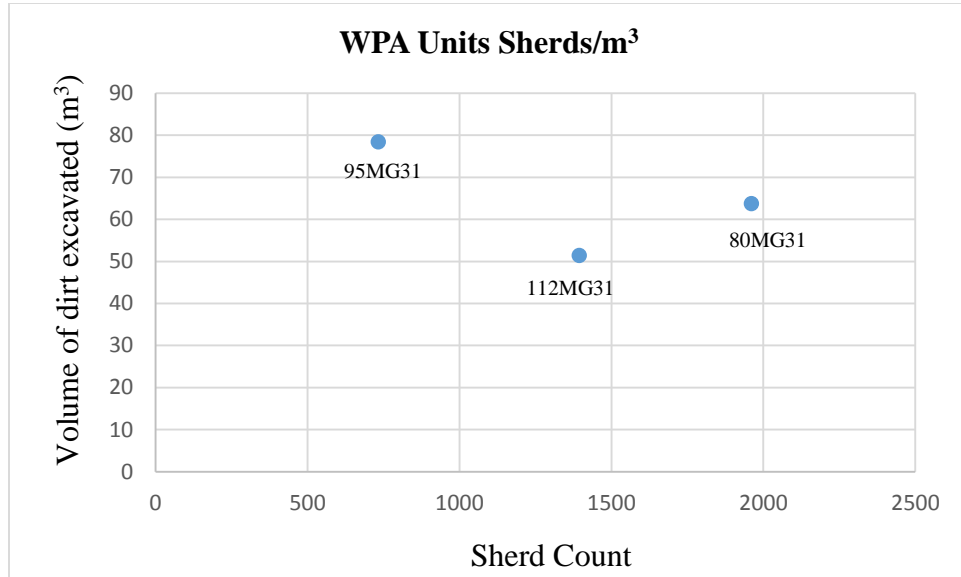
**Table 6**  
**Unit 20-B Data**

Surface Decoration	Count	Percentage	Weight (g)	Percentage by weight	Average weight per sherd (g)	Vessel Area	Count	Percentage	Vessel Type	Count	Percentage	Sherd Diameter	Count	Percentage
Cordmarked	226	5.37%	952.2	41.41%	4.21	Base	9	0.21%	Jar	10	27.78%	<1 cm	1005	23.89%
Plain	865	20.56%	1992.2	19.79%	2.3	Body	4156	98.79%	Bowl	3	8.33%	1 cm	1633	38.82%
Unidentifiable	3093	73.52%	1734.6	0.12%	0.56	Rim	36	0.86%	Bottle	0	0.00%	2 cm	1120	26.62%
Incised	2	0.05%	6	0.84%	3	Neck/Shoulder	6	0.14%	Indeterminate	23	63.89%	3 cm	330	7.84%
Checkstamped	16	0.38%	85.4	1.78%	5.34							4cm	81	1.93%
Fabric Impressed	5	0.12%	40.6	36.05%	8.12							5 cm	24	0.57%
												6 cm	7	0.17%
												7 cm	3	0.07%
												8 cm	2	0.05%
												9 cm	0	0.00%
												10 cm	1	0.02%
												11 cm	1	0.02%

more sherds due to different methods and less bias in the field, and that therefore the ratio of 1,497 sherds/m<sup>3</sup> is accurate, the WPA era excavations only collected approximately 1.40% (21 sherds per cubic meter/1,497 sherds per cubic meter) of the potential sherds that were deposited in units 80MG31, 95MG31, and 112MG31. Looking at a breakdown of different factors (surface decoration, sherd size, and vessel area) may help determine what biases may have been present during the WPA era excavations that could have led to this discrepancy, such as no screening or systematic collection of everything that was found. Post-depositional processes that may be affecting the data will be discussed as well, perhaps explaining in part the considerably low percentage for recovery that the data has provided.

### *Statistical Analysis*

Various tests were conducted to determine if there is a significant difference in surface decoration, sherd size, and vessel area of sherds collected between WPA era excavations and 1997–1999 excavations. Sherd counts from all three WPA era units were combined to compare to the 1997–1999 excavations. Given that the WPA units excavated were all the same type and excavated using the same methods and measurements, and that this is a pilot study to determine if there is any evidence of bias at all, the assumption was made that combining sherds counts would provide preliminary results that could lead to future, more in-depth studies. While the volume of dirt excavated from each unit was not exactly the same, the amounts were relatively close to one another when compared to the 1997–1999 unit (only 2.81 m<sup>3</sup> compared to 51.4 m<sup>3</sup>, 63.71 m<sup>3</sup>, and 78.37 m<sup>3</sup>). While the number of observations was too small to conduct a valid statistical analysis, Figure 11 demonstrates that there is not an observable trend that would indicate that a higher volume of dirt excavated correlates to a higher number of sherds recovered



**Figure 11**  
**Sherds per Cubic Meter in WPA Units**

between the three WPA units.

A Fisher's exact test demonstrated a significant difference between sherd sizes represented in WPA excavations compared to the 1997–1999 excavations with  $X^2_{(2, N=8295)} = 1553.62, p < 0.001$ . To conduct this test, the sizes were combined into three categories: small (from <1 cm to 3 cm in diameter), medium (from 4 cm to 7 cm in diameter), and large (from 8 cm to 11 cm in diameter). Small sherds affected this outcome the most, with significantly more small sherds recovered in the field school excavations than in the WPA excavations. Medium sherds also heavily influenced this test, indicating that significantly more medium sized sherds were recovered from WPA units than from unit 20B (Table 7).

Another Fisher's Exact test revealed that there was also a significant difference between the two excavations in terms of the representation of ceramic surface decorations, indicating a greater variety during the 1997–1999 excavations,  $X^2_{(6, N=8295)} = 6634.3, p < 0.001$ . The unidentifiable sherds had the biggest influence on the test statistic, as there were considerably less than expected from the WPA units and considerably more than expected in the 1997–1999 field school unit. Cordmarked sherds also affected the test statistic, indicating significantly more sherds were recovered from the WPA units than Unit 20B; the same can be said for the plain sherds (Table 8). Chi square tests revealed that vessel area demonstrated a significant difference in representation between the two excavations,  $X^2_{(3, N=8295)} = 210.23, p < 0.001$ . While it appears that each area influenced the test statistic, body sherds had the most influence, with significantly less body sherds recovered from WPA units than from unit 20B. Rims also significantly affected the test statistic, with significantly more rims in the WPA collections than the field school collections (Table 9).



**Table 7**  
**Sherd Diameter**

<b>Diameter</b>		<b>WPA</b>	<b>20B</b>
Small (>1cm-3cm)	Count	2694	4088
	Expected	3342.4	3439.6
Medium (4cm-7cm)	Count	1382	115
	Expected	737.8	759.2
Large (8cm-11cm)	Count	12	4
	Expected	7.9	8.1
Total		4088	4207

**Table 8**  
**Surface Decoration**

<b>Surface Decoration</b>		<b>WPA</b>	<b>20B</b>
Plain	Count	1461	865
	Expected Count	1146.3	1179.7
Cordmarked	Count	2598	226
	Expected Count	1391.7	1432.3
Brushed	Count	3	0
	Expected Count	1.5	1.5
Checkstamped	Count	13	16
	Expected Count	14.3	14.7
Incised	Count	0	2
	Expected Count	1	1
Fabric impressed	Count	0	5
	Expected Count	2.5	2.5
Unidentifiable	Count	13	3093
	Expected Count	1530.7	1575.3
<b>TOTAL</b>		<b>4088</b>	<b>4207</b>

**Table 9**  
**Vessel Area**

<b>Vessel Area</b>		<b>WPA</b>	<b>20B</b>
Base	Count	45	9
	Expected Count	26.6	27.4
Body	Count	3771	4156
	Expected Count	3906.6	4020.4
Rim	Count	210	36
	Expected Count	121.2	124.8
Neck/shoulder	Count	62	6
	Expected Count	33.5	34.5
Total		4088	4207

### *Interpretations*

In terms of sherd diameter, the results indicate that later excavations, due to methods like dry-screening with a ¼” wire mesh screen and flotation, allowed smaller sherds to be discovered, collected, and retained than during WPA excavations in which artifacts that were too small to be classified and therefore not seen as diagnostic were discarded, if even recovered (Lewis et al. 1995:627; Sullivan et al. 2011:93). This would also explain why WPA excavations show a significantly higher proportion of large sherds when compared to 1997–1999 excavations. Both results are consistent with the hypothesis that later, more modern collections would have a more accurate representation in terms of the size of the ceramics than WPA era collections. It bears mentioning that post-1930s agricultural practices may have had an effect on this data.

Because they lacked the necessary financial resources, few Tennessee farmers adopted the technology--tractors, trucks, hybrid seeds, and commercial fertilizers--that had become available in the 1920s and was revolutionizing agriculture elsewhere in the country. They continued instead to use the less efficient animal-drawn machinery, hand tools, and cultivation techniques from the nineteenth century. The Great Depression of the 1930s exacerbated conditions (Winters 2009: <http://tennesseencyclopedia.net/entry.php?rec=13>).

Before the WPA excavations in the 1930s, mule drawn plows were used for agriculture. While these plows could have damaged sherds in the plowzone, it is likely that the 60 years of plowing with the heavy, mechanized plows that were adopted by Tennessee farmers post-WWII (Winters 2009) played a role in the smaller sherds recovered during the 1997–1999 field schools. This does not negate the role of the screening process using ¼” wire mesh that was utilized during the field schools in locating these smaller sherds, but it is possible that more small sherds were present due to modern agricultural practices. While comparing the excavated strata of each of these investigations could provide more insights into sherd sizes, stratigraphic control could not

be maintained for this study because the ceramics from the WPA investigated Hamilton middens were not all labeled with FS numbers, and therefore could not be compared with FS logs to determine which sherds came from the plowzone and which were recovered from lower levels. If this study could have been controlled stratigraphically, it might have provided more information on whether post depositional processes, such as an additional 60 years of plowing with heavier machinery, had an effect on sherd size, and to what degree. Regardless of the effect of plowing on the number of sherds and their diameters, unit 20B still yielded more sherds by weight than the WPA units combined (Table 10), indicating a higher volume of sherds was recovered from the later excavations.

I had expected to find that proportionally more decorated sherds were present in the WPA collection than the 1997–1999 collection due to the WPA practice of valuing diagnostic sherds over plain, non-diagnostic ones. Considering that cordmarked sherds were found in significantly higher rates during the WPA era excavations and plain was found in significantly higher rates during the 1997–1999 excavations, this hypothesis was correct, and it suggests that plain sherds were more frequently discarded than cordmarked sherds during WPA excavations. Perhaps due to the locations (trash middens) examined, more everyday wares were to be expected, like the plain and cordmarked sherds that dominated the WPA collections. Several of the more unique decorated types uncovered during the 1997–1999 excavations were smaller sherds and at times difficult to identify, which might explain their absence from the WPA collections: either these sherds were not discovered due to their size, or if they were, they were considered undiagnostic and discarded. However, the fact that significantly more unidentifiable sherds were recovered from Unit 20B than from the WPA units supports my hypothesis that WPA era workers were more interested in what they considered to be diagnostic sherds. It appears that even if they had

**Table 10**  
**Sherd Weight per Cubic Meter**

<b>WPA Units</b>	<b>Weight (g)</b>	<b>Volume (m<sup>3</sup>)</b>	<b>W/V</b>
95MG31	4778.2	78.37	60.97
80MG31	11,327.8	63.71	177.80
112MG31	11,347.8	51.40	220.77
Totals	27,453.8	193.48	141.89

<b>1997-1999 Unit</b>	<b>Weight (g)</b>	<b>Volume (m<sup>3</sup>)</b>	<b>W/V</b>
20B	4811	2.81	1712.1

noticed any of the sherdlets they would have discarded them, creating a visible and significant bias towards larger, and therefore more likely to be recognized as diagnostic, sherds in the collection. The fact that the WPA era collections had a better representation of all vessel areas (body, rim, base, neck/shoulder) is likely due to the fact that the “sherdlets” (from <1cm to 1 cm in diameter) were included in the body sherd count for the 1997–1999 collections. These sherdlets could have come from other parts of the vessel but were too small to determine. Including these sherdlets as body sherds was purely a judgment call on my part, considering that no matter where one of the sherdlets was from on the vessel, it was part of the overall “body” at one point. Larger sherds are easier to identify, and given that the WPA collection yielded larger sherds, it makes sense that a wider range can be seen in that collection. However, the fact that significantly fewer body sherds and significantly more rim sherds were present in the WPA collection than the 1997–1999 collection supports my hypothesis that proportionally fewer non-diagnostic sherds were collected during WPA excavations.

### *Conclusions*

Based on these four units, it seems that while the WPA era excavations provided more of a range of ceramics in terms of size, surface decoration, and vessel area than expected, the 1997–1999 excavations collected a better overall representation of what was present. The most significant finding is that the WPA excavations only recovered about 1% by count of the potential sherds present in the volume of dirt that was excavated. It is important to keep in mind that modern plowing is likely to have affected the data to some degree. Clearly, modern day practices of using ¼” dry screening and water screening, as well as the excavator’s choice to

collect all sherds regardless of diagnostic value, provided a more accurate representation of the ceramics from the site. This is important to site interpretation because it prevents us from falsely stating that everyday ware was elaborately decorated, for example. Collecting even the smallest sherd and all the plain sherds provides a more accurate representation of the ceramics in use. This in turn allows inferences to be made regarding the more decorated wares, such as the likelihood that they were reserved for special occasions. A more accurate representation of vessels allows us to ask questions regarding trade, interactions with outside groups, and rank and status. Collecting only the largest and most diagnostic of sherds presents a biased picture of human behavior and vessel types used during the Hamilton phase.

The variety of surface decoration present and the number of decorated sherds did increase during later excavations. However, the range of vessel areas represented did not seem to increase with later excavations. Removing the 2,503 unidentifiable sherdlets (those less than 1 centimeter in diameter and those 1 centimeter in diameter) from the total of 4,156 body sherds from Unit 20B results in 1,653 body sherds. However, this only changes the overall percentage of body sherds found in Unit 20B from 98.79% to 97.01%. It would appear that including the unidentifiable sherds in the body sherd count did not considerably alter the end result. These results could also be a product of the units that were examined.

A separate pottery study would need to be conducted on the Mississippian village and substructure mound to determine if bias existed in the excavation of those units. I anticipate that the village would likely yield similar results—one would expect WPA workers to have only gathered large and diagnostic sherds from the entire site if that was the common practice, but the village should yield significant amounts of plain, everyday wares because that is where daily living activities were carried out. In regards to the mound, I would expect to see the same results



in terms of sherd diameter, merely because the excavation practices would not have changed.

And, given that Lewis and Kneberg (1946: Table 19) demonstrate that plain sherds make up over 50% of each mound level assemblage, I would not expect later excavations to reveal that there was any collections bias in surface decoration when excavating the mound. Based on this study, it appears that there is still much we could uncover about life on Hiwassee Island by looking at legacy collections in conjunction with newer excavations.

## Chapter 6

### Legacy Collections and Modern Analytical Techniques

The purpose of this section is to demonstrate that legacy collections can yield new information when examined with new analytical technologies. Improper curation of legacy collections has resulted in doubt as to whether modern testing will be successful. For example, museums often do not have a record of labeling methods, glues, or chemicals applied to artifacts in the past as part of laboratory or curatorial procedures. In some cases, pesticides that can contaminate results in modern tests were applied to organic artifacts to “protect” them while in storage (Knoll 2011:13). However, “acknowledgment of potential issues gives researchers the ability to make better decisions about how curated collections can be used to their fullest extent” (Knoll 2011:24) rather than exclude them from analysis entirely. These pilot studies demonstrate that in spite of known contaminants such as nail polish, paint, and ink, as well as some unknown ones, legacy collections can still be examined using modern technologies to record new data and provide new interpretations.

#### *Absorbed Residue Analysis*

Absorbed residue analysis can provide more information about what a vessel contained, whether it was likely used for serving or cooking, and what types of foods were prepared. Absorbed organic residues are complex mixtures of compounds that are absorbed within a porous substrate over the lifetime in which the object, commonly an unglazed pottery vessel, is used. The compounds are absorbed into pores in the vessel wall, protecting them from bacteria and other manners of decay (Reber and Evershed 2004:20). The best places to sample residues are the neck/shoulder area and body of the vessel (Reber et al. 2010:42; Reber et al. 2015:45). Most residues encountered in these tests are from foodstuffs, but non-food residues can include

sealants or other substances categorized as part of the manufacturing processes (Heron and Evershed 1993:250–251). There are two techniques for investigating what types of food were processed in ceramic vessels. The first is fatty acid composition, as testing can differentiate between plant, fish, and animal products, although it is difficult to differentiate between plants and fish (Reber and Evershed 2004:20). Fatty acids are more resistant to breakdown after deposition, and focusing on lipids decreases the chance for contamination from environment and handling (Skibo 2015:10). Lipid testing should be done on samples within the vessel wall to avoid contamination as well (Skibo 2015:10). Ideally, samples to be tested for absorbed residue should be selected in the field and not washed, handled with clean tools and hands, and stored separately in aluminum foil. However, analyses can be conducted on washed specimens, as water does not seem to have a significant impact. Despite concerns of contamination and poor curation, analyses have also been conducted successfully on curated legacy collections from the Angel Mounds site in southern Indiana (Baumann et al. 2013; Skibo 2015).

The second type of test that can be done is a biomarker analysis, in which cholesterol indicates meat and sitosterol and other plant sterols indicate plants. Biomarker analysis allows for more specific identification of foods, but biomarkers are usually present in lower concentrations than fatty acids and less common in absorbed residue, making this type of analysis more difficult (Reber and Evershed 2004:21–22; Reber et al. 2010:43-45).

The aims of this absorbed residue analysis were to determine 1) whether absorbed residue analysis could reveal any new information in legacy collections and 2) if there is a potential difference in contents for highly decorated wares versus everyday wares on Hiwassee Island. According to Lewis and Kneberg (1946:94), red on buff and red filmed wares served as “non-utilitarian pottery which was used only on special occasions.” I would therefore expect the

absorbed residue analysis to demonstrate that the contents of these vessels were distinct from those of the more everyday wares, like the plain and cordmarked varieties. However, a recent study by Reber et al. (2010) demonstrated that expectations based on vessel form and decoration can be deceiving. Reber et al. (2010) conducted an absorbed residue analysis on a bottle from the Moundville site in Alabama that was assumed to contain a ritual beverage, perhaps the black drink. The results of the analysis demonstrated that the vessel actually contained a meat/plant mixture (Reber et al. 2010:46), so it will be interesting to see if these results mirror theirs, or do in fact reveal a distinction in use for the painted wares from Hiwassee Island.

Due to the nature of the excavations and the records available, I decided to select samples from level E of the mound, unit 37MG31, because it had the best stratigraphic control. Level E is associated with the terminal Hiwassee Island phase during the Mississippian period (Lewis and Kneberg 1946:Table 19). The sherds selected for testing were difficult to locate at first, as they were not sorted well in the storage containers. Plain sherds were the most difficult to locate, as one whole box of plain body sherds contained sherds with no field specimen number recorded on them; these sherds comprised the small sample of shell tempered plain sherds kept by WPA workers. Six different surface decorations were represented in Level E, so one of each was selected for absorbed residue analysis to determine if the contents were the same for all or if there is any variation. All of these sherds are shell tempered, and the surface decorations include: plain, fabric impressed, cordmarked, Hiwassee Island Red Filmed, Hiwassee Island Red on Buff, and Hiwassee Island Complicated Stamped. I was unsure whether all pottery types would provide results due to possible contamination from mending or labeling of each sherd. The analysis was conducted by Dr. Eleanora Reber at the University of North Carolina – Wilmington (Reber 2017), who was able to extract residues from nine total sherds. Overall, the main

problems encountered before analysis even began were 1) that the excavation methodology and the way records were kept made the location of the sherds difficult—all the sherds from the same area were placed together under one field specimen number and not always separated by type, making locating them difficult, and 2) as previously mentioned, sherd selection for the absorbed residue analysis was made difficult by the way in which catalog numbers were recorded on the sherds. The “background/sealant” was painted on an area that was much larger than necessary, and the writing was not always as small as it could have been, often covering the entire section of the sherd that could be tested for residue.

### *Results*

All of the following results and an in-depth explanation of methods and processes for the absorbed residue analysis by Reber (2017) can be found in the attachment, “Analysis of Ten Absorbed Residues from Hiwassee Island Pottery.” Reber (2017:4) noted that the sherds were contaminated with nail polish, paint, ink, and pencil, and therefore had to be cleaned more vigorously than usual testing. Contamination could have also occurred during the excavation, field lab processing, transportation back to UT, preservation treatments, or long term storage and handling.

The one plain sherd (346-37MG31) possibly contained plant or fish, but a lack of biomarkers made further interpretations difficult. According to Reber et al. (2015:43), lean fish and Native North American freshwater mussels have a lipid profile that appears to be similar, so it is possible that this plain vessel contained freshwater mussels, but as the two residues are currently indistinguishable, it cannot be said for sure which resource was contained in the vessel. The one fabric impressed salt pan sherd (355-37MG31) revealed a small amount of soot and

fragrance contamination. The lack of biomarkers made the residue difficult to interpret, although it may have contained plants, which may support ethnographic evidence that Mississippian peoples obtained salt from both briny water and a “saltish” plant (Lewis and Kneberg 1946:90). Two Hiwassee Island Complicated Stamped sherds were sent and tested. Due to a lack of biomarkers combined with castor oil and fragrance contamination, the results of the residue analysis could not be interpreted for one of the sherds. However, the second Hiwassee Island Complicated Stamped sherd (369-37MG31), in spite of a highly degraded residue and castor oil contamination, showed evidence of processing and/or serving meat as well as the presence of coniferous resin. Two Hiwassee Island Red Filmed sherds were tested as well. The first (355-37MG31) showed evidence of both the presence of plants and meat, including a plant wax of some kind and coniferous resin. Castor oil contamination was encountered in this sherd as well. The second Red Filmed sherd (346-37MG31) contained plant resins, both coniferous and non-coniferous as well as oil, fragrance, and castor oil contamination. Soil samples would be useful for future absorbed residue analysis to determine if the source of the oil contamination was from the entire unit where this sherd was excavated, or if there is another explanation for its presence. One Hiwassee Island Red on Buff (349-37MG31) sherd was tested, showing the presence of meat and plants, including coniferous resin. As with the other decorated sherds, fragrance and castor oil contamination were detected, with the possibility of an additional oil contaminant. One cordmarked sherd (355-37MG31) was tested, also showing the presence of coniferous resin and the possibility of a waxy plant residue or fish. This sample was also contaminated with some sort of fragrance, and highly degraded, making an interpretation difficult and uncertain.

### *Discussion*

All of the decorated sherds had traces of what appeared to be castor oil. This is most likely a result of postdepositional processes or curatorial practices not mentioned in the field and lab manual written by Lewis and Kneberg (Lewis et al. 1995: Appendix C). Castor oil is also commonly used in fragrances and lotions, so it is possible that the contamination resulted from handling by someone either wearing perfume or scented hand lotion (<https://www.wildly-natural-skin-care.com/castor-oil-uses.html>; <https://uk.lush.com/ingredients/castor-oil>). This contamination did make the analysis difficult (Reber 2017:4), but it did not prevent analysis or the uncovering of new information regarding vessels on Hiwassee Island. Coniferous resin and meat was present in four of the six decorated sherds, while coniferous resin alone was present in one decorated and one plain. The report (Reber 2017:10) could not definitively state what type of coniferous resin was present in the sherds without having samples from conifers located at or near the site in question. Therefore, gathering samples from Hiwassee Island might be useful for future studies to determine if they were using local resources or they were trading for a specific resin from other locations. Overall the plain, cordmarked, and fabric impressed sherds could not be interpreted with any certainty due to contaminants, few biomarkers, and the fact that the residues were highly degraded, although it appeared that each vessel contained some kind of plant resource. All of the decorated sherds had ricinoleic acid and none of its sources are native to North America (Reber 2017:21–22). It is therefore probable that this residue is present as a result of modern castor oil use. Reber (2017:22) suggests that castor oil may have been used as some kind of treatment to bring shine to the artifacts or to act as a fungicide. Oil biomarkers were discovered in two decorated sherds; the residue could be diesel oil or indicative of prehistoric trade in bitumen or tar (Reber 2017:31). This could also be a result of contamination

with gasoline, as it was used to preserve wood samples and may have accidentally come in contact with the ceramics (Lewis et al. 1995:618).

As expected, on-site handling, lab processing, and curation and storage procedures and practices have impacts on what can be learned from absorbed residue analysis on legacy collections, such as the likely but unconfirmed historic use of castor oil contaminating these sherds. Soil samples from Hiwassee Island would make determining any contaminants much easier, perhaps allowing for a clearer understanding and interpretation of absorbed residues. The most significant results of these tests are (1) the presence of coniferous resin in five of the six decorated sherds and one of the plain sherds, and (2) the presence of a mixture of meat and coniferous resin in four of the six decorated sherds. The presence of the resin could be explained in a number of ways, such as a waterproof sealant, flavoring in cooking, or the result of processing a pine-based resource (Baumann et al. 2013:233; Reber 2017:23; Reber et al. 2015:44). Recent studies (Reber and Hart 2008a, 2008b) support the waterproofing sealant explanation, and it is ethnographically known that some groups within the United States as well as other countries used pine resin to waterproof the interior of their vessels (Hart and Brumbach 2009:377; Schiffer et al. 1994:202). While the current sample size is too small to say that a meaningful pattern has been discovered regarding the meat/resin combination in decorated sherds, it does demonstrate that despite poor initial treatment and inadequate storage of the artifacts of legacy collections, these artifacts still have research potential. To my knowledge, there have been no previous findings of coniferous resin and meat in Hiwassee Island Red Filmed or Hiwassee Island Red on Buff vessels. These results therefore provide some insight into two ceramic types that have always been considered unique. Conducting absorbed residue analysis on legacy collection ceramics might be difficult, and as we've seen, may not always



yield definitive results, but we know more after these initial tests than we did before, so it stands to reason that a more thorough examination would provide even more useful results. While this does not prove that Lewis and Kneberg (1946:94) were correct in their assumption that Hiwassee Island Red on Buff, Hiwassee Island Red Filmed, and Hiwassee Island Complicated Stamped were more “specialized” in their use, it does suggest that more research into this question might prove them right. I would recommend conducting the same type of analysis on a much larger sample size from the same level of the mound to determine if there is indeed a pattern and a distinction in use between these more highly decorated wares versus those considered more utilitarian. More in-depth studies could focus on the other Hiwassee Island phase mound levels and compare them to determine if vessel use changed over time.

#### *Portable X-ray Fluorescence (pXRF) Study*

Portable XRF technology has been used to analyze archaeological materials since the 1970s, with an increase in use by the mid-1990s (Speakman et al. 2011:3485). In short, XRF is the “determination of the bulk elemental composition of inorganic materials” (Tite 2000:672). To determine the elemental composition, XRF uses a beam of X-rays to irradiate the sample surface and if the radiation has enough energy to dislodge an atom’s inner electron an outer shell electron will take its place (Bow 2012:62). This process releases energy in the form of fluorescent radiation, and the XRF uses that fluorescent radiation to determine the abundance of the elements in the sample (Bishop et al. 1982:291; Bow 2012:62). Each element fluoresces uniquely and that fluorescence is what the machine reads to measure the amount of each element present in the sample based on the characteristic X-rays emitted (Bishop et al. 1982:291; Bow 2012:62-64). pXRF is convenient because it can be taken to the artifact and as long as said artifact area covers the aperture, it can be tested without further processing. For non-portable

XRF testing, small artifacts can be inserted into the XRF sample holder in their entirety rather than taking a small sample when the goal is to investigate the heterogeneous composition of said artifact. In this instance, testing can be non-destructive. However, if the artifact is too large to fit the instrument's sample holder and the goal is to analyze a heterogeneous sample, the artifact must be cut and/or ground into a powder that will fit in the designated sample area (Haschke 2014:1; Rice 2005:394). For this study, pXRF was used and no sample preparation was necessary.

The advantages to using pXRF are many. It is a portable, non-destructive testing method that requires minimal sample preparation; in fact, most samples require no pre-treatment before testing (Liritzis and Zacharais 2011:6; Shackley 2011:1; Tite 2000:672–674). The analysis is relatively quick, and the instrument and the software are easy to use, as the instrument is computer controlled and fully automated (Shackley 2011:2). pXRF is also more cost effective than other methods and provides sufficient accuracy and precision to answer a number of archaeological questions. One disadvantage to its use is the size of the artifact that can be tested (Shackley 2011:2). Size requirements will vary based on what is being tested and the specific pXRF instrument used, since the object will need to completely cover the area from which the X-rays are emitted to avoid readings that are not from the object in question. pXRF is also restricted in its ability to read certain elements due to low atomic numbers or low concentrations. pXRF cannot isolate small components within the sample, but analyzes every component in the sample, so just one element cannot be tested for alone (Bow 2012:61; Shackley 2011:2). It is also important to remember that this method only tests the surface of objects and that pXRF has a reduced sensitivity, meaning that it is limited in its ability to distinguish between pottery that was made from clays that were mineralogically similar and contained similar tempers (Bishop et al.

1990:539; Rice 2005:394). Surface roughness (i.e., not a flat surface) can also affect the results because it typically introduces an air gap between the sample and the instrument when the sample cannot lay flat (Liritzis and Zacharias 2011:5). However curved objects can often be placed in their “most flat” position and give fairly accurate readings. Despite these disadvantages, pXRF is a useful tool in ceramic paste studies because it can distinguish

among sources of raw materials used in pottery manufacture [either] directly, by establishing probable relationships of pottery to geographically localized raw materials, or indirectly, by demonstrating differences in ceramic pastes deemed to be sufficient to indicate the existence of geographically isolable resources (Bishop et al. 1982:276).

Clay and temper are bulky materials, and least-cost principles would indicate that these items are less likely to be obtained from distant locations, especially when compared to pigments used for decorating (Bishop et al. 1982:278). By this logic, clays that were procured using more effort than necessary could have been seen to possess some symbolic property, were used to create special or ritualistic pottery, or were better suited for the task at hand than locally available sources. However, to do more than say one sherd has a different paste from the other and to accurately source ceramics, clays from the area of interest should be sampled and analyzed for comparison (Bishop et al. 1982:280–281).

### *Research Goals*

The primary goal of the pXRF analysis was to determine if there is potential for pXRF studies on legacy collection pottery. A secondary goal was to see if the pXRF could get enough readings from selected Hiwassee Island sherds to document pastes and determine if they came from different source(s). This study did not set out to find clay sources, merely to determine if a difference in paste between ceramic types could be determined using pXRF. This testing

occurred under the assumption of the Provenience Postulate, that “there exist differences in chemical composition between different natural sources that exceed, in some recognizable way, the differences observed within a given source” (Weigland et al. 1977:24). In other words, variations in paste composition will be greater between differing sources than within the same source, meaning that significant paste variation is indicative of the use of different clay sources even though those sources may not be known.

### *Methodology*

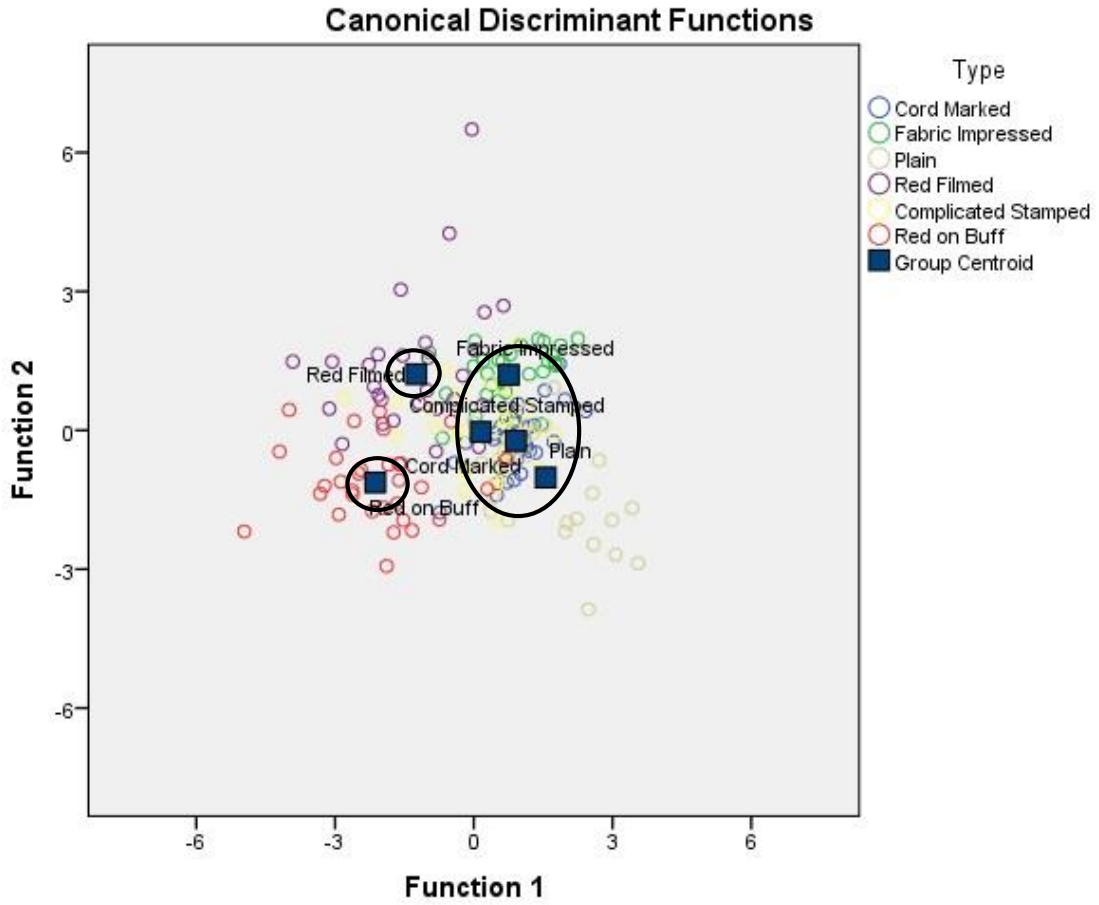
I decided to conduct this test on ceramics from the mound, Unit 37Mg31, and of the same decorative types as those tested with the absorbed residue analysis. The instrument used for this study was the Bruker Tracer III-SD, 40kV, 11.3 $\mu$ A with vacuum attachment and assay duration was 180 seconds. pXRF assays were taken from a total of 180 sherds, 30 from each of the following types: Cordmarked, Hiwassee Island Complicated Stamped, Fabric Impressed, Plain, Hiwassee Island Red Filmed, and Hiwassee Island Red on Buff. Two assays were taken for each sherd, one from the exterior and one from the interior—on the painted sherds, the exterior assay was taken from the buff or non-painted area. Only one control assay for each type was chosen to conduct the statistical analyses below; the control for the two painted varieties was either taken from a broken side or from the non-painted area. Sherds were chosen in part based on size, to be sure that each sherd would fit over the aperture and ensure that the paste was being analyzed and not the temper or any paint that may have been present. Although it would have been ideal, this study could not be controlled for chronology as all the plain sherds lacked field specimen numbers, and therefore their specific location (i.e., mound level) could not be determined. In order to include them in the analysis, the choice was made to not test for chronological

differences. Unfortunately, this appears to be one of the downsides to working with legacy collections.

### *Statistical Analyses and Results*

Before running statistical analyses, all elements were normalized to rhodium, an element that occurs in the instrument itself and is used as a monitor for consistency during testing. A one way MANOVA was conducted to determine whether there are any differences between independent groups (ceramic type) on more than one continuous dependent variable (elements). Pillai's Trace was used to assess the MANOVA due to unequal variances and indicated that there is a statistically significant difference in elements present in the paste based on ceramic types at Hiwassee Island ( $p < 0.001$ ). Specifically, there was a significant difference throughout the ceramic types in the following elements: Al ( $p < 0.001$ ), Ba ( $p < 0.001$ ), Co ( $p = 0.004$ ), Cu ( $p = 0.016$ ), Fe ( $p = 0.001$ ), K ( $p < 0.001$ ), Mn ( $p < 0.001$ ), S ( $p < 0.001$ ), Sr ( $p < 0.001$ ), Ti ( $p < 0.001$ ) V ( $p = 0.029$ ), Y ( $p = 0.034$ ), Zn ( $p = 0.047$ ), and Zr ( $p = 0.003$ ). These elements are driving the difference seen from the MANOVA. However, the MANOVA cannot show specific groupings of the ceramics based on paste, so a discriminant analysis was used to compare the pottery types based on the combined dependent variables.

Based on the Games-Howell post-hoc tests, the discriminant analysis visually distinguishes the groups (see Figure 12), and Wilk's Lambda indicates that functions 1-5 are significant ( $p < 0.001$ ). Looking at the scatterplot, plain, cordmarked, fabric impressed, and Hiwassee Island Complicated Stamped all cluster together. Interestingly, the Hiwassee Island Red on Buff and Hiwassee Island Red Filmed formed two additional groups. The two main functions of the discriminant analysis that are influencing the groupings are Function 1 and Function 2. Function 1 is most heavily loaded by Barium, Potassium, Iron, and Vanadium while Function 2 is most heavily loaded by Titanium, Manganese, and Iron. Hiwassee Island



**Figure 12**  
**Clay Paste Groupings Based on**  
**Surface Decoration**

Complicated Stamped is equally driven by both functions. Fabric Impressed sherds are driven more by Function 2, while plain and cordmarked sherds are being driven by Function 1. Hiwassee Island Red Filmed is being driven by Function 2 while Hiwassee Island Red on Buff is being driven by Function 1. There are a few outliers of Red on Buff, Red Filmed, and plain sherds.

### *Discussion*

It is important to note that there was not a significant difference in Ca ( $p=0.15$ ) between the types, likely because all the types tested were shell tempered. It should also be noted, given that all sherds tested were shell tempered, that the shell tempering did not affect the data. None of the functions from the discriminant analysis were heavily loaded by either calcium or strontium, indicating that assays were successfully taken of the paste rather than testing large portions of shell within the paste. The significant difference overall between most of the elements indicates a variety of clay sources were being used, although the exact location of each source is not known and the reason(s) why can only be speculated.

The three clusters visible on the discriminant analysis suggest that at least three distinct clay sources were utilized. While there is a cluster of plain, cordmarked, fabric impressed, and Hiwassee Island Complicated Stamped, there is still some variability in the paste, indicating that the clay used for these four wares was not from the exact same source, but rather that the clay sources used were all from a narrow geographic range. Hiwassee Island Red on Buff and Hiwassee Island Red Filmed were formed from two distinct clay sources. These results are in accordance with the Provenience Postulate (Weigland et al. 1977:24) in that more variation in composition is seen between sources rather than within sources. This finding may support Lewis

and Kneberg's assertion that Red Filmed and Red on Buff wares were not every day wares, but rather pottery that was only used for special occasions (1946:94). Lewis and Kneberg also state that Hiwassee Island Red on Buff and Hiwassee Island Red Filmed were made from a low iron content ball clay that gave it a buff color when fired and a "fine, compact texture" (1946:103) as opposed to the coarser and frequently more brown and brick colored paste evident in the other wares. This is likely why these two types were separate from the main cluster, but it does not lend an explanation as to why they seem to form distinct groups from each other. These three distinct clusters and the various outliers bring up research questions that can be addressed in the future, such as 1) are the differences we see temporal? since this study could not control for time, perhaps one in the future could); 2) did manufacturing practices change over time?; and 3) is it possible that the clay used for some wares was left to the discretion of the maker?

In the future, it would be useful to obtain clay from the site to compare to the sherds tested to determine if all sources were local or if some clays were so highly valued that makers were willing to travel to obtain it. The only way to source ceramics accurately rather than merely state a difference in paste composition is to conduct a baseline study that will define the chemical composition of the sources themselves (Steponaitis et al. 1996:556).

Bishop et al. (1982:316-318) discuss five strategies of exploitation that can explain clay gathering, and accurate sourcing would help us understand the process of pottery making at Hiwassee Island, if some wares were indeed more "special" or "ritual" than others, and how trade and group interaction may have affected the pottery industry. If clay sources from Hiwassee Island and the surrounding area can be tested to use as a baseline and compared to XRF results in the future, it would help us determine if Hiwassee Island phase peoples were either non-discriminating (little to no preference in sources), discriminating (specific sources



only), specializing (specific sources for specific vessels), compounding (mixing distinct clays), or importing (clays traded for) (Bishop et al. 1982:316-318). Understanding this could help understand trade relationships or the value of individual ceramic types more clearly. Tracing the movement of pottery based on distance from sources could also aid in understanding population movements, especially cycles of site use and abandonment. For example, sourcing clays near known sites throughout the Chickamauga Basin and creating a baseline from which to study East Tennessee ceramics could aid in the deeper understanding of population movements that were discussed by Sullivan (2009, 2016) by tracing movements of pottery made from distant sources or determining if as people moved they adapted and made their more unique, special wares from more local materials.

## Chapter 7

### Conclusions

This thesis project has examined both the limitations and research value of legacy collections, using collections from the Hiwassee Island site in east Tennessee as a case study. Excavation methods and collection strategies prior to the 1960s were different than those in place today, resulting in collections that were not finescreened or floated but rather handsorted, and culled in favor of more diagnostic artifacts. The resulting legacy collections are therefore lacking smaller artifacts and are not an accurate representation of the site assemblage. These factors call into question what new information can be provided by legacy collections using modern technologies. In addition, most legacy collections are not properly curated to modern standards and therefore not always seen as suitable for modern testing. The way these collections have been handled and stored raise concerns of potential contamination that may discourage researchers from utilizing these collections, perpetuating a cycle in which these collections are not prioritized in terms of care because no one is interested in using them. Simply stated, these collections are vulnerable as their sometimes less than desirable curation, according to today's standards, makes them appear to have less potential research value (Childs and Sullivan 2004:13, Kersel 2015b:78).

The first issue this thesis addressed was the research value and limitations of legacy collections when compared with modern well curated excavation assemblages. The pottery study from Hiwassee Island investigations revealed biases caused by previous excavation strategies. In particular, the fact that more small sherds were recovered during later excavations proves that newer methods of excavation (and artifact recovery and curation) provide a more accurate representation of site history, as does the higher proportion of unidentifiable sherds recovered during the 1997–1999 excavations. The most significant results discovered were that WPA

excavations only recovered about 1% of the potential sherds present in the volume of dirt that was excavated. This study also reinforces the progress that modern methods have made in the ability to recover more information about the site while excavating, and the utility of comparing legacy collections to modern ones. We now know that Lewis and Kneberg's (1946) analysis of Hamilton shell middens on Hiwassee Island was less accurate than the one explored in the 1990s. However, this does not detract from the value of the legacy collection; it adds to it in that we understand better excavation practices from that time, we can value more the ones in place today, and it enhances the previous data, rather than replaces it.

Collections similar in size to the Hiwassee Island legacy collections were created by excavations in the post-1960s Cultural Resource Management (CRA) era, although using today's methodologies and theoretical paradigms. As discussed in Chapter 2, the CRM era is part of the current curation crisis. Although this thesis addresses pre-1960s legacy collections, the goal of determining the limitations present in legacy collections as well as how to apply new technological methods to the collections can be applied to CRM era collections—understanding any limitations present in the CRM legacy collections can be used to formulate research questions, and pilot studies such as those conducted in this thesis could be conducted on those collections as well.

The second issue evaluated how modern technology and methods can be applied to legacy collections to provide new insights. Two new methods, absorbed residue and pXRF analyses were employed as a part of this thesis to address the research value of the Hiwassee Island legacy collection ceramics.

The absorbed residue analysis demonstrated that new technology can be successfully applied to old collections. In fact, the most important finding of this test, the presence of

coniferous resin on six of the nine sherds, suggests a process used for sealing vessels that was previously unknown for Hiwassee Island ceramics, and in so doing provided novel information about the people who inhabited Hiwassee Island. Although these tests were made difficult by the collection's state of curation, they still yielded new insights. The absorbed residue analysis also led to new research questions that can be similarly tested, demonstrating the research value of the Hiwassee Island ceramics.

The results of the pXRF study also successfully demonstrate the research potential of legacy collections. First, the results may support Lewis and Kneberg's (1946:94) assertion that Red on Buff and Red Filmed wares were more highly valued than the other wares from the Hiwassee Island phase. But now, there is scientific evidence to support that claim made over 70 years ago. This study could also be expanded and perhaps used to further more recent scholarship regarding the Chickamauga Basin. The outliers of Red on Buff and Red Filmed in the pXRF analysis could reflect the movement of people or sociopolitical relationships within the Chickamauga Basin. Sullivan's (2009, 2016) outline of the constant ebb and flow of mound use and the movement of peoples to and from Hiwassee Island within the Chickamauga Basin could explain the outliers in the pXRF study, either due to temporal factors, to visitors or immigrants bringing pottery with them from a distant homeland, or to the use of different sources of local clay, such as ritual clay from nearby caves. Future studies that could control for time in testing and compare results to sampled clay sources, particularly those from local caves, would reveal whether this is the case. For now, it is important to realize that the pilot pXRF study not only provided new information, but it also led to new research questions.

Increased accessibility to not only the Hiwassee Island collections but to all of the legacy collections at the McClung Museum would greatly benefit future researchers. Ford (1980)

proposed a tiered storage system for museums housing archaeological collections, in order to make the best use of space, time, and, of course, limited funds. This storage system is based on the facts that “1) all archaeological materials are not consulted with equal frequency or always for the same purpose, 2) archaeological collections are extremely heterogeneous in size and composition, 3) the repository is responsible for the preservation and protection of these materials *in perpetuum*” (Ford 1980:55). This system takes fragility and frequency of use of the artifacts into account when determining the best way in which to store the myriad classes of artifacts that make up an archaeological collection. Tier 1 consists of reference collections, regularly accessed study materials, artifacts that require special storage, and those unique and diagnostic items that are regularly requested by researchers. Tier 1 items should be in a permanent location with proper security, and their storage containers should be airtight and have a door seal to protect against dust and insects (Ford 1980:56–57). These collections, due to their frequent use and the special care required, should be in the same vicinity as the research facility within the museum (Ford 1980:59). Tier 2 items are those that are not accessed on a regular basis, but enough that their retrieval time should be kept to a minimum. As these artifacts are not in need of as much continuous attention as Tier 1 objects, they can be located further away (Ford 1980:55–57). Tier 3 items are the bulk items that are rarely accessed for research and mostly retained for future examination. These usually consist of soil samples or those classes of artifacts that are least likely to be re-examined. Ground stone artifacts and ceramic body sherds fall into this category as they do not require acid-free storage materials. These items need little to no monitoring and are rarely requested by researchers, so they can be located further away, perhaps even in an offsite location (Ford 1980:55–57). Tier 2 and 3 storage does not have to be airtight and steel shelving will suffice provided it can support the weight of the bulk artifacts, but storage

in boxes is ideal to prevent dust accumulation (Ford 1980:58). These items can be located in basements, warehouses, or other such offsite buildings as long as proper cataloguing has been done (Ford 1980:59).

This system of tiered storage is in place at the McClung Museum. The fragile and temporally diagnostic artifacts are housed in cabinets within the archaeological research laboratory that buffer fluctuations in temperature and humidity—a monitoring system for both temperature and humidity is in place in the lab. These objects are the ones most frequently handled by researchers. Whole vessels are placed on padded shelving in the lab as well, allowing them to be seen easily when access is required. Currently, these vessels are protected from dust by plastic sheets covering the shelves; this could be improved with muslin dust covers (Lynne Sullivan, personal communication 2017). Tier 2 storage consists of mainly bulk potsherds and ground stone artifacts in pasteboard boxes on metal shelving, both in the lab and the basement. Tier 3 items are housed at an off-site storage facility and consist of those items that are not fragile, like soil samples. One concern with these samples is the possibility of mold that could result from the sample not being completely dry before stored or fluctuations in climate conditions.

This thesis concludes by proposing a project that will improve access to Tier 2 storage items at the McClung Museum. Ford (1980:60) gives the example of “boxes with the catalogue numbers of the contents clearly printed on the outside” as Tier 2 storage at the University of Michigan Museum of Anthropology. I propose that the best way to increase accessibility to future researchers at the McClung Museum is to conduct a basic inventory of the Tier 2 materials located in Collections storage. This inventory would create a list of the FS numbers of all the artifacts located in each box, assigning a number to each box that can be located on a searchable,

digital database, thus making it easier to locate objects from the same provenience within a site; a task that, based on experience, can be daunting and discouraging. Visiting researchers often have limited amounts of time to spend gathering their data, and cutting down on the time it takes to locate artifacts would increase their data collection time, and perhaps encourage future use of the collections by them and others.

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## Vita

Erika L. Lyle was born in Chattanooga, Tennessee on January 27, 1990. In May of 2012 she received a B.A. in Spanish and Anthropology, with a minor in Latin American and Caribbean studies from Washington and Lee University in Lexington, Virginia. She entered the graduate program at the University of Tennessee, Knoxville in the fall of 2014, where she received her MA in Anthropology in August of 2017.