Visualizing the Cherokee Homeland through Indigenous Historical GIS: An Interactive Map of James Mooney's Ethnographic Fieldwork and Cherokee Collective Memory

by

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Abstract

In 1887, the Bureau of American Ethnology appointed James Mooney to work among the Eastern Band of Cherokee. From 1887 to 1916, Mooney documented the sites and stories of the Cherokee homeland as shared with him by members of the community. Mooney's working maps and field notes were recently discovered at the archive of the Smithsonian Institution. For this thesis, I combine Mooney's work with Cherokee collective memory to re-interpret the stories of the Cherokee homeland according to *Duyuktv*, a Cherokee theoretical framework and paradigm. Asking the question, "How can the Mooney archive be transformed into a digital map that will engage and inspire Cherokee youth to learn and explore the stories of their homeland?" I demonstrate what is possible when Cherokee perspective is synthesized with geospatial technologies to present the ancient stories of the Cherokee homeland in a way that weaves traditional and modern culture into its components.

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CHAPTER ONE

INTRODUCTION

> "You never really understand a person until you consider things from his point of view—until you climb into his skin and walk around in it."
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> -Atticus Finch, *To Kill a Mockingbird*

Interpreting Indigenous historical geographies through the eyes of the historical occupants of the land leads to a better understanding of Indigenous historical landscapes. Those scholars who overlook Indigenous perspective when conducting research on the historical geographies of Indigenous communities run the risk of misinterpretation. Accurate data collection, analysis, and useful representation of that analysis for an Indigenous community and society as a whole, compels us to not only collaborate with the Indigenous community, but also interpret our findings using the perspective of the Indigenous community. Setting aside pre-conceived ideas and beliefs about the history and culture of the Indigenous society allows us to interpret Indigenous historical landscapes in a way that honors the traditions of the Indigenous community.

For my thesis, I focus on a component of the historical archive that specifically deals with the stories of my homeland, the James Mooney archive in the Smithsonian Institution. Using a Cherokee perspective, Indigenous methodology, the collective memory of my people, and geospatial technologies, I reinterpret and reconstruct this historical archive. My project demonstrates how geospatial technologies can be used to accurately portray and preserve Indigenous geographic history when developed through an Indigenous perspective, through collaboration with the historical occupants of the land, and through Indigenous methodology.

Geospatial technologies (GT) are the digital geographical tools used to research, study, analyze, and display places on the earth's surface. Following the protocols for ethical research, the protocols for conducting respectful collaborations with Indigenous communities, and the protocols of the Eastern Band of Cherokee Indians (EBCI), I use GT to create an interactive digital story-map of Cherokee homeland sites for the EBCI community. Because this deals with the mapping of culturally sensitive information, I relied on EBCI community consultations and protocols throughout the research, development and design of this project, and placed the well-being and benefit of the community as the first priority of the research. I provide further discussion on the protocols guiding this research and examples of GT in the literature review section.

Since the beginning, Cherokee oral tradition (stories communicated from generation to generation) was the medium for containing and preserving knowledge about our homeland. After the majority of Cherokee were removed from our homeland to Indian Territory, the use of oral tradition diminished among the younger generations. If this knowledge is not preserved, it will be lost to future generations. I view my creation of an interactive, audial story-map as a continuation of Cherokee oral tradition through the use of modern technology.

RESEARCH QUESTION

In this project, I ask the question, **"How can the Mooney archive be transformed into a digital map that will engage and inspire Cherokee youth to learn and explore the stories of their homeland?"**

To address the first half of the question, *how can the Mooney archive be transformed into a digital map,* I ask:

What is the extent of information contained in the Mooney archive? How can I complement, correct, broaden, and heal this information with the archive of Cherokee collective memory?

To address the second half of the question, *to engage and inspire Cherokee youth to learn and explore the stories of their homeland*, I ask:

What is the homeland the EBCI seeks to represent? How can geospatial technologies be used to engage and inspire Cherokee youth?

Discussion

The work of James Mooney, an ethnographer among the Eastern Band Cherokee during the late 1800s and early 1900s, was the starting point of this research. An archive of his notated field maps, housed in the Smithsonian Institution, was made available to me through digital scans of the collection. I relied on his field maps to determine positional accuracy and assign coordinates to the sites included in my project.

A cursory glance through Mooney's mapping field notes revealed inconsistencies between Cherokee living memory and Mooney's historical interpretation of homeland sites. When I inquired about these misinterpreted sites, the Eastern Band Cherokee Historic Preservation Officer and the Cultural Resources Supervisor verified these inconsistencies. It may be that Mooney interpreted some sites incorrectly based on his own perspective, the perspective of other scholars, or because of disagreements among his collaborators; or, it may be that Cherokee people purposely gave incorrect information to Mooney to protect the true identity of a site. Either way, this study does not attempt to determine the source of error, but focuses instead

on blending Mooney's research with Cherokee collective memory to produce a map of Cherokee homeland sites.

The Cherokee student body, grades K-12, is the target audience for my digital story-map of Cherokee homeland sites. Because students of varying ages will use the maps, the interactive portions needed to be simple, easy to control, and flow smoothly between sequences and gradients. I also felt the map needed to be visually and audibly engaging in order to retain the students' attention. The digital map directs students to sites where they visually explore images while listening to a cultural story about the site. By using the interactive map, Cherokee students learn the stories of their homeland. Learning the stories will hopefully lead to a desire to explore the stories in a real-world setting. To encourage site visits, students are allowed to download site coordinates to a smart phone, tablet, or GPS unit. Using these coordinates, the student can visit the site, take a picture at the site with friends or family, and upload pictures to a special "I was here" site visit section linked to the map.

To assist me in answering my research question, I reviewed five areas of literature. Literature pertaining to the concept of homeland provides a deeper understanding of the Indigenous perspective of homeland and how the perspective is relevant to this study. Literature on Indigenous and Cherokee map history is reviewed to understand and acknowledge the many unique forms of Indigenous cartography that exist outside the scope of Western cartography. Indigenous methodology literature is reviewed for guidelines on how to proceed ethically in the areas of sensitive cultural narrative and mapping and how to collaborate with an Indigenous community. This area of literature assisted me in framing the foundations of my theoretical approach. Historical GIS (HGIS) and GT literature provide understanding of the fields of HGIS

and GT, and examples of their application. Interactive map design literature provides background on the various platforms available for the design of an interactive story-map.

OUTLINE OF THE STUDY

The majority of Chapter Two focuses on my literature review where I outline and discuss the literature relevant to this project. The selected literature provides insight, depth, and clarity about the concepts in my thesis. Building on the literature reviewed, I also discuss the framework for my theoretical analysis and chosen methodology.

In Chapter Three I discuss my research design. I begin by examining the archival data used in this study. I then provide the historical context for the data and for this study before moving into the methods and procedures I used in data collection, analysis, and in the design and content of the interactive digital story-map.

Chapter Four is dedicated to the story-sites. I begin this chapter with a review of the geospatial technologies used to create the story-site backgrounds and scenes. I then review the story-sites animation, audio, and presentation platform, and end the chapter with a review of the stories themselves. When reviewing the stories I follow a pattern of analysis for each story-site. I usually begin with the oldest written record and work my way forward to the present, correcting the written archive to reflect Cherokee perspective in the telling of the story as I proceed through the analysis.

In Chapter Five, I review the end product—the digital story map. I begin by discussing my original vision for the map, then move into what was possible, and end with the final processes used to create the digital story-map.

In Chapter Six I discuss the outcomes of my research objectives, the limitations of the project, future research, and the significance of the study.

The final chapter, Chapter Seven, is dedicated to my thesis conclusion.

CHAPTER TWO

LITERATURE REVIEW, FRAMEWORK, AND METHODOLOGY

LITERATURE REVIEW

The Concept of Homeland

The definition and importance of homeland is determined by cultural context. Popular English dictionaries, such as Microsoft Encarta and Merriam-Webster online dictionaries, define homeland as a "native country or native land; an area set aside for people of a particular nationality, culture, or race; a self-governing region created and set aside for a population". These definitions lend credence to an ideology wherein homelands are easily created and changed based on cultural, societal, and political factors. From an Indigenous perspective, however, the homeland is the birthplace of creation and the place of one's ancestors[1] since the beginning of time.

In 1853, Brownell wrote about the commonality shared among the Indians of North and South America in relation to their origin. The majority of Indians encountered believed their people groups were created in America[2] and that if mankind did come from a single pair (as was

[1] Archaeological investigations demonstrate the preference of pre-19th century Indigenous cultures of the southern Appalachian region, which includes Cherokee culture, for burying their dead among the structures of their living relatives. (Riggs, B. H. and Shumate, S. M. 2003. *Archaeological Testing at Kituhwa 2001 Investigations at Sites 31Sw1, 31Sw2, 31Sw287, 31Sw316, 31Sw317, 31Sw318, and 31Sw320*, report prepared for the Eastern Band of Cherokee Indians Cultural Resources Program. Chapel Hill, NC: University of North Carolina, p. 72.)

[2] Brownell refers to this as the doctrine of separate creation (Brownell, C. De Wolf. 1853. *The Indian Races of North and South America; comprising an account of the principal aboriginal races; a description of their national customs, mythology, and religious* (see pg. 10) *ceremonies; the history of their most powerful tribes, and of their most celebrated chiefs and warriors; their intercourse and wars with the European settlers; and a great variety of anecdote and description, illustrative of personal and national character*. Boston: Dayton and Wentworth, pp. 18-19).

the predominant belief of the Europeans), then that pair must have originated on the continent of the Americas and the people of the Eastern continents are simply descendants of this pair (Brownell, 1853). For the majority of Indigenous societies, homeland is viewed as the place of emergence. It is the place of creation and from it comes the language of the people and oral tradition—it is the place of the ancestors and ways of being since time immemorial (Aikau, 2008:71; Deloria, 2003; Martin, 2001:6-7; Silko, 1996; Standing Bear, 2006:212-213). Indigenous homelands provide living histories that embody the present while allowing current generations to actively participate with their ancestors of past generations (Basso, 1996:32-33). For Tribal peoples, homeland is the place where past, present, and future generations fuse together and form identity, culture and religion. In other words, homeland and identity are one.

The study of homeland is fairly new to the discipline of geography; prior to its introduction geographers spoke about "culture regions" rather than homelands. In the 1970s, when the term first appeared in academic writing, geographers defined homeland in a way quite different than that of Indigenous peoples. "Homeland" was first used by geographers to describe the attachment, to place, formed by a people group (a group of people with shared qualities such as ethnicity, language, religion, morals and values) having successfully acquired, used, and retained a land they then refer to as homeland (Carlson, 1971; Tuan, 1976). The discipline revisited the concept in the 1990s, and refined its view of homeland as an area where a people group has lived long enough to adjust to and be transformed by the natural environment, produce feelings of attachment to the place, and desire to defend their right to inhabit it (Conzen, 2001; Nostrand, 1992; Nostrand and Estaville, 1993). In the past decade, cultural geographers began studying the possible entwinement of physical landscape and national identity, and many now view the two as inseparable (Domosh et al., 2010).

If we combine the views of geographers since the 1990s, a definition of homeland emerges that contains semblances of Indigenous perspective. When a people group can live long enough in a place to call it a homeland, and land shapes national identity, then homeland is the landscape that forms the basis for identity. Although this recent definition by geographers most resembles Indigenous definitions, there remains a divergence in perspective between current cultural geographers and Indigenous peoples. For Indigenous peoples, the landscape not only forms the basis of identity but is itself defined by the story routes of the ancestors—the sites and stories that form the basis of cultural knowledge and livelihood (Basso, 1996; Riggs, 2013a).

Indigenous Map History

Western cartography, built on the traditions of European society, emphasizes paper and digital products to capture and record knowledge of the landscape. Indigenous societies, in contrast, use memory, oral instruction, and a variety of cultural traditions (e.g. carvings of wood and ivory, drawings on animal skins, decorative patterns on clothing, beading, basketry) as the preferred cartographic forms for conveying Indigenous knowledge of landscape and geography (Barr, 2011; Wareham, 2002; Warhus, 1997). For centuries, Indigenous cartographic knowledge and forms of expression were ignored by European scholars and scientists (Lewis, 1998a). Viewed as inferior, Indigenous cartographic expressions did not conform to European cartographic standards of representing the earth on a paper map using uniformity of scale, Cartesian coordinates, directional symbology, and specified locations (Warhus, 1997; Woodward and Lewis, 1998). However, a lack of conformity to Western technique does not signify a lack of cartographic knowledge (Barr, 2011). Indigenous societies, inhabiting ancestral homelands for

hundreds and thousands of years, are very knowledgeable about their landscapes. This knowledge is held and conveyed according to the traditions of the Indigenous society.

In 1998, Woodward and Lewis developed theoretical frameworks for recognizing the "traditional"[3] forms of cartographic expression existing outside Western conventions. "Cognitive or mental cartography, performance or ritual cartography, and material or artifactual cartography" (1998:3) are the labels used to categorize the numerous "internal" and "external" forms of traditional cartographic expression (Woodward and Lewis, 1998). The significance of Woodward and Lewis' development of a traditional theoretical framework lies not in the categorical descriptions, but in the inclusion of traditional cartographic practices as valid forms of expression within the context of a larger society. Because of their work, all forms of traditional (Indigenous) cartographic expression, historical and modern, are now validated as legitimate forms of cartographic expression within the academic discipline of cartography.

Cherokee Map History

While Cherokee society is predominantly an oral society, Cherokee cartographic knowledge is demonstrated through both internal and external forms of expression. Throughout history, Cherokees exchanged geographic knowledge with each other and with non-Cherokee by drawing temporary or ephemeral maps on floors or paper using charcoal or wood (Lewis, 1998b). In Woodward and Lewis' (1998) traditional cartographic frameworks, such maps fall under the category of "an external material and ephemeral performance cartographic approach".

[3] Woodward and Lewis chose the term "traditional" over other options presented in the historical archive such as "preliterate," "simpler," "primitive," and "savage." (Woodward, D. and Lewis, G. M. 1998."Introduction." In Woodward, D. and Lewis, G. M., eds. *The History of Cartography, Volume Two, Book Three, Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies*. Chicago: University of Chicago Press, p. 2.)

In addition to ephemeral maps, Cherokee also display geographic knowledge through creative and cultural expressions. Art and oral tradition are the preferred mediums. Beading, basketry materials, pottery designs, storytelling, and the very act of weaving itself capture Cherokee knowledge of place (Foster, 1885; Hill, 1997; Lewis, 1998b; Mooney, 1888; Speck, 1920). An example of a cultural device that served both the creative and cultural forms of Cherokee cartographic expression is the wampum belt. Wampum belts were created to form association with events. At a specified place and time, the wampum belt(s) would be read by an orator(s) who would convey to the audience the story behind the belt, including all details of place and time (Foster 1885:56; Smith 1998; Strickland, 1975:11-12, 103). The belt itself was the recording and public performance was required to unlock the memory contained in the belt (Smith, 1998). If the belt was used to recall the words of a treaty or pledge, the belt was referred to as a "road or alliance" belt or "wampum map" (Lewis, 1998b:88-89).

The earliest documented use of a Cherokee wampum map occurred in 1758 when a Cherokee orator presented a road belt to the Iroquois in support of the friendship between the Cherokee of Kiowee (possibly Keewhoee Town), the Iroquois, and the British (Lewis, 1998b). During the presentation, the Iroquois were told explicity of the Cherokees intent for making the Road—to encourage their brothers (allies) to use the Road to bring news and messages to the Cherokee towns of "Kiowee" and "Chotta" by keeping the Road clear and safe for them to walk upon and killing all enemies who dared use the Road or attempted to obstruct its use (Lewis, 1998b).

Although scholars disagree about whether wampum belts are part of traditional Cherokee cultural practices, or whether they held wampum belts given to them in political relations with the Haudenosaunee (Lewis, 1998b; Riggs 2013b), the display of knowledge is considered

cartographic according to Woodward's and Lewis' categories of the "internal cognitive cartographic approach", the "external mobile comparable objects material cartographic approach", and the "external nonmaterial and ephemeral performance cartographic approach" (Woodward and Lewis, 1998). Until the time of European contact, Cherokee cartographic expression consisted primarily of internal and external forms of expression. However, as Cherokee people experienced different customs, through contact with non-Cherokee people, other tools were added to Cherokee cartographic tradition, and used in ways that complemented and benefited Cherokee Society.

Contact with European explorers brought an additional form of expression to Cherokee cartographic knowledge—paper maps. When interacting with Western society, the Cherokee drew paper maps to mark the boundaries of lands they controlled. In 1760, the *London Magazine* published a map by Thomas Kitchen "engraved from an Indian [Cherokee] draught" and titled "A New Map of the Cherokee Nation with the Names of the Towns & Rivers They are Situated on N° Lat. From 34 to 36º" (Waselkov 1998; Power 2007). In 1785, Old Tassel, a Cherokee chief (also known as Corn Tassel) created a paper map for the United States Senate to delineate the line between the eastern boundary of Cherokee lands and the Western boundary for legal settlement by Americans (Warhus, 1997; Lewis, 1998b).

The introduction of computerized mapping programs further transformed the communication and representation of Cherokee cartographic knowledge. Eastern Band Cherokee and the Cherokee Nation Tribal governments created Geographic Information Systems (GIS) centers to facilitate the use of GIS and to store all data associated with each mapping project (CN, 2012; EBCI, 2012). Mapping projects are developed according to the needs of the community and to strengthen and promote Tribal sovereignty. GIS maps for community

planning, natural resource development, and emergency management strategies, are examples of community driven projects (Bond, 2002; CN, 2012; EBCI, 2012). Mapping of jurisdictional borders and land parcels, cultural preservation projects, and mapping of Cherokee lands using Cherokee place names and syllabary are examples of projects aimed at strengthening and promoting Cherokee sovereignty (Bond, 2002; Jackson, 2011).

GIS maps are dynamic. They are easily changed, can be viewed at multiple scales, are capable of storing large volumes of geographic data in computer memory, and are not restrictive in design or content. In comparison with the static and materially restrictive nature of paper maps, GIS maps are more complementary to performative, nonmaterial, and ephemeral values in traditional Cherokee cartography.

Indigenous Methodology

To avoid silencing the voice of Indigenous people, research conducted about Indigenous people, within or outside of Indigenous communities, should conform to Indigenous methodologies. Conforming to Indigenous methodology can be challenging for the researcher, however. There is not an 'all-inclusive' or theoretically defined Indigenous methodology. Indigenous methodologies are both "fluid and dynamic" (Louis, 2007). This fluidity confirms the necessity for community involvement and participation. Ancestral traditions form the foundation, but practices change and evolve with time. Accurate representation and interpretation of Indigenous cultures requires the inclusion of Indigenous perspective.

Theory and method are defined and shaped by local Indigenous culture and ethical protocols (Botha, 2011). Cultural protocols play a large role in Indigenous communities. These protocols guide the actions of each community member and their interactions within the

community. Each community sets these protocols according to tradition, values and belief systems. Respect, reciprocity, responsibility and "genuine relationship" are foundational protocols shared by Indigenous communities worldwide (Smith, 2012:125). These commonalities, and the local protocol of the community, should be followed when conducting research about the community. If not followed, the researcher runs the risk of offending and falsely representing the community on which the research is based.

Indigenous methodologies are based on the needs and desire of the community not the scholar. Respect, inclusion, participation, social hierarchy, and selflessness must be taken into consideration. Seeking out appropriate members of the community for collaboration, seeking community involvement in each step of the research process, and adhering to cultural protocol for ethical research is respectful and beneficial to both the participants and the scholar (Faircloth and Tippeconnic, 2004).

Historical GIS and Geospatial Technology

Geographic Information Systems[4] is a component of GT that enables the digitization of geographic inquiry through computer based mapping, storage, and analysis. When paired with historical inquiry, the acronym HGIS (historical geographic information systems) is used. Traditionally, geographers study space and its alteration by human interactions, and historians study differences across time. HGIS is the avenue that enables both the geographer and the historian to study "patterns of change over space and time" (Knowles, 2002). Paper maps can provide visualization of historical events, but because of their static nature, they can do so only

[4] The acronym GIS encompasses both the singular and plural form of a geographic information system. (Bolstad, P. 2005. *GIS Fundamentals: A first text on geographic information systems*, 2nd ed., White Bear Lake, MN, Eider Press.)

in a fixed dimension (2D or 2.5D) and format. GIS allows for the inclusion of other GT and is therefore able to produce visual aids in several dimensions and formats. HGIS is the application of the strengths of GIS for mapping historical events and spatial patterns and analyses across time.

Within the discipline of Geography, the term Geospatial Technology emerged to describe the various technologies used for capturing data about the earth's surface. Computerized mapping systems, systems for determining geographic coordinates both horizontally and vertically, (non-human) earth imaging systems, and scanning systems that use radiant heat, pulses of light energy, microwaves, or sound-waves to capture geographic features fall under the umbrella of GT. Basically, any technological system used for capturing, displaying, or reconstructing spatial or geographical dimension is considered a form of Geospatial Technology (Jackson, 2009; van Manen et al., 2009). As the understanding of these technologies grows, application for historical projects is increasing. HGIS practitioners are applying GT in creative and unique ways to advance historical spatial understanding through the mediums of modern, cutting edge technology.

HGIS and GT are not confined to the discipline of Geography. The many applications of these technologies have caught the attention of scholars across disciplines. Now considered to be an interdisciplinary application, HGIS is used throughout the social sciences and humanities (Knowles, 2008). Archaeologists are using advanced applications such as terrestrial LiDAR[5], virtual reality, virtual GIS, and computer simulation to not only investigate and analyze historical settings but also model and recreate historical settings in three and four dimensions (Harris, 2002; Lee, 2012; Rua, 2011). Surprisingly, archaeologists, and not geographers, are leading the

[5] Literature refers to Light Detection and Ranging systems as LiDAR and lidar. I will also use both forms of the acronym in this paper.

way in finding creative uses and applications of geospatial technology and historical geographic information systems, by mapping and recreating historical landscapes prior to modern encroachment. These projects allow viewers to step back in time and experience a historical setting in its natural state, while providing real world images and coordinates for site visits.

The discipline of geography has not been as adventurous in its use of HGIS and GT. The most common applications of HGIS do not take full advantage of the array of technologies available. Grossner (2010:94) uses the term "constrained in scope" to describe the majority of HGIS projects to date. Modeling their digital projects after their paper-map counterparts, HGIS projects often consist of two-dimensional snapshots of a historical time period for themes such as population statistics, settlement patterns, and transportation or exploration networks (Grossner, 2010). These two-dimensional maps of historic sites limit visual analysis to a flat surface layer, whereas three and four dimensional maps would allow for greater analysis by incorporating the time and depth components of a site (Harris, 2002). HGIS and GT used in a three or four dimensional map, on the other hand, allows one to recreate historical artifacts and settings, and create buildings, features, and scenes that can be examined from any angle at any height. By modeling reality as closely as possible to the actual time period, viewers are presented an evocative sense of historical place.

HGIS projects are more than technological portrayals of historic settings. Behind each project stands a foundation of solid research. Historical GIS scholarship incorporates historical inquiry, archival research, evidence, analysis, argument, and data into the framework of each project (Knowles, 2008; Schuppert and Dix, 2009). Cutting edge technology is used to create the visuals and experience of an HGIS project, but the main goal is to provide a greater awareness and understanding of historical geographic space. For Indigenous Historical GIS (IHGIS), solid

research also includes the involvement of community and interpretation through Indigenous perspective.

Interactive Map Design

Computerized maps that provide users with dynamic viewing and participation experiences are known as interactive maps that allow users to make real-time changes to the display (Andrienko and Andrienko, 1999). When functioning properly, real-time display allows immediate viewing of user induced changes (Badni, 2006). The design of the map dictates what changes the user is able to make. However, technology restricts the design and dynamics of the map.

Artistic expression, hardware, software, volume of data, and level of interactivity are all considered when designing an interactive map. But the greatest limiting factor for design is performance of the technology. Displaying scenes in real-time requires excessively fast (super) computing and large (super) storage capacity (Badni, 2006; Moltenbrey, 2001). According to Badni (2006), a true realistic representation requires a minimum of 80 million polygons per second—almost twelve times faster than a typical PC and four times faster than a gaming station. An interactive map designed on such a system could not be read by most computers. To compensate for this, designers can choose from several online programs and web-based environments for rendering, storing and displaying map content.

Dynamic mapping systems are an emergent technology. Dynamic mapping allows users to create content and make changes to maps in real-time. HTML5 Canvas is an example of a true dynamic system that allows real-time changes through manipulation of downloaded data and JavaScript execution speed (Boulos et al., 2010). Although dynamic interactive map design can

take place using HTML5 Canvas, this system is not a true mapping system. It is an application technology that requires map designers to know and apply scripting language (HTML and JavaScript) when creating a map. Once the map is created, its readability is restricted to viewers with web browsers that are compatible with HTML5.

Other online programs exist for interactive map design. Some of these programs are open-source and easily accessed. These mapping frameworks use a combination of pre-designed and dynamic elements. Cartagen is an example of an open source mapping framework that provides geographic style sheets (GSS) for developing, changing, manipulating, and displaying real-time or live-stream mapping data (Boulos et al., 2010; Warren, 2012). Cartagen, written in JavaScript, display maps through HTML 5, and uses the Canvas element to load mapping data (Warren, 2012). To use the GSS to their full potential, designers must also know CSS (cascading style sheets) HTML scripting language. The online viewing of Cartagen created maps is restricted to web-browsers compatible with HTML5.

Google Earth and ArcGIS Online are examples of web-based environments used to create interactive maps. Both of these systems are stable, time-tested, and relatively simple for the viewer to use. Web mapping systems offer simulations of dynamic presentation by using a series of tiled images at a variety of pre-determined scales (Boulos et al., 2010). The viewer believes their actions are making real-time changes to the map display when in reality their actions are simply activating preset parameters. Web mapping systems may not be true dynamic systems but do provide an interactive viewing experience of pre-determined content at different scales. These systems are not restricted to specific web-browser versions or applications.

CONCEPTUAL FRAMEWORK/THEORETICAL APPROACH

Carl O. Sauer, one of the most influential geographers in American history (Shortridge, 2011), emphasized the importance of reconstructing historical cultural landscapes from the viewpoint(s) of the historical occupants of the land and not from the viewpoint of an "educated American of today" (Sauer, 1941:10). Unfortunately, a theoretical framework for such a position did not exist at the time of Carl Sauer. At that time, models used by geographers, historians, ethnographers, and anthropologists, in the study of history and human cultures, mandated interpretation through the perspective of Western science. Interpreting Indigenous historical landscapes and cultures from the viewpoint of Western science not only suppresses Indigenous perspective but also sets the stage for misinterpretation of Indigenous cultures. Fortunately, Indigenous theoretical frameworks and methodologies are now available to assist and guide researchers in studying all aspects of Indigenous peoples and cultures.

Postmodernist social science theory, developed throughout the 1960s, 70s, and 80s, paved the way for academic inclusion of Indigenous methodologies and theoretical frameworks. The Postmodernist approach to research rejects the rigidness of three hundred years of modernist theories born out of the Renaissance, Reformation, Scientific Revolution, and Enlightenment periods that require the use of a single, overarching, dominant culture approach to research (Dear, 1988, 1994, 1999). According to Dear, postmodernity "liberates the voices of those outside the traditional centers of scholastic authority" and "appreciates diversity and difference and the consequent diversification of theoretical and empirical interests" (1994:9). Postmodernism embraces the significance of all voices and allows for the utilization of localized knowledge, philosophy, and perspective (Dear, 1994; Phillips, 2010). The postmodernist liberation and appreciation for theoretical diversity led to the acceptance of several (previously)

marginalized theoretical approaches to scholarship and the eventual inclusion of Indigenous methodology.

In the late 1990s, Indigenous scholars began questioning the absence of Indigenous methodology and theoretical frameworks when conducting research on Indigenous cultures, peoples and communities. They argued that the absence of these frameworks prevented accurate articulation and interpretation of Indigenous perspective (Moreton-Robinson and Walter, 2009). In 1999, Linda Tuhiwai Smith called for the 'decolonization' of research methodologies, through the disruption of relationships (Smith, 2012). In the second edition of her book, Smith expounds on the relationships in need of disruption, including

> relationships between researchers (mostly non-indigenous) and researched (indigenous), between a colonizing institution of knowledge and colonized peoples whose own knowledge was subjugated, between academic theories and academic values, between institutions and communities, and between and within indigenous communities themselves (*Decolonizing Methodologies*, 2012:*x*).

In addition to social disruptions, Smith (2012) also urged Indigenous communities to take back the stories, languages, and ways of knowing stolen from them by researchers and to begin conducting and facilitating research on their own terms by implementing Indigenous codes of ethics that are (generally) founded on respect, reciprocity, and responsibility. Smith's intent was simply to begin a dialogue on the subject. However, these discussions became the cornerstone for the creation and development of Indigenous theoretical frameworks that now provide scholars with alternative approaches (Indigenous approaches) to Indigenous research.

For my thesis, I borrow from two Indigenous theoretical frameworks to create an approach that best fits the needs of my study. The first approach is viewed through the decolonizing lens of *Tribal methodology* and emphasizes Tribal knowledge and epistemology (Kovach, 2011). Tribal knowledge and epistemology is Tribe specific. For my study, I focus on

Eastern Band Cherokee methodology. The guiding principles behind this methodology come from the Cherokee philosophy of *duyuktv* (also referred to as *duyuktai*), "the right way," which shares common ground with the Indigenous research ethic outlined by Smith, above. *Duyuktv* focuses on balance; the rights of the individual are balanced with the good of the whole and personal freedom is balanced with societal responsibilities (Duncan and Riggs, 2003). Although no one has yet published with this perspective, *Duyuktai* now governs all research conducted within the jurisdiction of the EBCI (see Figure 7 on page 32). *Duyuktai* methodology mandates that research be performed with an attitude of respect toward the community, integrity towards the community and its members regarding their lives and history, an understanding that the acquisition of traditional knowledge is not considered a right but a privilege, an understanding that the research project must benefit the Cherokee people as a whole, and an understanding that research is relationship building (Holland, 2012a).

The second approach I borrow from is *Indigital(ization) as a Postcolonial Discourse* (Palmer, 2013). I do not agree with the term postcolonial because it is a temporal approach which implies that colonialism no longer exists (Downey, 2010:2260); in fact, it is ever present and going strong. However, I understand it can be useful as a foundation for new theory. Indigitalization is a term used by Palmer (2013) to describe the union between Indigenous and geotechnologies (e.g. GIS, remote sensing, LiDAR). Postcolonialism allows indigitalization to create new spaces, a "*third space*, of radical openness where both development and social justice can be envisioned together" (Palmer, 2013:42). Indigitalization processes, which are built on Indigenous perspectives, include the mixing and sharing of knowledge systems, flexibility, the creation of something new, and reciprocity (Palmer, 2012). The Indigital approach provides a framework for the use of geotechnologies in a manner consistent with *Duyuktai*.

In addition to *Tribal Methodology* and *Indigitalization*, I approach this project in harmony and selflessness. This project is a gift to my people and provides an opportunity for me to give back. My completed research and interactive mapping project shall become the property of my sister Tribe, The Eastern Band of Cherokee Indians (EBCI).

My work is guided by the protocol of the EBCI Cultural Institutional Review Board through my partnership and collaboration with the Cultural Resources Office; the protocol for ethical research as articulated in my first-year training in Responsible Scholarship from the Department of Geography; and the protocol and prior approval of the University of Kansas Human Subjects Committee (Appendix A) for conducting respectful collaborations with Indigenous communities.

CHAPTER THREE

RESEARCH DESIGN AND PROCEDURES & METHODS

RESEARCH DESIGN

Archival Data

Throughout this project, I rely on the work of ethnographer James Mooney and the collective memory of Eastern Band Cherokee Tribal members captured through interviews and written records.

James Mooney lived among the Eastern Band of Cherokee Indians at various times between 1887 and1916.[1] In the course of his work, he documented Cherokee homeland site information through Cherokee oral history and Cherokee manuscripts (Ellison, 1992; King, 1982; Mooney, 1900). Cherokee elders and tribal leaders escorted Mooney to sites where he recorded their knowledge of place on topographic maps using both Cherokee syllabary and English (Riggs, 2012; Ellison, 1992). Based on his field experiences, Mooney then gave written reports to the Bureau of American Ethnology and wrote several journal articles; some of his field notes were also preserved and made available for research today. Mooney's field maps have only been available for research since 2006. Dr. Brett Riggs, Research Archaeologist with the University of North Carolina at Chapel Hill, discovered the maps in the Bureau of Ethnology archives at the Smithsonian Institution. The maps were in poor condition. Dr. Riggs obtained funding for the maps to be stabilized and scanned in preparation for future research. For simplicity's sake, I will use the term "Mooney archive" when referring to Mooney's maps, field notes, reports, and journal articles.

[1] Figure 44 contains a Census Map of the Eastern Band of Cherokee Towns and boundaries, produced during the same period of time as Mooney's work among the Cherokee.

The Mooney archive includes twenty-five maps on nineteen United States Geological Survey topographic quadrangles. Each quadrangle has a scale of 1:125,000 and represents approximately 963 square miles on the ground for a total coverage area of 18,297 square miles.

Figure . The front side of one of the 1886 Nantahala quad sheets used by Mooney (he used three quad sheets for this area). (Mooney, Manuscript 3318.)

In addition to making annotations on the front side of the maps, sometimes Mooney wrote field-notes on the reverse side.

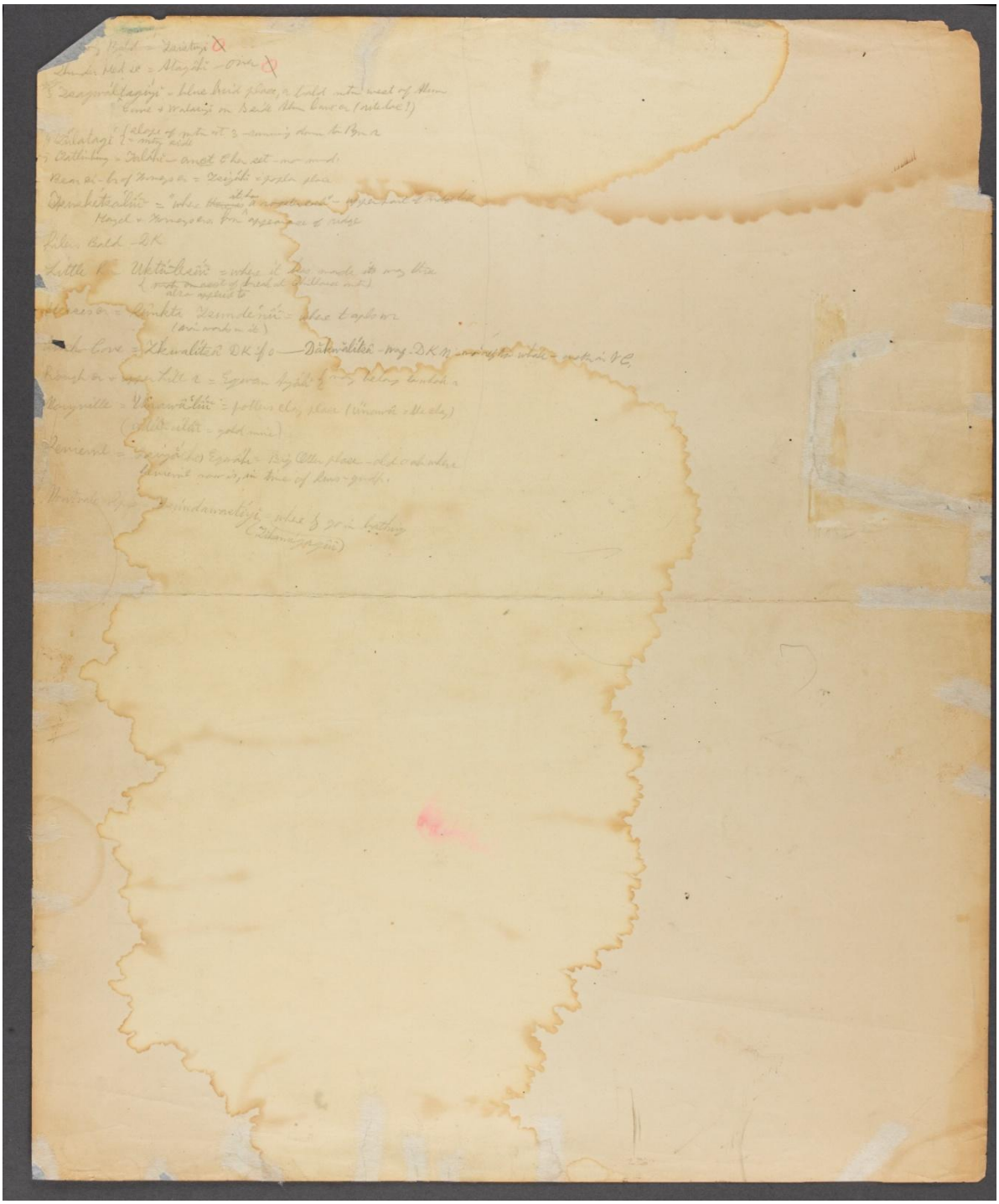

Figure . The reverse side of one of the 1886 Nantahala quad sheets used by Mooney. (Mooney, Manuscript 3318.)

Winslow M. Walker, Associate Anthropologist for the Bureau of American Ethnology, transcribed a large portion of the annotations and field notes onto separate sheets of paper in handwritten and (sometimes) typed formats.

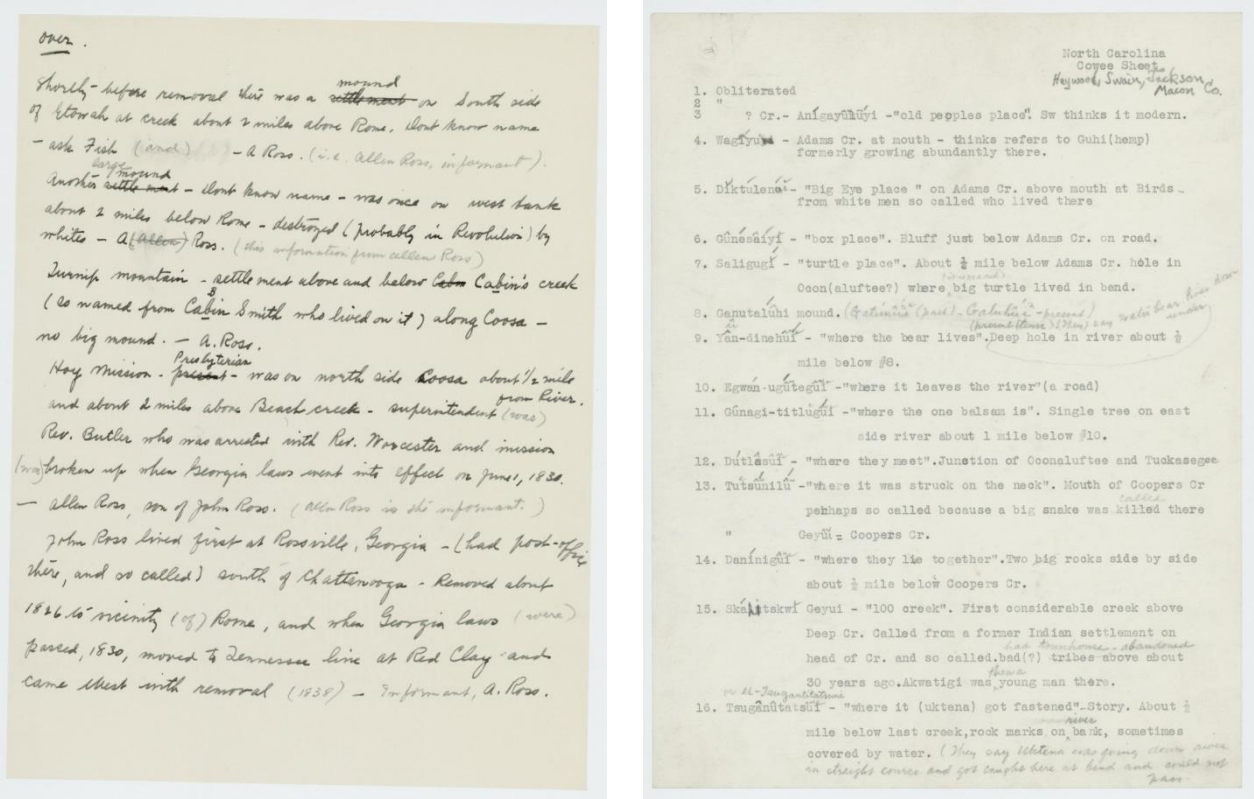

Figure . Samples of handwritten and typed transcriptions of Mooney's field-notes. (Mooney, Manuscript 3318.)

The second archive I rely on is the collective memory of Eastern Band Cherokee people. Known as an “old form” or “living archive”, collective memory is a blend of oral tradition and personal living memories (Wareham, 2002). Cherokee collective memory provides a better understanding of the places documented by Mooney and aids in the correction of inconsistencies or errors contained in the Mooney archive. For this research, conversations and interviews with EBCI Elders, traditionalists, historians, and community members about the cultural sites documented by Mooney, have provided me with direct access to this collective memory archive.

Aspects of these cultural sites have been captured through previous interviews and conversations with the Cherokee and are presented in the historical writings of Adair, 1775; Buttrick (also spelled Butrick), n.d.; Cummings, 1830; Foster, 1885 and 1889; Haywood, 1823; Knight, 1914; Lanman, 1849; Payne, n.d.; Skinner, 1896; ten Kate 1889; Terrell, 1892; Timberlake, 1765; and Ziegler and Grosscup, 1883; and the scholarly works of Ashcraft and Moore, 1998; Duncan, 2008; Duncan and Riggs, 2003; Hendrix, 1983; Kilpatrick and Kilpatrick, 1964; Speck and Broom, 1951; Teuton, 2012; and Walker, 2004. I include this body of information as a part of Cherokee collective memory.

Historical Context

To provide a better understanding of the archival data in this study, I offer a brief historical context of relevant areas. I begin with a discussion of what the term homeland means to the Cherokee. I then provide an overview of the historical and present-day geographies of the Cherokee and how they came to be. I conclude this section with historical background for James Mooney and his work among the Cherokee.

Cherokee Homeland

From a Cherokee perspective, the homeland is viewed as an intimate part of traditional cultural identity. It holds the mother town of Kituwah, the birthplace of the Cherokee, and tells the stories of the ancients. It is the place where Cherokee language was given and where Selu (the English translation is “corn”), the first woman of the Cherokee, died and was reborn, giving sustenance to all (Awiakta and Justice, 2003). Cherokee Elder Tom Belt often speaks about how Cherokee language makes sense when used in the homeland. He explains how this language

seems ill-fitted to the post-Removal environment of Oklahoma. "Cherokee language is full of "hilly" words, words that are difficult to associate with the predominantly non-mountainous landscape of Oklahoma…..but once a [Cherokee language] speaker returns to the homeland, words make sense" (Belt, 2011). For the Cherokee who remained in a portion of their ancestral homeland, the connection of language and place continues but is confined to their current land base commonly known as the Cherokee Indian Reservation.

Historical and Present Day Geographies of the Cherokee

The homeland of the Cherokee is vast. Some oral tradition claims control of all lands from the Cherokee Mountains[2] to the Mississippi, and south of the Ohio River to the land controlled by the Creeks. This oral tradition is confirmed in British exploration maps drawn in 1730 and 1755 (Figures 45 and 46). The combined English and American Treaties with the Cherokee, record a land base of over 68,898,000 acres, encompassing portions of present-day Alabama, Georgia, Kentucky, North and South Carolina, Tennessee, Virginia, and West Virginia (Smith, 2000:1-1; Royce, 1884). Through territorial cessions (relinquishment of rights through treaty processes) the land holdings of the Cherokee people were reduced to a fraction of their original size. In 1835, the remaining 7,882,240 acres were ceded in an illegal treaty backed by the President of the United States, Andrew Jackson (Smith, 2000; Royce, 1884). This treaty is deemed illegal because it did not follow Cherokee protocol; it did not go through Tribal Council, so it did not have a voting majority of the Cherokee people. The treaty was signed by a small

[2] The portion of the Appalachian Mountains controlled by the Cherokee, were often referred to as the Cherokee Mountains on historical maps (*A New and Correct Map of the Province of North Carolina* by Edward Moseley, late Surveyor General of the Said Province. 1733.)

group of Cherokee men who were not given the authority, by a majority of Cherokee citizens or by Principal Chief John Ross, to represent the Cherokee Nation (CN, 1836:10-11).

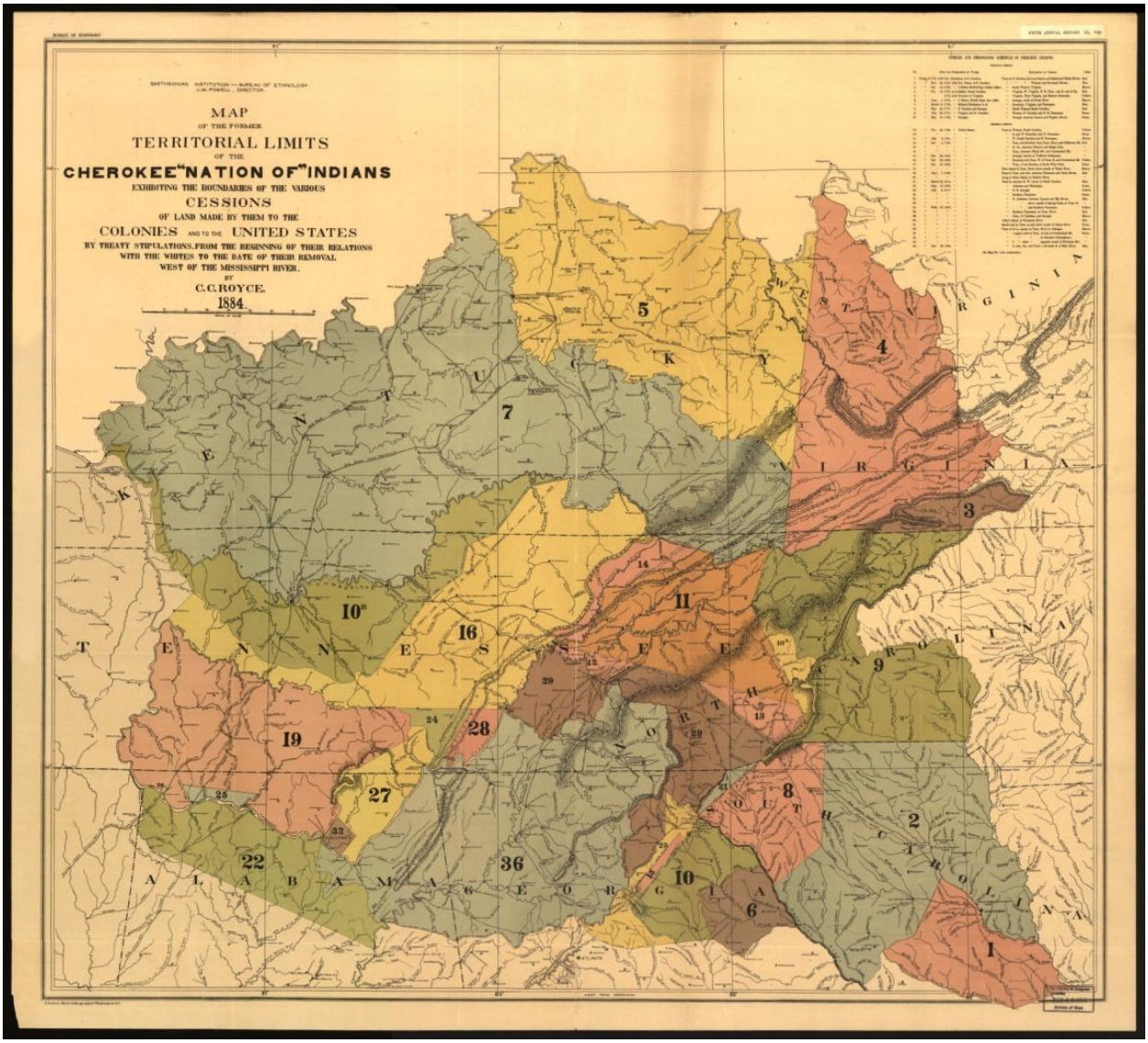

Figure . Royce, C.C. 1884. ("Map of the Former Territorial Limits of the Cherokee "Nation of" Indians, exhibiting the boundaries of the various cessions of land made by them to the colonies and to the United States by treaty stipulations, from the beginning of their relations with the whites to the date of their removal west of the Mississippi river" *Bureau of Ethnology; Fifth Annual Report,* Plate *VIII*.)

Three years later, under the leadership of President Martin Van Buren, the United States government enforced the illegal treaty of 1835, and uprooted over 16,000 Cherokee from their homes on a forced emigration known as the “Trail of Tears”.

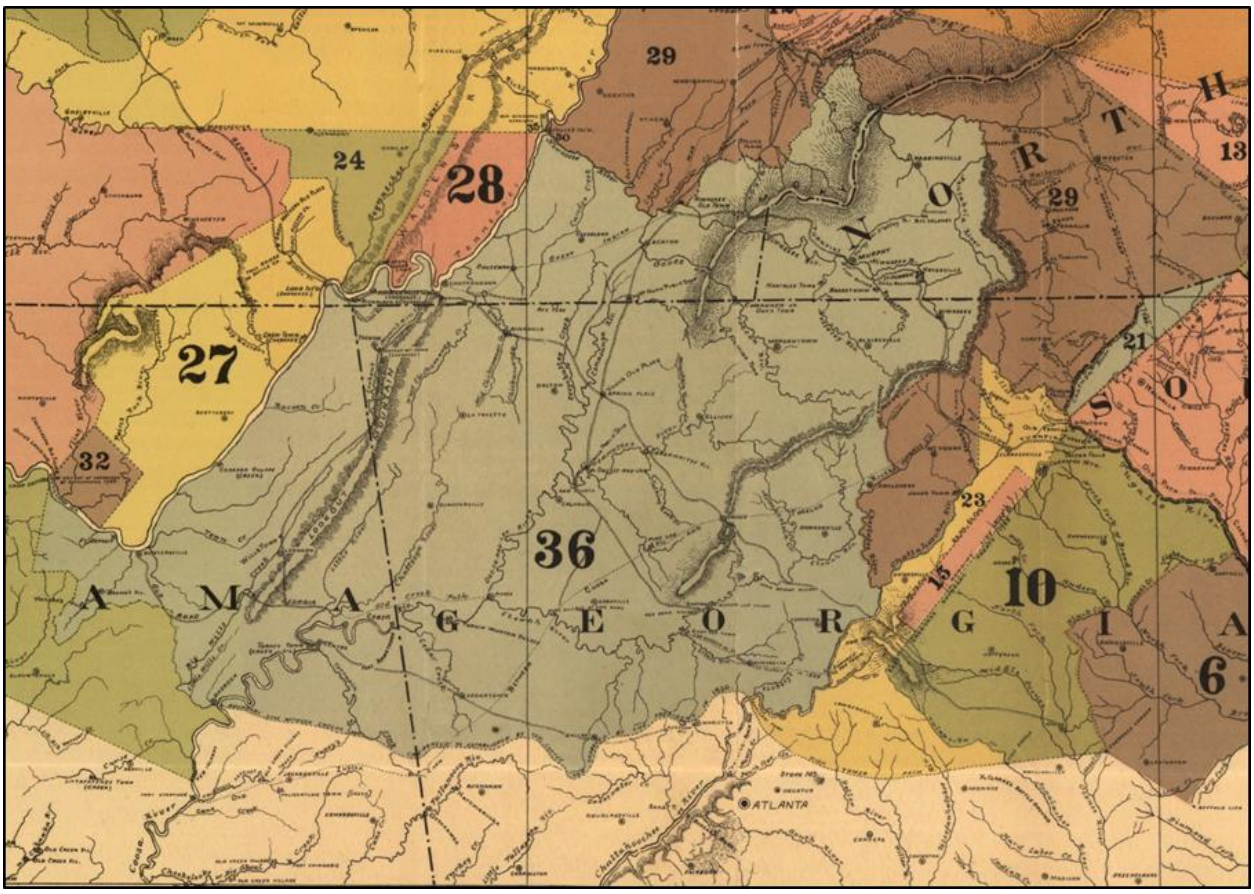

Figure . Area 36 of the 1884, Royce map, showing the reduced size of the Cherokee Nation in 1835. ("Map of the Former Territorial Limits of the Cherokee "Nation of" Indians, exhibiting the boundaries of the various cessions of land made by them to the colonies and to the United States by treaty stipulations, from the beginning of their relations with the whites to the date of their removal west of the Mississippi river” *Bureau of Ethnology; Fifth Annual Report*, Plate *VIII*.)

Forced to relocate in Indian Territory, Cherokee people settled on trust lands set aside specifically for them. The acreage of the trust lands was similar in size to the land ceded in the 1835 treaty. The trust lands totaled 7,000,000 acres with provision made for an additional 800,000 acres if needed (Cherokee Treaty at New Echota, 1835; Smith, 2000; Treaty with the

Figure . This map shows the jurisdictional area (not the individual lands held in Trust) of the Cherokee Nation in Oklahoma. (Map drawn by author, December 12, 2012. U.S. Census Bureau 2010 TIGER shapefile of American Indian Areas placed over ESRI National Geographic basemap.)

Cherokee, 1835). Through additional measures of forced treaties and the (forced) Allotment Act of 1887, Cherokee land holdings in the West were reduced to 25 town sites containing a total of 6,887.65 acres of land in trust (DOI, 1902). Through various means, the Cherokee Nation has acquired, and continues to acquire (when feasible) lands lost through the allotment process. The current land base contains 90,000 acres which are located throughout the 14 jurisdictional counties of the Cherokee Nation in what is now the State of Oklahoma (CNE, 2005). At the present time, these lands and future lands acquired by the Cherokee Nation are not subject to

forced allotment or treaty processes, and Tribal members are hopeful that they and future generations will not face forced removal from these lands.

In 1838, some Cherokee escaped Removal by hiding out in the mountains of western North Carolina. Instead of experiencing the Trail of Tears, they experienced a loss of land, and without a land base, continually faced threats of removal from the United States Government (Finger, 1984). In 1870, after decades of political and legal battles, the State of North Carolina and the Federal Government both acknowledged the right of the "Eastern Cherokees" to remain in their homeland (EBCI, 2012). Present enrollment of the Eastern Band of the Cherokee Nation, more commonly referred to as the Eastern Band of Cherokee Indians (EBCI), consists of over 14,000 members (EBCI, 2012). The land base of the EBCI is a mix of lands purchased by the Tribe and lands purchased by the Federal Government (EBCI 2012; Mooney, 1900). The current land base contains over 56,000 acres (Figure 7) and the Tribe continues to add to it by re-purchasing culturally significant lands as they become available (EBCI, 2012). At the present time, these lands and future lands purchased by the EBCI are not subject to forced allotment or treaty processes, and Tribal members are hopeful that they and future generations will remain in the ancestral homelands of the Cherokee people.

In 1949, a group of Cherokee separated from the Cherokee Nation and received Federal Tribal recognition through a corporate charter organized under the Oklahoma Indian Welfare Acts of 1936 and 1946 (DOI, 2012; UKB, 2012). This group of Cherokee, now known as the United Keetoowah Band of Cherokee Indians in Oklahoma (UKB), consists of over 13,000 enrolled members (Wickliffe, 2008). Historically, the UKB did not have a land base of its own but operated within the jurisdictional area of the Cherokee Nation (Good Voice, 2011; UKB, 2012). In July, 2012, the Federal government approved an application submitted by the UKB to

place 2.03 acres of land into trust status (UKB, 2012). The UKB is hopeful that additional lands, purchased by the Tribe, will follow suit.

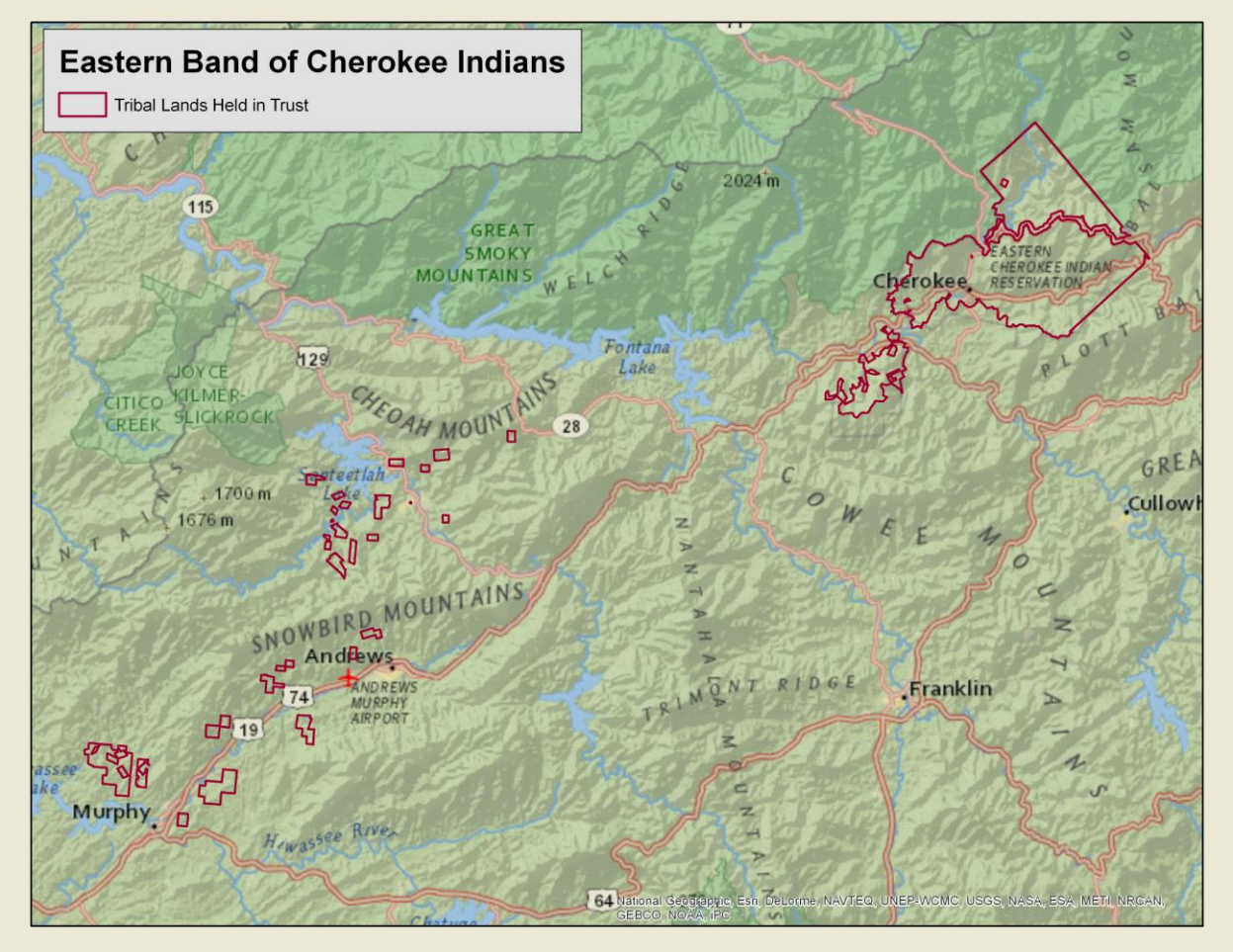

Figure . Map of lands held in Trust by the Eastern Band of Cherokee Indians. (Map drawn by author, December 12, 2012, revised August 7, 2013. U.S. Census Bureau 2010 TIGER shapefile of American Indian Areas placed over ESRI National Geographic basemap.)

James Mooney and the Cherokee

James Mooney's interest in American Indian culture began at an early age and continued throughout his adult life. During his formative years, he endeavored to research the names and locations of all North and South American Indian tribes, and compile his discoveries in a notebook and hand-drawn map; in 1872, as valedictorian of his high-school, Mooney spoke

about the need for a more effective and humane Indian policy (between parent—the U.S., and ward—the Indians) built upon a better understanding of tribal cultures; and over a ten year period he conducted a study of linguistics affinities, general history, and local names of North and South American Indian Tribes (Moses, 1977). In 1882, while working as an editor for a newspaper, Mooney began his pursuit of a position with the Smithsonian Institution's Bureau of American Ethnology (Moses, 1977). He was eventually hired as a researcher by the Bureau in 1885, and was sworn in as an ethnologist in 1886 (King, 1982; Moses, 1977).

As an ethnographer, it was Mooney's job to "study and trace the development of human thought under varying conditions of race and environment, the result showing always that primitive man is essentially the same in every part of the world" (Mooney, 1900:12). His approach to Indigenous ethnography was based on the "Primitive Institutions" theory promoted by the Director of the Bureau of Ethnology, J.W. Powell (1896). Similar to Edward Taylor's scholarly writings *Primitive Man* (1871) and *Anthropology* (1881), the primitive institutions theory attempted to prove all races of men were essentially the same, just at different levels of development (Powell, 1896). According to Powell (1896), the development of American Indian cultural institutions were on the level of "savagery", one step lower than that of barbarism. The structure of their tribal systems was the main reason for placing American Indian cultural institutions at this level. American Indians organize themselves according to a matriarchal system (perceived as the lowest form of human institutional development) of "family, clan, tribes, and confederacies", while the next higher class, barbarism, organized themselves according to a patriarchal system of "families, gentes, tribes, and confederacies" (Powell, 1896:2).

During his time with the Cherokee, Mooney documented what he titled the "Myths of the Cherokee" in maps, field notes, and reports (Mooney, n.d., 1900). The very title "Myths of the Cherokee" evokes the cultural context and societal perspective within which Mooney worked. And although he relied on Cherokee people to inform the main body of his work, he based his interpretation of our origin as a people on the writings of non-Cherokee scholars (Mooney, 1900:12); scholars whose writings were shaped by the, then prevalent, ethnocentric views toward Indigenous people (Moses, 1977).

And yet, Mooney's interest in American Indian culture seems to have been sincere. It was his sincerity that garnered the attention of Eastern Band Cherokee Principal Chief N.J. Smith (Moses, 1977). In 1887, when Mooney requested an assignment with the Eastern Band of Cherokee Indians under his new Bureau commission as field ethnographer, Chief Smith became a leading advocate for Mooney's work among the Cherokee (King, 1982). Over the next couple of years, Chief Smith provided interpretation services and hospitality during Mooney's visits to North Carolina (Ellison, 1992; Mooney, 1900). After a period of scrutiny and assurance of Mooney's character, other influential Tribal members eventually agreed to assist Mooney in his endeavors (King, 1982). As a result, Mooney produced volumes of information about Cherokee culture.[3]

To aid Mooney in his work, Cherokee oral tradition, collective memory, and syllabaric writings were shared by influential members of the Eastern Band. Mooney's collaborators included A´yûñ´inĭ (Swimmer), a ceremonial leader, healer, storyteller, and elder among the

[3] In his reports to the bureau, Mooney uses the word "informant" when referring to the Cherokee who agreed to assist him, and describes them as priests, shamans, doctors, conjurers, and recognized authorities (Mooney, 1900). Instead of continuing to propagate Western vocabulary and perspective to describe the Cherokee who collaborated with Mooney, I will refer to them and describe them using Cherokee terminology and perspective.

Cherokee; Itagû´năhĭ, commonly known as John Ax, an elder, storyteller, artisan, and Tribal traditionalist; Suyeta (The Chosen One), a storyteller of rabbit and other animal stories; Ta´gwădihlĭ or Dagwatili (Catawba-killer), a healer and storyteller who also provided physical evidence to confirm Cherokee oral tradition; Ayâ´sta (The Spoiler), a traditionalist and ceremonial leader among the women; James and David Blythe's father, a recognized ceremonial leader; Gatigwanastĭ (Belt) a prominent medicine keeper; Gahuni, a medicine keeper and the husband of Ayâ´sta; Inâlĭ (Black Fox), a gifted man and prominent Cherokee storyteller; Principal Chief Smith; and others who are mentioned only by name— Salâ´lĭ, Tsĕsa´nĭ (Jessan), A'wanita (Young Deer), Tsiskwa (Bird), Yânûgûlegi (Climbing Bear), Dûninâli (Tracker), and Âganstâta (Groundhog Meat) (Hodge, 1923; Mooney, 1891,1900). Without the assistance of these Cherokee collaborators, Mooney's archive would not exist.

During his time with the Cherokee, Mooney conducted research and collected vast amounts of information on the history and traditions of the Tribe. Mooney's supervisor, in his report to the Bureau, referred to Mooney's work as a "complete sketch of the most trustworthy and most convenient outline of Cherokee history extant" which "illustrate[s] the dominance of mythology over the lowly mind of the aborigine" (Powell, 1900:*XXXVI, XXXVIII*). Mooney's extensive contributions to the field of ethnology have led to frequent citations in the majority of literature, published across disciplines, concerned with the historical or traditional aspects of Cherokee people.

PROCEDURES AND METHODS

Mooney's archive forms the base of my research project and serves as a catalyst for locating and assigning GPS coordinates to the places referred to in Mooney's "Cherokee myths"

(1900:11). Mooney (1900) classified the stories shared with him into seven categories: cosmogonic myths; quadruped myths; bird myths; snake, fish and insect myths; wonder stories; historical traditions; and miscellaneous myths and legends. I will re-categorize these stories according to Cherokee vocabulary and will not use the term "myth," as these stories are the traditions of my people. My interpretation of this data is informed through semi-structured and unstructured interviews[4] and previous scholarly works.

I rely on the archive of Cherokee collective memory for site interpretation and cultural perspective garnered through conversations, collaborations, and partnerships with the EBCI. This project is a collaborative effort between the EBCI Cultural Resources Office and me, and I look to them to provide feedback and instruction on clarifying and correcting the Mooney archive, to vet out culturally sensitive site information, and to provide Cherokee language translation for the story-sites. Eastern Band Cherokee Tribal authorities and councils will determine the final content of the story-map through a formalized review process.

Data Collection

My fieldwork for this project began in the summer of 2012. Following the advice of Indigenous scholar and cartographer, Dr. Margaret Pearce, I spent the month of July immersed in Eastern Band Cherokee culture. I volunteered to help at events, drove the countryside for a better feeling of the landscape, accompanied my family to the local community hangouts, and visited informally with community members. I also met with the Tribal Historic Preservation Office and the Cultural Resources Supervisor to gain their perspective on how I could tailor my thesis

[4] In this study, I define the term interview as "a purposeful conversation, or a conversation with a purpose, between myself and the community or individual community members" (Bagele, 2012:204-205). Bagele, C., (2012), *Indigenous Research Methodologies*. Thousand Oaks, CA., SAGE Publications.

project to fit the needs of the community. My visit with the Cultural Resources Supervisor (and Chair of the Cultural Resources Committee) Mr. T. J. Holland, was very beneficial and I emerged with a sense of direction and purpose for my thesis project—an interactive story-map of homeland sites for the Cherokee language immersion program.

As a starting place for creating the interactive map, I used ArcGIS to georeference and assign coordinates to the scanned versions of the Mooney maps. The historic quadrangle sheets

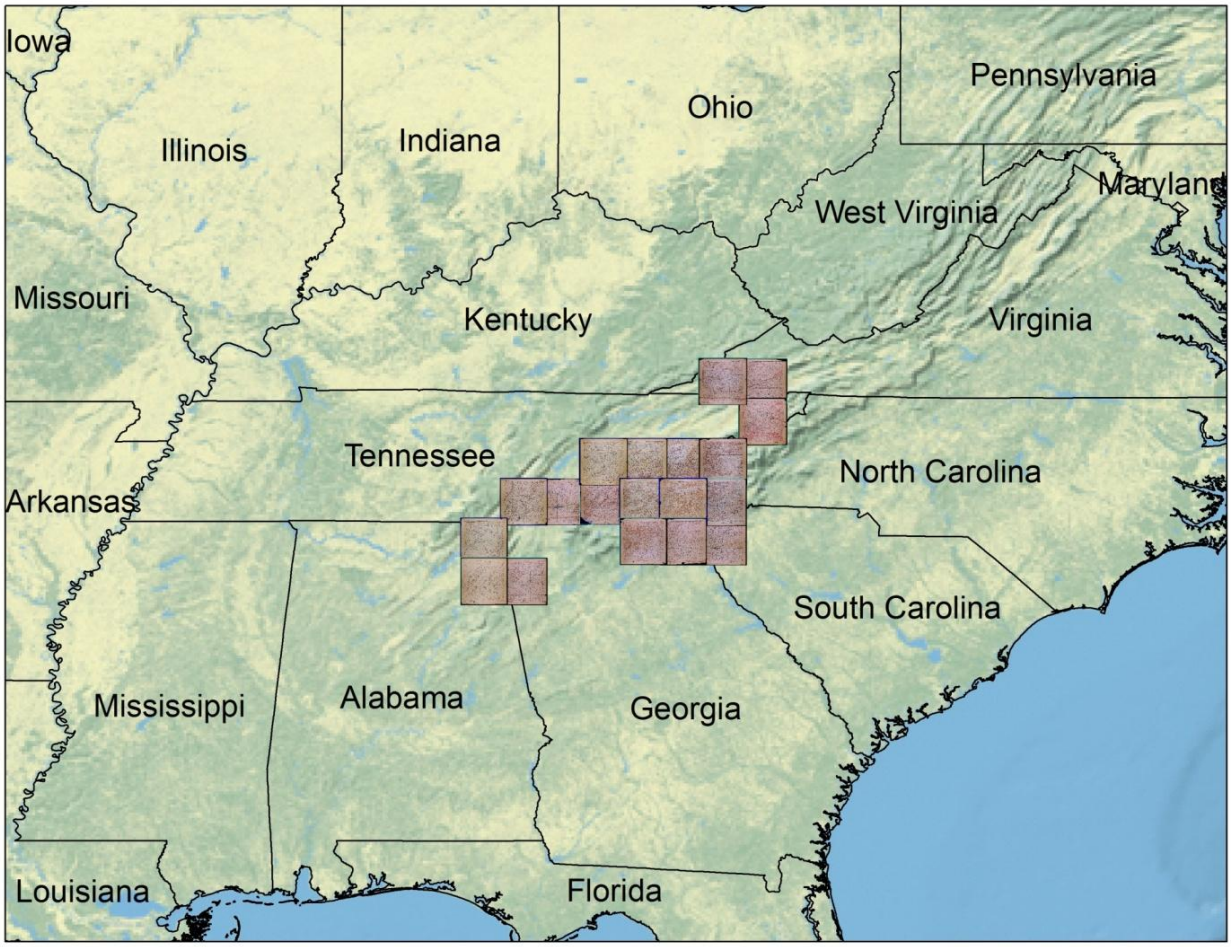

Figure . Georeferenced quad sheets placed over an open source Natural Earth basemap. (The Natural Earth raster file is available from http://www.naturalearthdata.com.)

are based on the Clarke 1866 graticule, so I georeferenced the maps to the Clarke 1866 spheroid and geographic coordinate system and then re-projected them into the WGS84 coordinate system

in preparation for field work. I chose WGS84 as my working coordinate system as this is the default coordinate system used in GPS.

The Mooney archive contains over six hundred sites. As time permits, I will eventually digitize all of the Mooney map sites for future research and create a geodatabase of categorically-named vector shapefiles corresponding to the types of sites contained in the map. For this project, I began with a list of thirty-one sites selected by Mr. Holland for inclusion in the initial phase of the interactive map. These sites were selected based on location and ease of access for collection of terrestrial aesthetic lidar scans, clarity of existing aerial lidar data, and the importance of the site to the community. Some of the Cherokee cultural sites on the list were not included in the Mooney archive. For these sites, I relied on Mr. Holland and Dr. Riggs to provide their location.

After locating the selected sites, I sorted them into two categories according to lidar treatment: terrestrial aesthetic lidar treatment or aerial lidar treatment, and created shapefiles for each category. Two important sites, the home of Selu and Kanati, and the place of Kanati's hunting preserve located on Black Mountain (Mooney, 1900:431-432), did not fall within the area of Mooney's maps. To obtain coordinates for these sites, I digitized the area of Mount Mitchell (formerly known as Black Mountain) from ESRI's georeferenced topographic data. The USGS topographic maps, on which Mooney wrote his field-notes, were created using a scale of 1:125,000. Using the georeferenced maps, I then obtained coordinates for each site; still, I relied on Dr. Riggs, Mr. Holland, and EBCI community members for greater accuracy in pinpointing these sites in the field.

Table . Terrestrial aesthetic lidar treatment for story background.

Terrestrial aesthetic lidar		
	Topo_Quad	**Site Name**
	tn-nc_mtguyot	Nvnnunyi
	tn-nc_mtguyot	Yellow Hill
	tn-nc_mtguyot	gihli dinehuhi
	nc_cowee	Gatiyitsu dayehui - opp. mouth Mill Cr. old settlement
	nc_cowee	Saligugi
	nc_cowee	Kituwah
	nc_cowee	Ukten'na-tsuganun tatsun yi
	nc_cowee	Ukten'na utansi nastun yi
	nc_nantahalah_sheet3	Briartown, Cherokee old community (Nantahala Town)
	nc_nantahalah_sheet3	Tsudayehi
	nc_nantahalah_sheet3	Leech Place (secondary)
	tn-nc_murphy	Fort Butler
	nc_cowee	Judaculla (Tsul kalu) Rock
	nc_cowee	Nikwasi (also Nuhnehi lived under)
	nc_nantahalah_sheet3	Fort Hembree, women suicide (removal)
	nc_nantahalah_sheet3	Fort Lindsay
	nc_nantahalah_sheet3	Leech Place (primary)
	nc_nantahalah_sheet 3	Abandoned Town (due to Utsu ta)

Table . Aerial lidar treatment for story-site backgrounds.

Aerial lidar		
	Topo_Quad	**Site Name**
	tn-nc_mtguyot	Yellow Hill Area
	nc_nantahalah_sheet3	Utsu ta (Uw tsun ta)
	tn-nc_mtguyot	Atsilawai, "Fire's Relative"
	nc_cowee	Nuhnehi - Pilot Knob near Yellow Hill, NC
	ga_dahlonega	Nuhnehi, Blood Mountain, GA
	nc_cowee	Sanigilagi-Whiteside Mtn, (Utlun ta, Spear-Finger)
	tn-nc_murphy	Diya hali yi, Lizard place, Joanna Bald
	nc_nantahalah_sheet 3	Sehwte yi "Hornet Place", Cheowa Maximum/Swim Bald

	nc-sc_pisgah	Pilot Knob (Tsuwatelda/Tsuwateldunyi) lost settlement of Kanasta and the spirit Cherokee
	nc-sc_pisgah	Jutaculla (Tsul kalu) old fields
	nc-sc_pisgah	Tsunegun yi (Tennessee Bald) home of Tsu kalu (Judaculla)/Devil's Courthouse
	none	Home of Selu and Kanati, hunting preserve of Kanati (Black Mountain)
	nc_cowee	Qualla Town

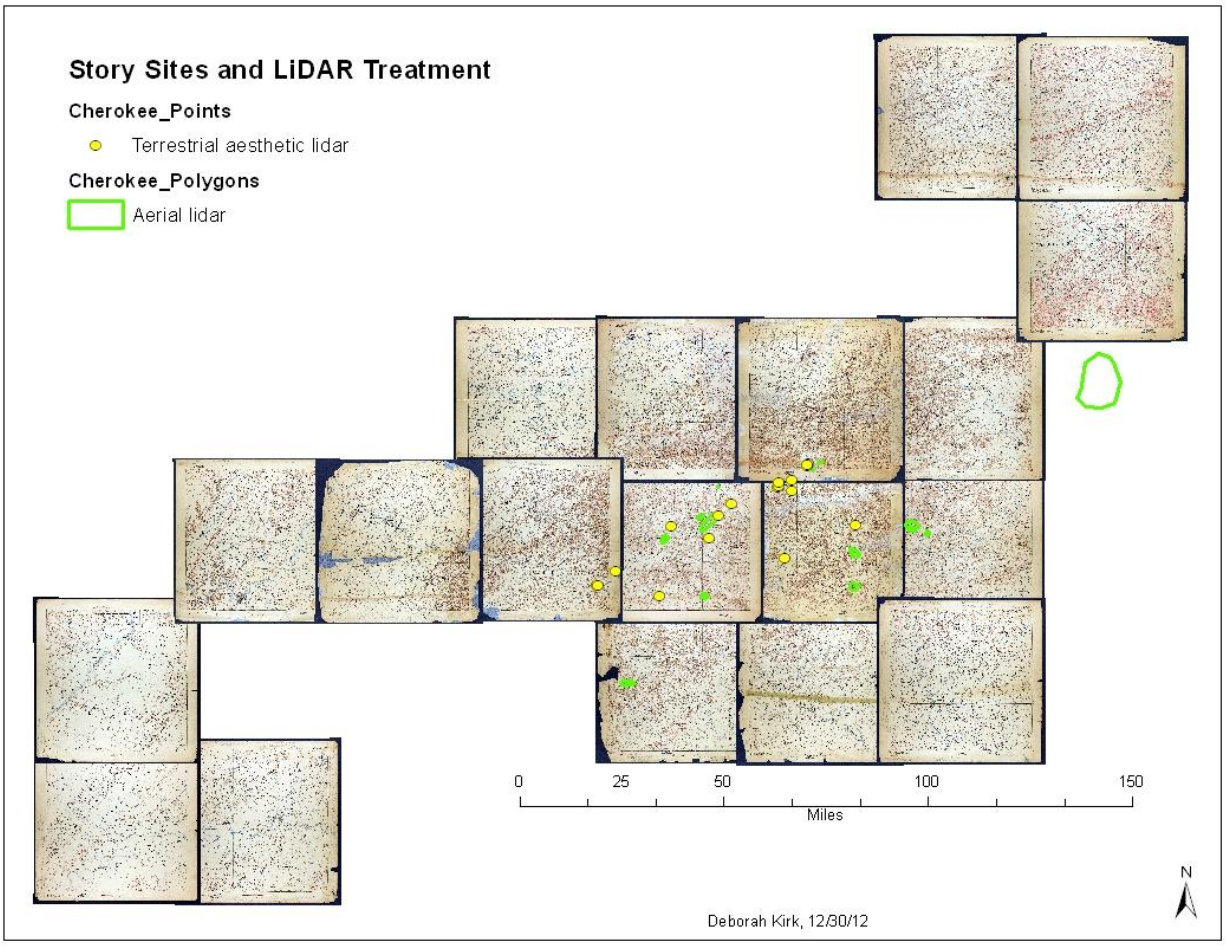

Figure . Map of shapefiles according to lidar treatment.

In early January, 2013, I travelled to North Carolina to complete my fieldwork. I planned to collect lidar data; present my project to the EBCI Tribal Council, Elders Council, and Historical Council, and then follow up the presentations with a request for community members to share their knowledge and memories about the selected sites. I also had a list of community members with whom I hoped to receive formal introductions.[5] Unfortunately, Western North Carolina had one of the most extreme winters in weather history.

According to weather.com, precipitation in the Cherokee, NC area averages a little less than 5 inches a month during the winter months (TWC, 2013). During my twenty-eight days in North Carolina, (arrived January 10th, departed February 8th) the area experienced two large rain events and two snow and ice events for a total of 18 inches of precipitation (MTOSN7, 2013). These weather events resulted in widespread flooding, road wash-outs, unstable soil conditions, cancellation of Tribal meetings, the postponement of formal introductions to community members, and the rescheduling of terrestrial lidar data collection—snowstorms, rain, mist, and high winds impede the collection of lidar data (Fowler et.al, 2007).

While waiting for suitable weather conditions, I downloaded quality level 3 (QL3) aerial lidar tiles from the North Carolina Floodplain Mapping Program for the twenty story-sites not receiving terrestrial lidar treatment. Currently, QL3 lidar data is the highest quality level available statewide for North Carolina (Maune, 2012). The horizontal resolution point density at QL3 is 1-0.25points/m^2 and vertical accuracy consists of an RMSEz factor of ≤18.5cm and an equivalent contour accuracy of 2 feet (Sugarbaker, 2012). For this project, I used aerial lidar data to supplement ground-based lidar for large geographic features (mountain tops and ridge lines),

[5] Cherokee tradition requires formal introduction, by a community member, for outsiders entering into the community. Although I am Cherokee, I am not a member of the Eastern Band and am treated as an outsider until formal introductions are made.

steep rock outcroppings, rock faces, cliffs and overhangs, and sites now surrounded by modern encroachment (e.g. houses, marinas, commercial buildings). During this time, I also refined GPS coordinates for the sites receiving terrestrial lidar treatment.

During the process of refining the GPS coordinates, the Tennessee-North Carolina Mt. Guyot topographic sheet used by Mooney presented difficulties. River and mountain locations in the bottom third of the quad sheet did not georectify with present day topographic maps. After the rain subsided, I met with Mr. Holland to discuss this portion of the map and gain his knowledge of the landscape. We came to the conclusion that this section of the historical quad sheet is inaccurate. Mr. Holland then pointed out the actual location of the sites contained in this section of the map and I corrected the coordinates. During this meeting we also reviewed the project, discussed the EBCI members he thought I should meet with, and the community members to whom I would be formally introduced. Mr. Reuben Teesatuskie, a well-known member of the EBCI community, also offered to make formal introductions and offered additional names of members he believed could assist me with my project.

A break in the weather allowed me to schedule lidar collection for January 23rd and 24th. Due to scheduling conflicts, Mr. Holland and Dr. Riggs could not accompany me on the first day of lidar collection. To familiarize me with the site locations, on January 22nd, Mr. Holland drove me to the first set of sites so I could pre-determine the laser scan angle at each location and feel comfortable in locating each site on my own.

LiDAR

On Wednesday, January 23rd, my *edoda* (Cherokee for father), Odene Kirk, (acting as

my field assistant) and I met Jason Dixon of ESP Associates[6], for the first round of lidar scanning. Mr. Dixon used a Leica ScanStation C10 3D laser scanner, mounted on a tripod.[7]

Figure . My field assistant, William Odene Kirk. Photo taken by author.

Figure . Mr. Dixon and the Leica ScanStation set-up at site 1--Gihli dinehuhi. Photo taken by author.

My initial plan included 360 degree (deg) scans for each site, but the lingering high water (from the previous flood) prevented us from setting up the scan station in the water at three of the sites. The first site, Gihli dinehuhi (red dogs playing on bank), received a 360 deg scan. The second site, Ukten'na utansi nastun yi (where the Uktena crawled), received a 45 deg scan. The third site, Ukten'na-tsuganun tatsun yi (where the uktena got fastened), also received a 45 deg scan. The fourth site, Kituwah Mound, received a 360 deg scan. And the last site of the day, Saligugi (the snapping turtle place), received a 120 deg scan. A sixth site was planned, but due to a family land dispute, we were unable to obtain access at that time. All sites on this day were

[6] ESP Associates, P. A., is a North Carolina based company specializing in Land Planning, Engineering, Surveying, Landscape Architecture, Geotechnical Engineering, and Materials Testing.

[7] This type of laser scanning is referred to as terrestrial, aesthetic, or static lidar.

scanned using a medium resolution (horizontal and vertical point spacing) setting of 0.1 m per 100 m.

Figure . Map of lidar collection sites, day 1, January 23, 2013. Map by author.

The second day of lidar collection we were joined by Dr. Riggs and Mr. Holland. On this day, four sites were scheduled to receive lidar scanning. One site was deemed too large of an area for static lidar scanning and was removed from the schedule. One site is culturally sensitive, and although it did receive lidar scanning, will not be included in this chapter. The two sites

Figure . From left to right, Mr. T. J. Holland, me, and Dr. Brett Riggs, Judaculla Rock site, January 24, 2013. Image courtesy of Nick Breedlove, reporter for The Sylva Herald, Sylva, NC.

included in this chapter, from the second day of scanning, are the Judaculla Rock site and the Leech Place site. Because of its significance to not only the Cherokee people, but also the North Carolina Rock Art Project, the Judaculla Site was scanned from four positions using two settings, high resolution (0.05 m per 100 m) for the 360 deg scans and highest resolution (0.02 m per 100 m) for the rock face and sides, ensuring dense, full coverage for petroglyph analysis.[8] The Leech Place site required high resolution scanning from two positions (located opposite the site) for a complete 180 deg image of the area. After scanning was complete, the terrestrial lidar files were delivered in a PTS format.

[8] Analysis of the petroglyphs is not part of this thesis but is of interest to the EBCI, Dr. Riggs, and the NC Rock Art Project.

Figure . Members of the North Carolina Rock Art Project, U.S. Forest Service, and the landowner who donated the site for preservation, gathered to observe the lidar scanning process and discuss future plans for Judaculla Rock. Image taken by author.

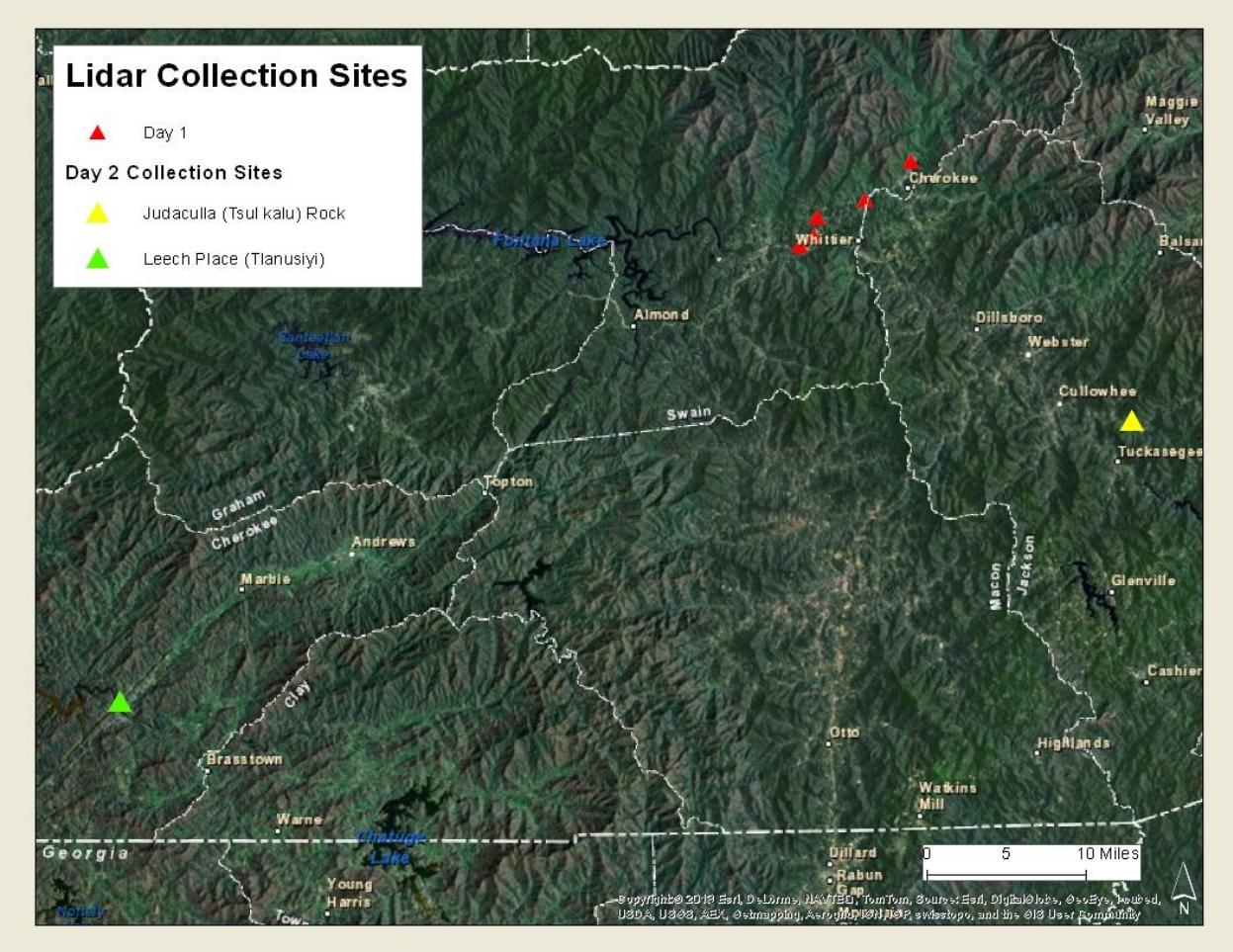

Figure . Map of lidar scan sites on day two, January 24, 2013. Map by author.

In addition to the ground-based scans at each site, I also collected GPS coordinates for greater site position accuracy in my map. I used two Garmin handheld units: an eTrex10 and a GPSmap62sc to test and compare advances in technology. Since my research often takes me to dense, canopy covered sites[9], I need a reliable handheld GPS unit that quickly captures accurate positional coordinates. According to Garmin (2012) the GPSmap62sc device is an up-scaled

[9] Under dense canopy cover, capturing accurate GPS positional coordinates is difficult and sometimes unattainable, as the necessary triangulation of satellite signals is often weakened or obstructed by vegetation.

handheld unit that includes (among other features) a 3-axis compass, a built in 5 megapixel autofocused geo-tagged camera, and boasts a highly sensitive quad helix GPS antenna for "unparalleled reception". In comparison, the eTrex10 is a stripped down handheld GPS device that does not possess any of the high-end features built into the GPSmap62sc, but does have the capability of tracking GLONASS[10] and GPS satellites simultaneously, and boasts a faster response time for determining positional accuracy (Garmin, 2012). The eTrex10 is about a quarter of the cost of the GPSmap62sc model. The initial results of my test indicated that both units are equally accurate in capturing positional coordinates, however, the speed at which the Garmin eTrex10 provides coordinates was far superior to the GPSmap62sc. Since coordinates were captured during leaf-off season, further testing is necessary to determine the response time and positional accuracy of both units under leaf-on conditions.

Collective Memory

During my time in North Carolina, I also visited with several EBCI community members. As I stated previously, I had hoped to meet with a minimum of twenty members, but weather conditions and circumstances did not allow this. After formal introductions were made, the community members who agreed to share their knowledge with me were asked to sign the KU IRB consent form (Appendix A). After the forms were signed, I began the interview process. During the interview process I took notes and audio-recorded three of the interviews. Because of the subject matter (oral history) and because of the interview settings, semi-structured and

[10] GLONASS (Global Navigation Satellite System) is the Russian version of GPS; it currently has 24 operational satellites in orbit. (Gibbons Media & Research LLC. 2013. "Russian Launches Another GLONASS-M Satellite." *Inside GNSS; Engineering Solutions from the Global Navigation Satellite System Community*. *GNSS News* [cited April 28, 2013]. Available from http://www.insidegnss.com/node/3534.)

unstructured conversations occurred in combination (Dunn, 2005; George and Stratford, 2005). During the semi-structured portion of the conversation, I referred to my primary questions to begin the dialogue but then moved into an unstructured conversation when oral history was offered (Dunn, 2005; George and Stratford, 2005).

At the beginning of each interview, I presented the list of sites given to me by Mr. Holland, asked the interviewee if they knew of the sites, and then asked if they knew any stories about the sites. After determining which site(s) the member had knowledge about, I then began an informal exchange of information. After the member shared their knowledge about a site, I then inquired about the source of their knowledge. If the community member spoke Cherokee, I also asked for a pronunciation of the site name in Cherokee and a literal translation for the place name.

Of the community members interviewed, three had knowledge specific to sites on the selected list. Mr. Jeremiah (Jerry) Wolfe, a beloved man of the Cherokee people, shared with me about the *uktena*, the Leech Place (*Tsanusiyi*), Spear Finger, Yellow Hill community, *Ujuntv* (the place in the Nantahala Gorge), *gihli dinehv* (the place of two red dogs playing), and Judaculla Rock. A Cherokee Elder, who wishes to not be named and who I will refer to as UCE (Unnamed Cherokee Elder), shared with me about *saligugi* (the snapping turtle place), Judaculla and the Judaculla Rock, *Selu* and *Kanati*, Nikwasi Mound, and Kituwah Mound. Dr. Barbara Duncan[11], Education Director at The Museum of the Cherokee Indian, shared with me about the *uktena*, *diya hali yi* (the lizard place), *sehwte yi* (hornet place), Judaculla, Leech Place, *Utsuta* (the giant inch worm located at the Nantahala Gorge), and *Selu* and *Kanati*.

[11] Dr. Duncan is not Cherokee, however, she has lived and worked among the EBCI community for several years—conducting research and interviewing community members about Cherokee culture and history. She has a PhD in folklore and folklife from the University of Pennsylvania.

During this time I also searched written records for material pertaining to the sites on Mr. Holland's list, specifically focusing on prior interviews given by community members about the sites. It was difficult to find material which didn't reference Mooney as a source. However, I did manage to find a few secondary sources which pointed me in the direction of other primary sources. The combination of my interviews and these additional sources contribute towards a fuller understanding of the Cherokee homeland sites written about by Mooney.

I used a semi-systematic manual coding approach when reviewing the primary written materials for each site (Watson and Till, 2010:122-123). I began the process by first reviewing the material I had gathered up until the time of Mooney's work (ca. 1900), and then compared it to the material I gathered that was written during and after Mooney's research. If the later primary documents contained material that was different or added to the earlier record, I incorporated it. Material that did not differ significantly from the historical record, or that referenced the Mooney archive as the primary source, was not incorporated.

Budget and time constraints did not allow the inclusion of all thirty-one selected sites in the initial phase of the interactive map process. Since the first phase of the interactive map process included method selection and the creation of a mapping template for site inclusion, I narrowed my focus to five sites. I made my decision based on the amount of knowledge surrounding each site, the location of the site, and the opportunity to work with both terrestrial and aerial lidar data when creating the story-site backgrounds.

The sites I selected are Judaculla Rock, Kituwah Mound, Ukten´na-tsuganun tatsun yi, Leech Place, and Spear-Finger. From my perception, gleaned through conversations, interviews, and written records, these sites contain key events in a series of related story-sites; I l use them as pivot points in which to direct and lead the map viewer in the exploration of related material. In

Chapter 4 of this thesis, I provide in-depth analysis and discussion of the collective memory (interviews and written records) for these five sites.

CHAPTER FOUR

THE STORY-SITES

THE STORY-SITES IN GEOSPATIAL TECHNOLOGIES

I began my work on the story-site backgrounds by first previewing the terrestrial and aerial lidar data for each site. I used Leica Geosystems Cyclone 8.0 software (Cyclone) to view the PTS[1] terrestrial lidar files and QCoherent LP360 ArcGIS extension (LP360ext) to view the aerial lidar files. After viewing the files, I decided to blend aerial lidar with aerial imagery to create a better visual for the story-site area backgrounds. I downloaded aerial lidar data for the Judaculla Rock, Kituwah, Uktena, and Leech Place sites (these sites were not included in my previous download of aerial lidar data) and aerial imagery in the form of DOQs (digital orthophoto quadrangles), for all five story-sites from the USGS Earth-Explorer website[2]. The horizontal (XY) coordinate system for the aerial lidar data is NAD_1983_StatePlane_North_Carolina_FIPS_3200_Feet, and the vertical (Z) coordinate system is NAVD_1988.

For the Judaculla Rock story-background I used a blend of aerial lidar and imagery for regional area scenes and terrestrial lidar for close-up scenes. The Kituwah, Uktena, and Leech Place story backgrounds were created from a blend of aerial imagery and terrestrial and aerial lidar. To create the Spear Finger story-background, I blended aerial lidar and aerial imagery.

[1] PTS is a Leica proprietary format

[2] The source for this lidar data is the North Carolina Flood Mapping Program.

Judaculla Rock

To create the area scene backdrop for this story-site, I used ESRI ArcGIS Desktop 10.1. I began by adding the black and white DOQ to ArcMap and accepted the default settings for resampling technique, compression type, and compression quality. I then added the aerial LAS files using the LP360ext "add LAS files" tool and used a pyramid thinning factor of 2. The LAS file did not retain the coordinate system. To project the file into the correct coordinate system I experimented with two options.

For Option One, I downloaded the "LAS to LAS" tool from the ESRI website, made sure my data frame was in the correct coordinate system (NAD_83_North_Carolina_FIPS_3200 _Feet), then ran the tool on a LAS file and set the coordinate system to the same as the display. This created a new, projected LAS file. I closed ArcMap and did not save any changes to avoid corrupting the LP360 LAS file. Using ArcCatalog, I then imported the projected LAS file coordinates to the corresponding LP360 LAS file.

For Option Two, I used ArcToolbox to create a LAS dataset (LASD) for one of the LAS files downloaded from USGS. While creating the dataset, I implemented the option to add the XY (NAD_1983_StatePlane_North_Carolina_FIPS_3200_Feet) and Z (NAVD_1988) coordinate systems to the tool. After the tool cycled, a new LAS datasets was created as well as a projection (.prj) file. I then imported the .prj coordinate file into the LP360ext LAS file through ArcMap's Table of Contents (TOC) window. Although both options worked equally well, Option Two was less time consuming, so I chose this option as the LAS projection method for the remaining story-sites.

After resolving the projection issue, I used the LP360 software extension to display the lidar data by elevation drawn on a TIN surface. Using a 55% transparency level, I layered the

lidar over the black and white DOQ, changed the DOQ layer symbology to 'stretched over a natural earth inverted color ramp', applied a hillshade effect, and changed the Z factor to 8. I saved the map and exported images in JPEG, TIFF, and PDF formats[3]. I then turned my

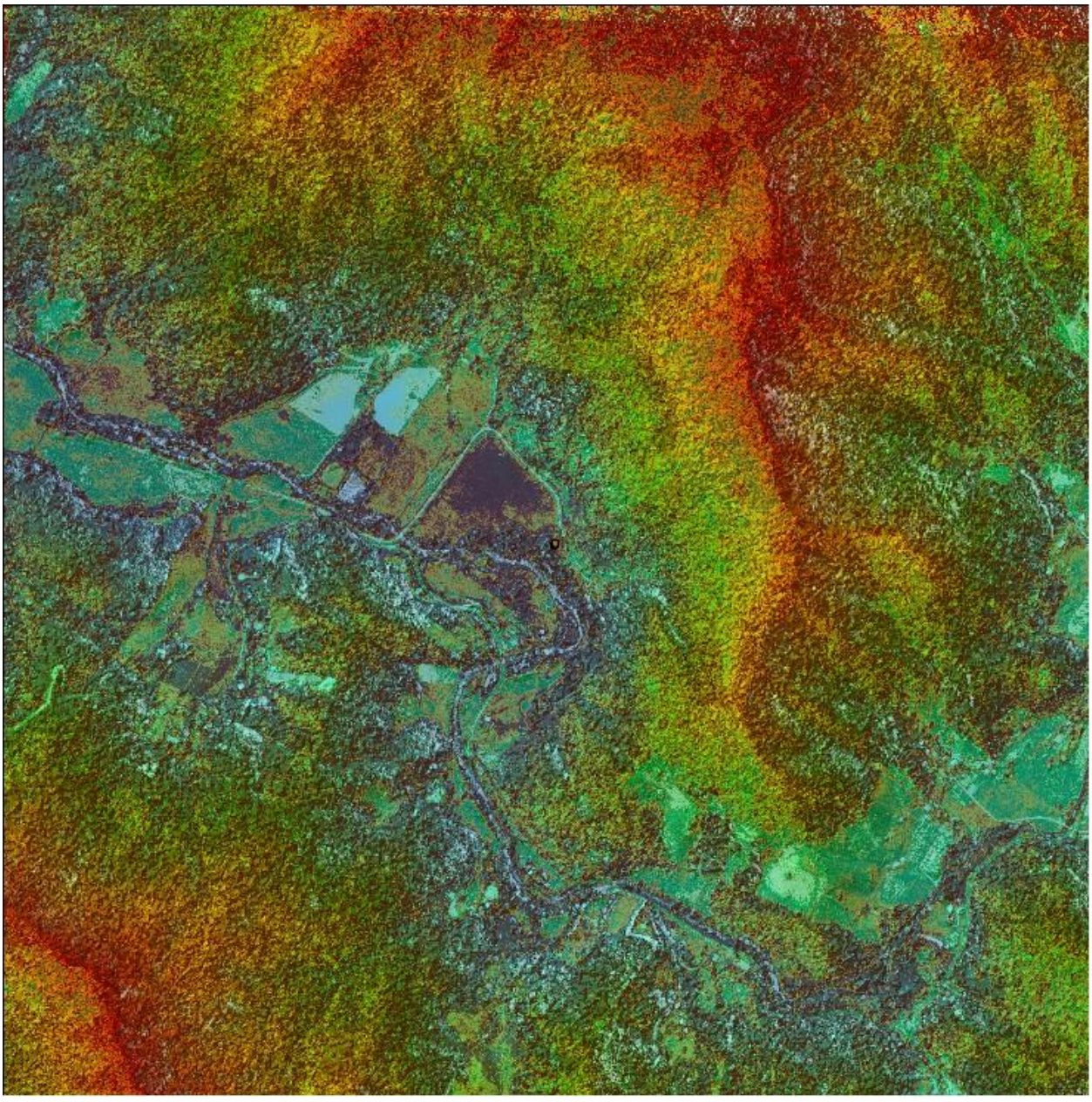

Figure . Judaculla Rock area 1st level story-map scene created from aerial lidar colored by elevation, drawn on a TIN surface, and layered over a black and white DOQ with a 55% transparency level.

[3] Throughout this process I saved the images in several formats for future use. I will choose images from among these formats for the final display.

attention to creating a close-up background image for the area directly around the Rock.

To create the close-up scene, I began by georeferencing the exported TIFF image (from the previous step) to the black and white DOQ. I then used PointZip[4] to convert the terrestrial PTS lidar file to a LAS file, created a LASD file from the converted data, and used the LAS to LAS tool to assign a projection. The LAS to LAS projection tool did not work on the converted data. Apparently, PTS files do not retain any original scan or registration information (Payne, 2012). I closed ArcMap (to avoid corrupting the LAS file) and then opened a new ArcMap and added the Judaculla Rock eTrex10 GPS point file to the data frame. Using LP360, I then added the converted LAS file and used the GPS point file as the map projection. The result was better, but the LAS data was still several meters out of position. Eventually I may determine why the data is not lining up, but to save time I decided to create a TIN of the close-up scene from an overhead perspective and export the resulting image (Figure 18) in TIFF, JPEG, and PDF formats. I then used Leica Cyclone and Applied Imagery's Quick Terrain Modeler (QTModeler) version 8.0 software to create the remaining pieces of the story-site background.

The Judaculla Rock terrestrial lidar data consisted of two PTS files: a consolidated 360 deg scan and a consolidated Rock scan. I imported the 360 deg scan data into Cyclone Navigator and opened a TruSpace window to view and manipulate the point cloud. Viewing the point cloud from the perspective of the scanner set in the middle of the scene, I decreased the point width rendering to the lowest setting, reduced the point cloud density, and colored the scene according to the hue intensity map. I then opened ModelSpace view from the TruSpace file menu and

[4] PointZip is a tool developed by Martin Isenburg that can convert PTS or PTX files into compressed LAZ or uncompressed LAS formats. This tool is available for download at http://www.cs.unc.edu/~isenburg/pointzip/

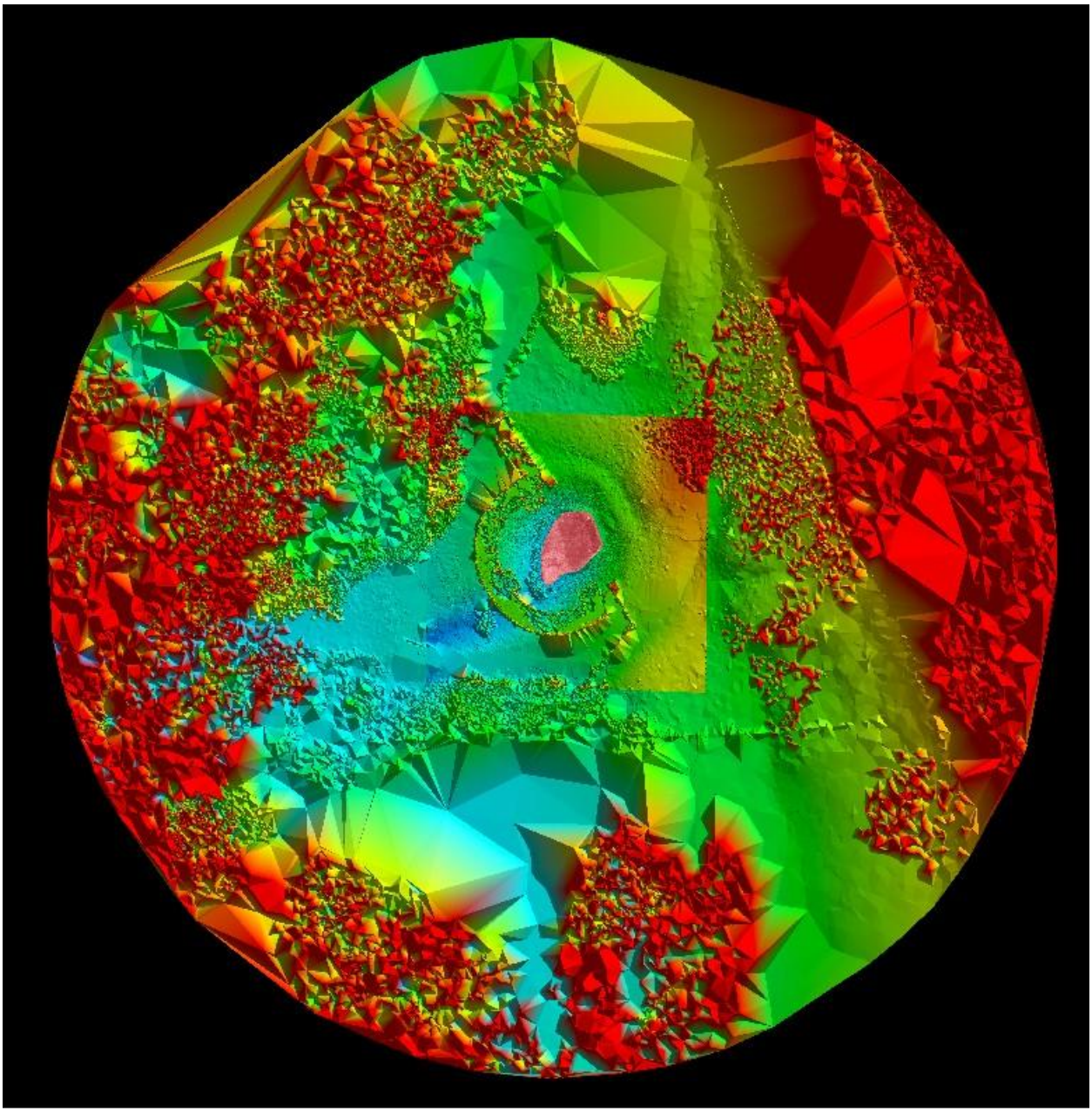

Figure . Judaculla Rock, second level scene created from terrestrial lidar colored by elevation, drawn on a TIN surface, and viewed from an overhead vantage point.

navigated the scene around the scanner perspective while exporting images in BMP, JPEG, and TIFF formats (Figure 19). I repeated the process for the consolidated Rock data, but the result was not visually appealing, so I decided to view the data in QTModeler. I used PointZip to

convert the PTS file into a LAS file, then opened it as a model in QTModeler and accepted the default settings. I liked the resulting display, so I captured images of the Rock from different angles, pasted the images in Microsoft Paint and saved them in TIFF, JPEG, and BMP formats (Figure 20).

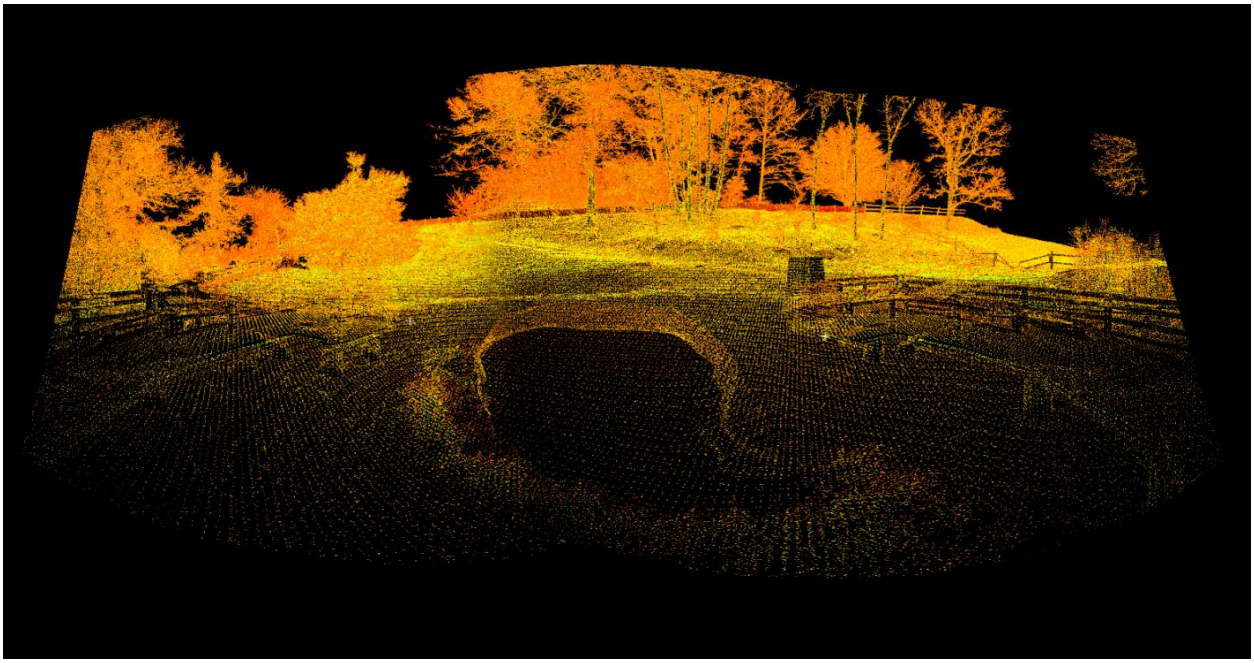

Figure . Judaculla Rock level 3 scene created from terrestrial lidar point cloud colored by hue intensity, then exported as three image frames (an approximate 180 degree viewing angle) stitched together with PhotoStitcher software.

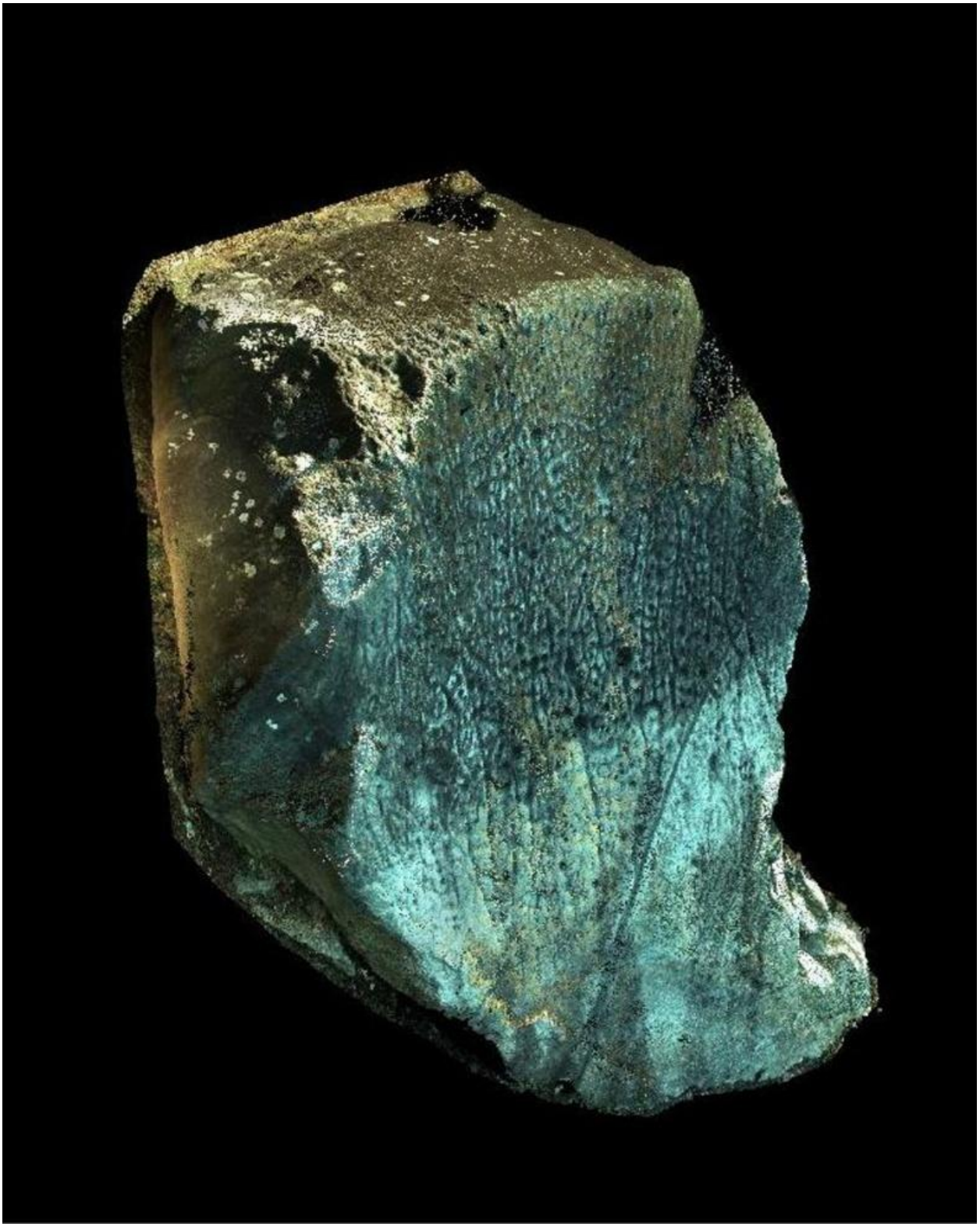

Figure . Judaculla Rock, level 4 scene created from terrestrial lidar point cloud viewed with default settings in QT Modeler.

Kituwah Mound and Ukten'na-tsuganun tatsun yi

Because the Kituwah Mound and the Ukten'na-tsuganun tatsun yi sites are in close proximity to each other, for visual continuity I created a uniform background area scene for both sites. For the aerial lidar tiles I followed Option Two (outlined above in the Judaculla Rock section) then added DOQs of the area. I used LP360ext tools to display the LAS files by elevation on a TIN; however, I could not get all the tiles to display at the same time. I closed ArcMap without saving my work then reopened a new ArcMap display. Instead of adding the LAS files through LP360ext, I added the LASD files through the TOC window. For a better visual display of elevation values, I used one of the LAS files as a template and changed the classification method for the break values from Natural Breaks (Jenks) to manual classification, then manually lowered the break values.

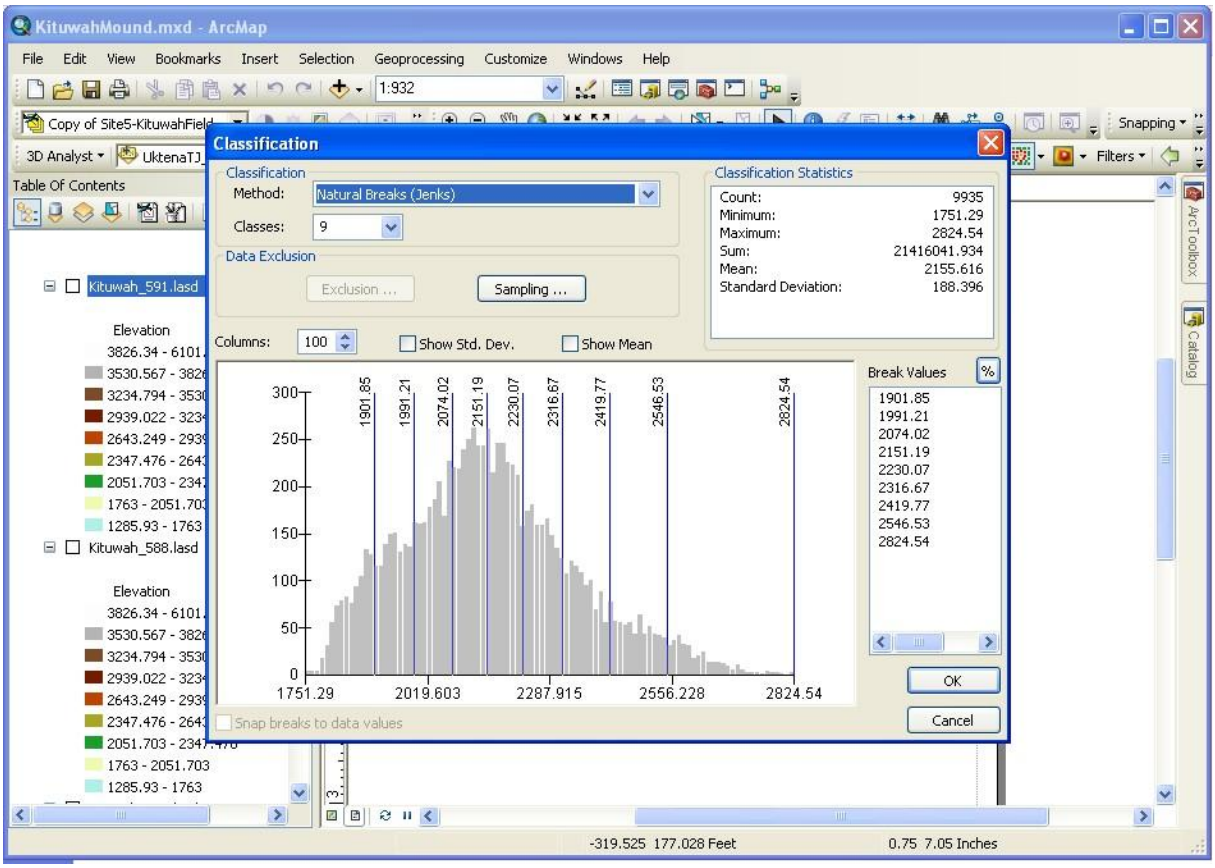

Figure . Natural Breaks (Jenks) elevation values (default setting).

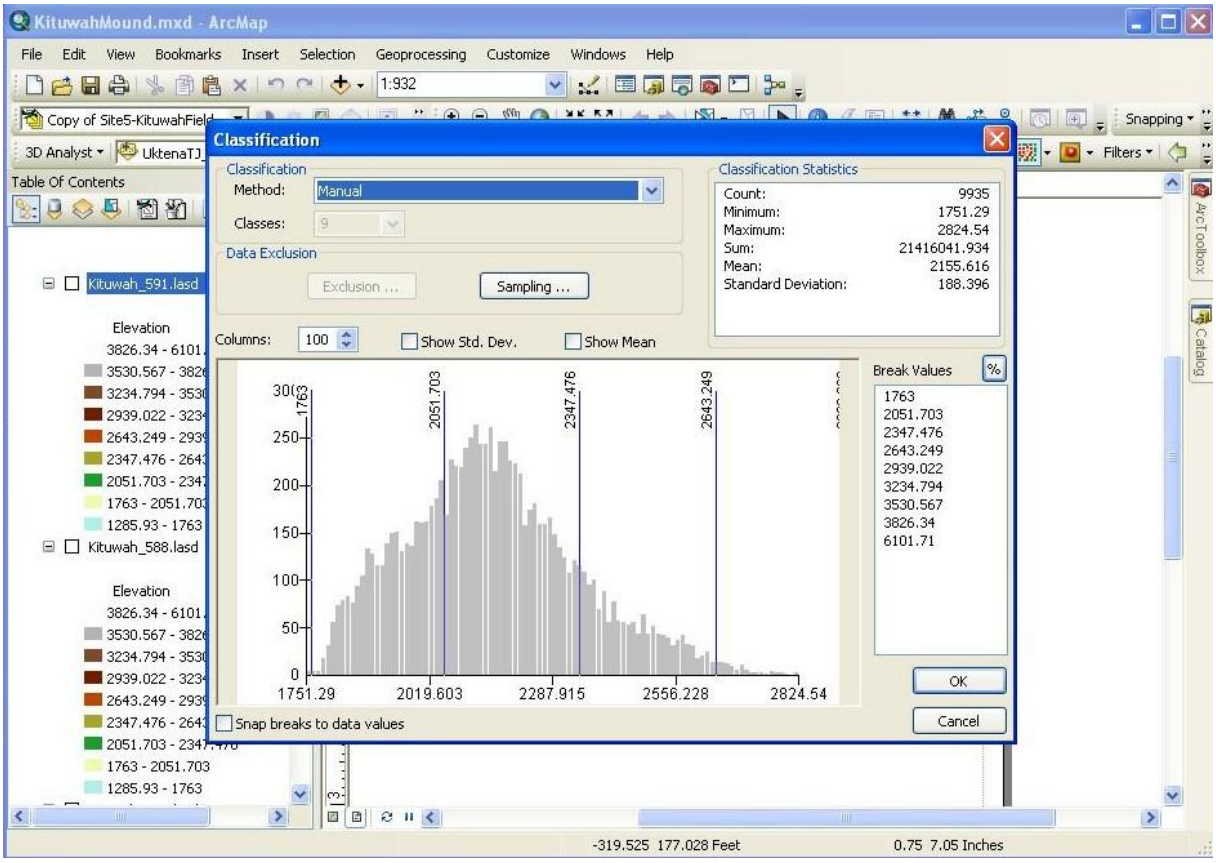

Figure . Manual break elevation values.

To improve visual continuity among the lidar data sets, I imported the classification scheme into the remaining three LAS tiles. Using ArcMap LAS dataset tools, I symbolized the point cloud for each tile by elevation displayed on a TIN surface. I then layered the DOQs on top of the LAS tiles. A strip of overlap between the DOQs was causing problems with visual continuity, so I used Arc tools to mosaic them into a new TIFF raster. I set the transparency level of the mosaic raster to fifty-five percent, changed the symbology layer properties to stretched values, selected color band 1 displayed with a natural earth color ramp, turned on the hillshade effect and accepted the default Z value. I set the map scale to 1:24000 and exported TIFF images for both background scenes. I then changed the map scale to 1:10813, set the mosaic raster symbology to color band 2, and exported TIFF images for both sites.

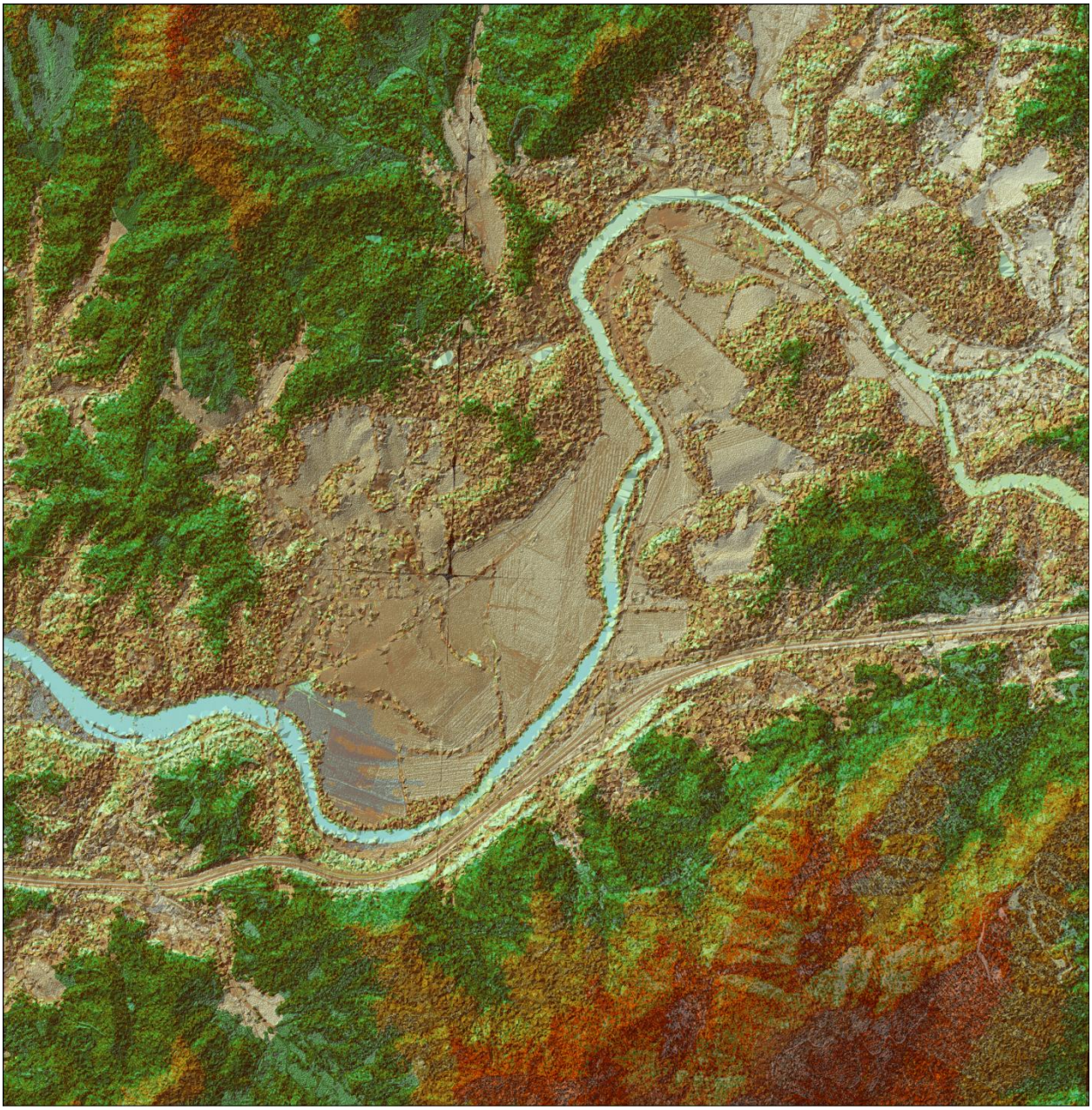

Figure . Kituwah Mound Level 1 scene, (also includes Ukten'na-tsuganun tatsun yi site) background created from aerial lidar, colored by elevation, drawn on a TIN surface, layered underneath a DOQ with a 55% transparency level.1:24000 scale.

To create the close-up images of the Kituwah Mound from terrestrial lidar, I used Cyclone and LP360. For Cyclone, I followed the same sequence as I did with the Judaculla Rock and then added an extra step; I changed the viewpoint to orthographic and exported images of the

trees. After converting the PTS file to LAS, I opened the LAS file with LP360. I changed the point size to 1, used Draw Points as the Draw Type, displayed the points first by elevation and then by “color from scanner”, and exported images of the trees in BMP, TIFF, and JPEG formats.

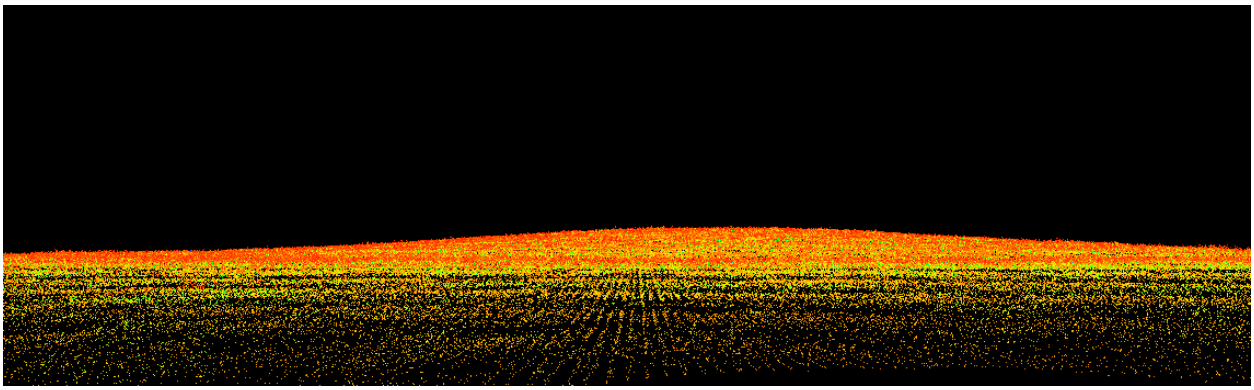

Figure . Kituwah Mound Level 2 scene, terrestrial lidar point cloud colored according to intensity values.

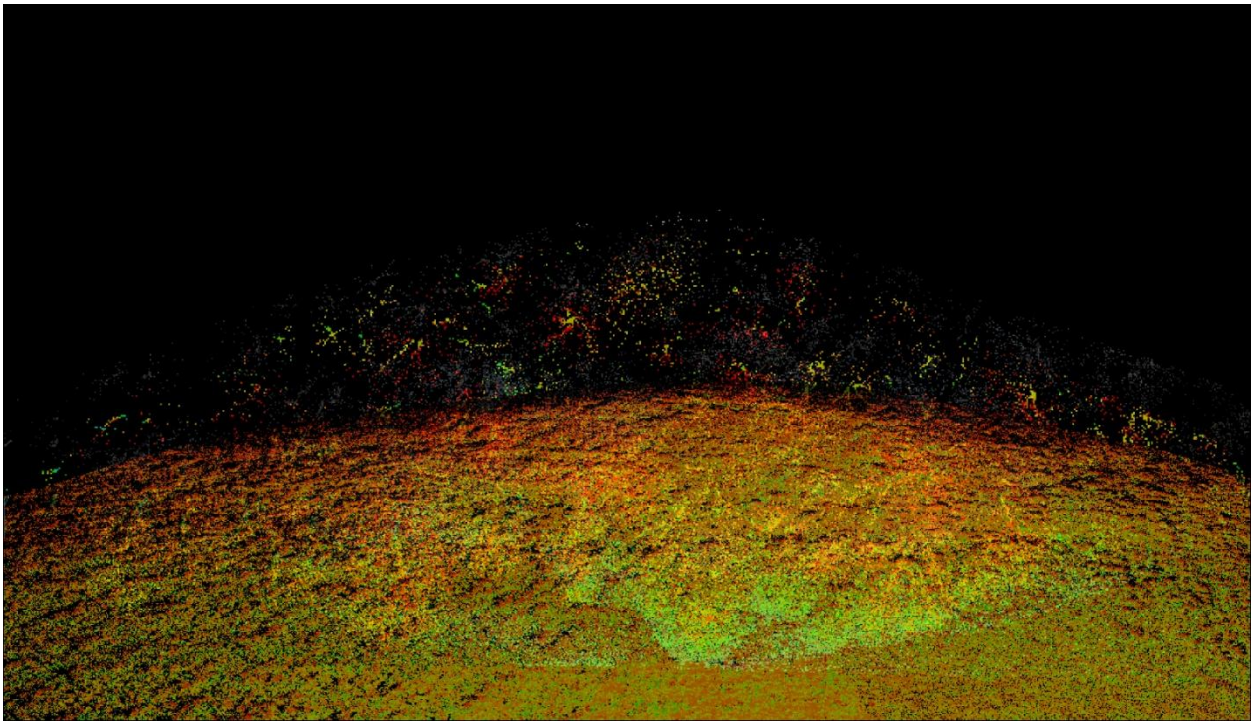

Figure . Kituwah Mound Level 3 scene, lidar scan with superimposed lidar tree scan to simulate the original height of the mound and the fire within.

Prior to working with the terrestrial lidar data for the Ukten’na-tsuganun tatsun yi site, I created two additional scale levels for the area background, 1:9000 and 1:1000. At the 1:1000

Figure . Ukten'na-tsuganun tatsun yi, Level 1 scene.1:9000 scale.

scale, I changed the aerial LASD file color ramp to gray/gold, set the transparency to 25%, layered it over the mosaic TIFF, and changed the color ramp of the TIFF to inverted muted pastels. After exporting TIFF images at these scales, I converted the terrestrial lidar PTS file to a LAS file. I opened the LAS in LP360 and selected “draw points by colorband”, used a point size of 1, and captured two images of the display in TIFF, BMP, and JPEG formats.

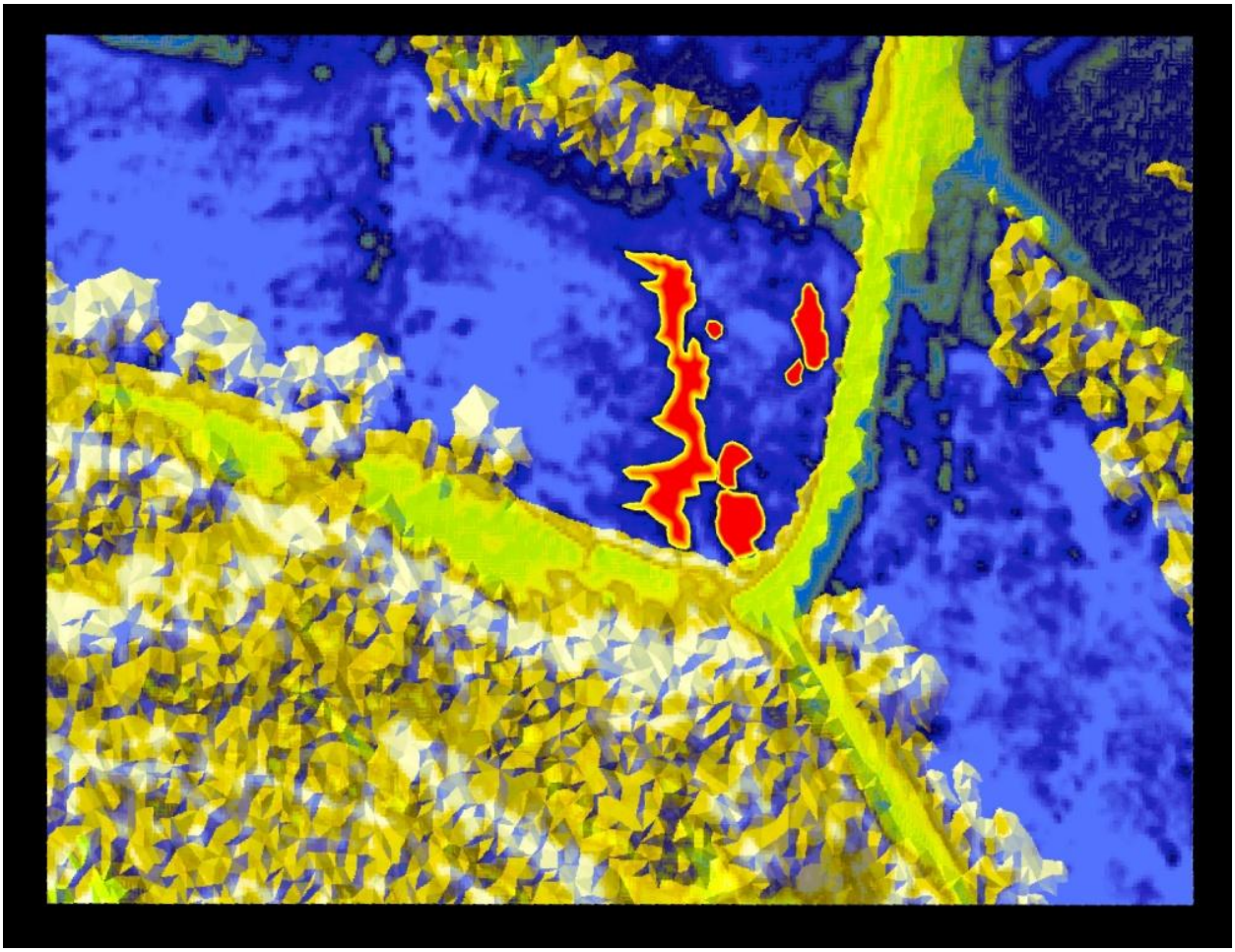

Figure . Ukten'na-tsuganun tatsun yi, Level 2 scene. 1:1000 scale.

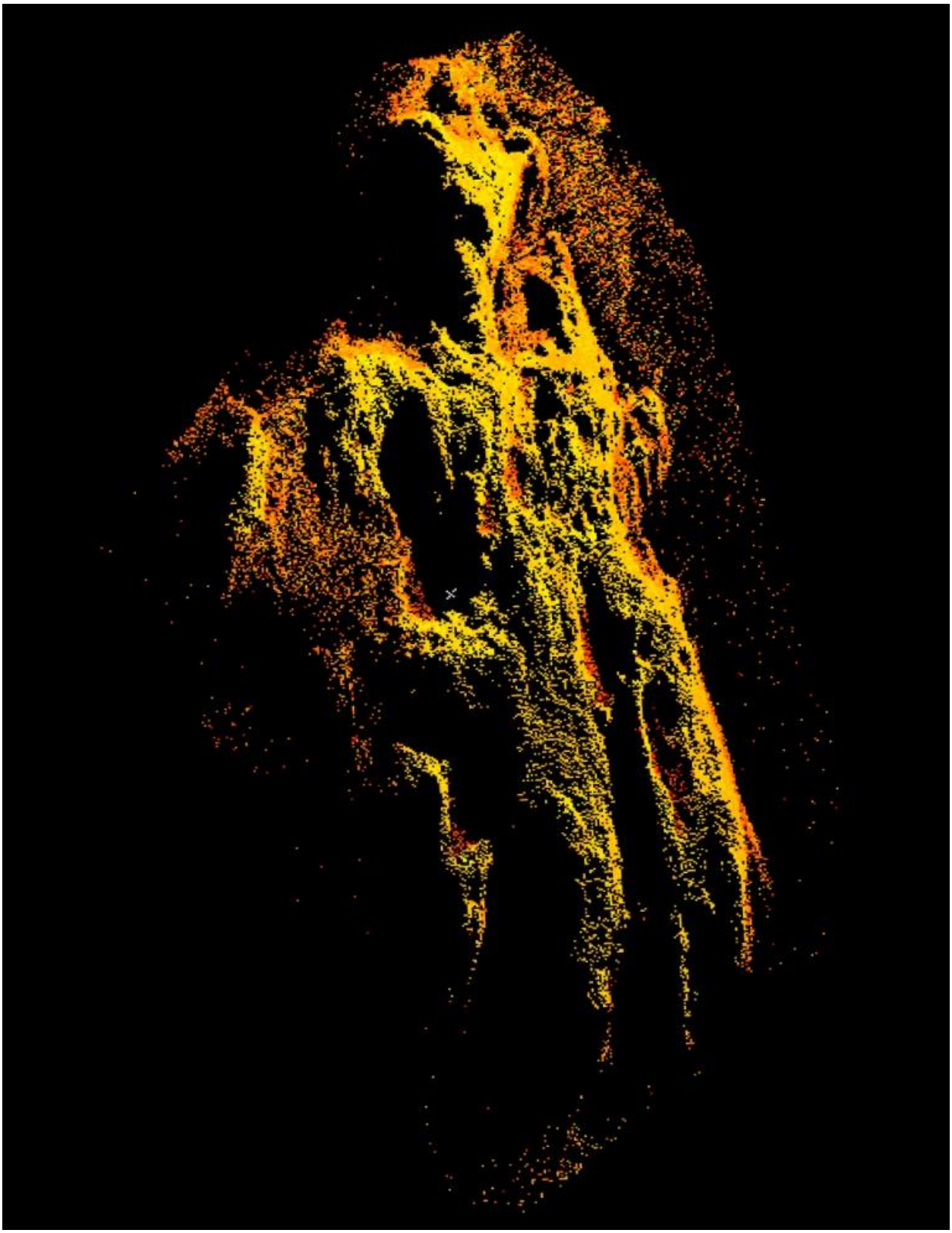

Figure . Ukten'na-tsuganun tatsun yi Level 3 scene. Aesthetic lidar point cloud image of the rock where the Ukten was fastened, exported from Cyclone.

Spear Finger

The home of Spear Finger is a large site encompassing the side of a mountain. The area is too large for collecting terrestrial lidar data from a tripod mounted scanner, so for this site I focused on blending aerial lidar and remotely sensed imagery when creating my background scenes. I began this process by repeating the steps used in the Judaculla Rock scene. However, I was not pleased with the results so I decided to work in ArcScene.

I downloaded a Jackson County 20' lidar DEM from North Carolina State University's Geodata Library.[5] Prior to working in ArcScene, I first had to prepare my data in ArcMap. I began by setting my data frame properties and display extent, then I used Arc Toolbox "ASCII to Raster" tool to convert the ASC lidar data to an Arc grid "floating" raster. To reduce rendering time, I only converted the data that fell within the display extent. I opened ArcScene and added the newly created raster to the scene. Under the raster properties, I changed the base height to floating on a custom surface and set the surface path to the original ASC file. I then changed the vertical exaggeration of the "Scene layers, scene properties" to 2, changed the scene background to midnight sky, and experimented with different color ramps. I exported 2D and 3D images of the scene in WRL, AI, TIF, and JPEG formats.

[5] NCSU Alumnus Tom Colson compiled some of the 2003 and 2005 state lidar data into 20' resolution DEMs, tiled by county. These tiles retain the original elevation values and are not rounded to the nearest foot. The downloadable zip files contain ASC, PRJ, and XML metadata files. The data is available from www.lib.ncsu.edu/gis/elevation.html.

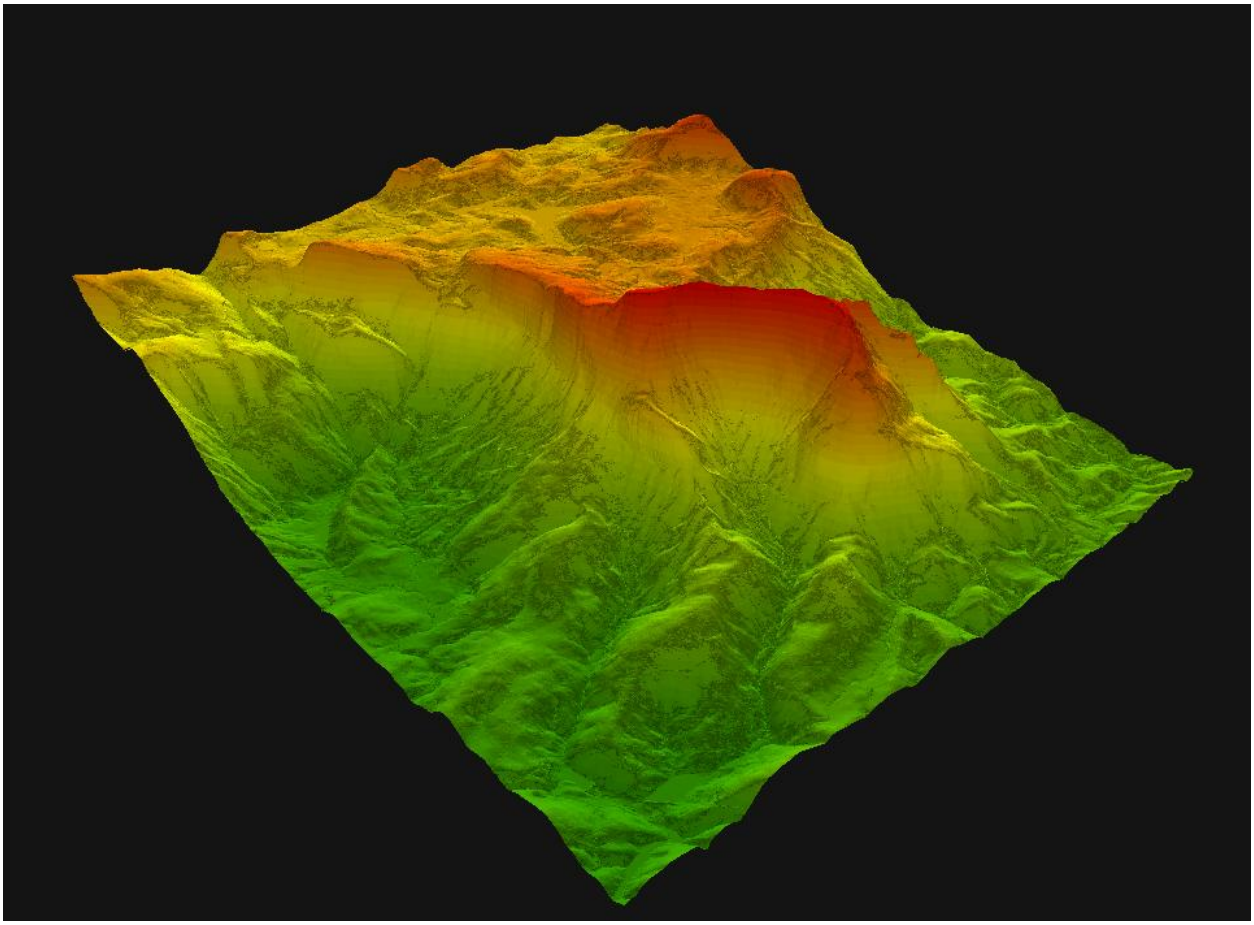

Figure . Spear Finger Level 1 scene of Whiteside Mountain, home of Spear-Finger, created in ArcScene from aerial lidar floating on a grid. Inverted red to green color ramp.

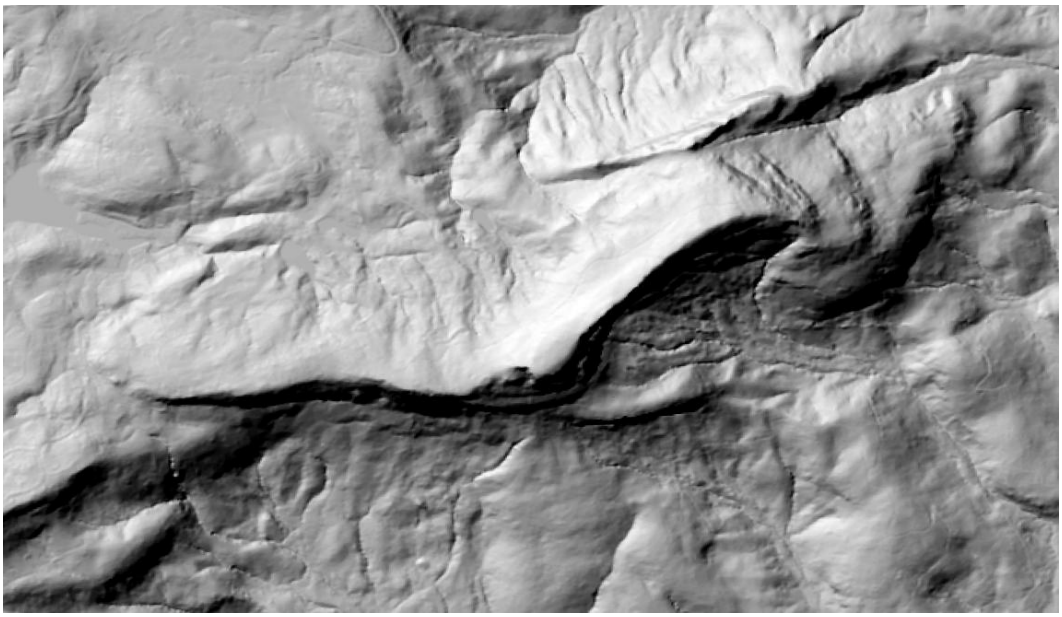

Figure . Spear Finger Level 2 scene of Whiteside Mountain created from an ASC file displayed in ArcScene.

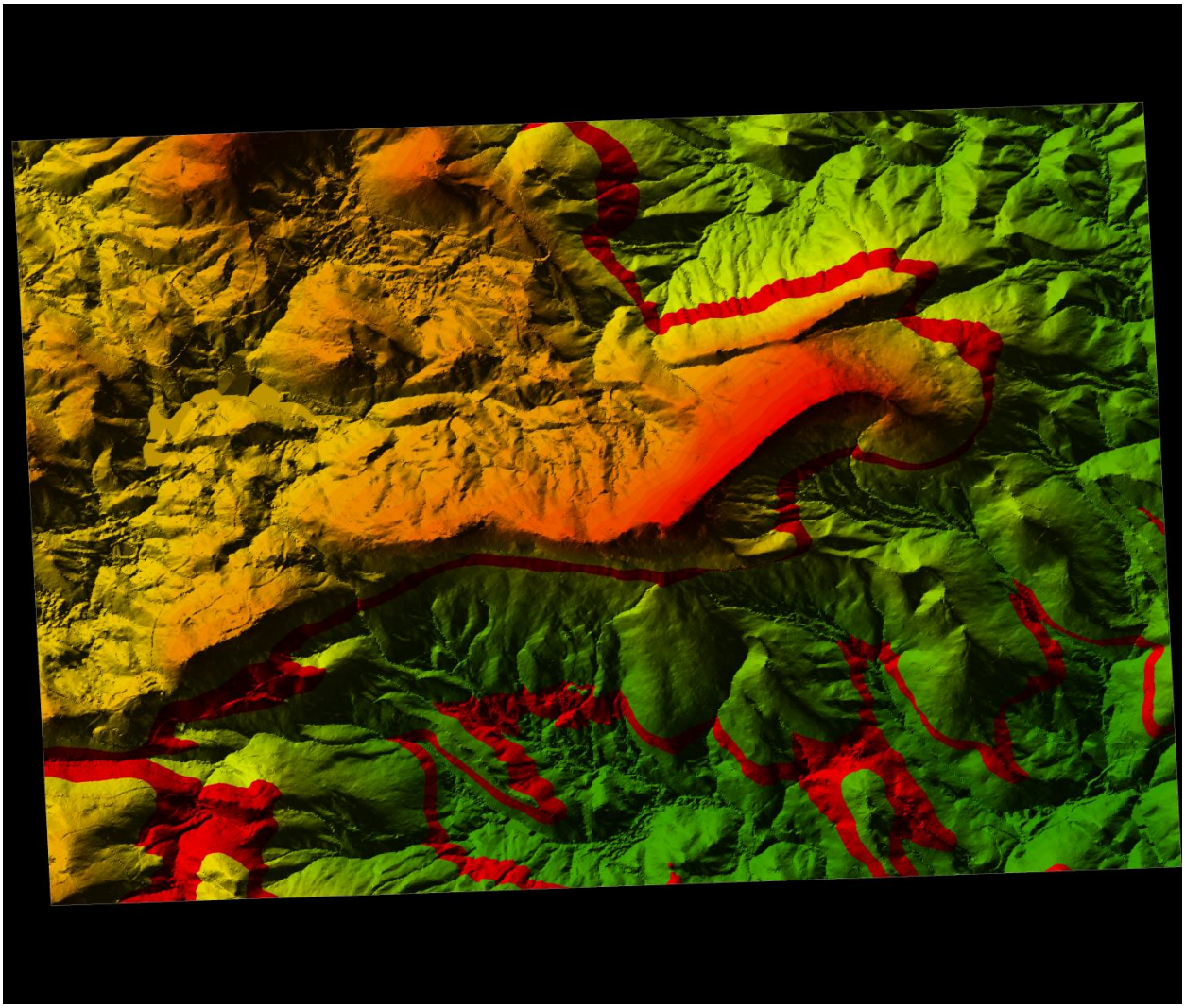

Figure . Spear Finger Level 3 ASC file displayed with an inverted and adjusted color ramp in ArcScene. The ribbons of red symbolize the bloody trail of Spear-Finger as she departs from her home at Whiteside and travels throughout the Cherokee homeland.

Leech Place

For this site, I used a combination of the procedures used in the Judaculla Site and in the Spear Finger site. For the larger 1:24000 scale area background, I first created LASD files from the NC_Phase3_2005 aerial LAS data, calculated statistics on the newly created datasets, and chose one LASD file as a template. I changed the lowest elevation breakline on the template

from 1518 to 1560 feet and set the color ramp to fall colors. I then imported the template symbology into the remaining LASD files, and used the LAS Dataset tools to select “symbolize the dataset TIN faces by elevation”, and set the filters to non-ground points only. I exported TIFF, JPEG, and AI images of the scene.

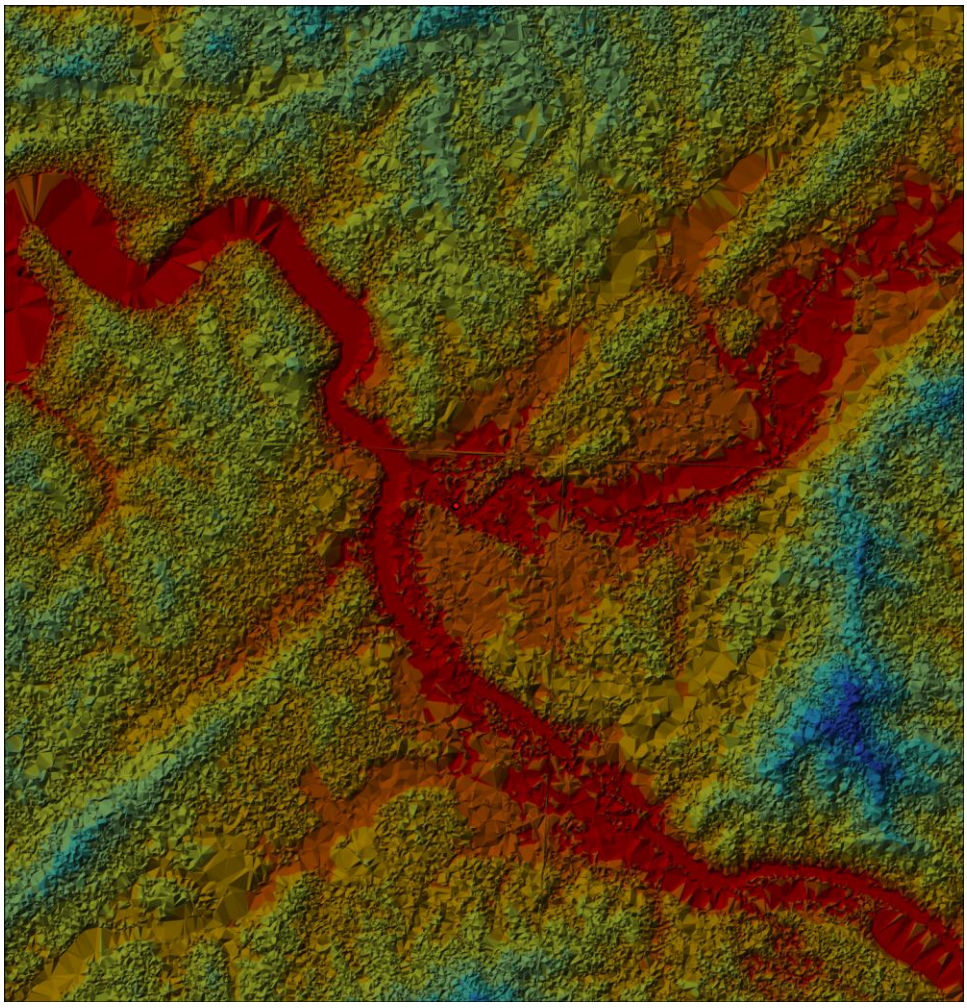

Figure . Leech Place, scene level 1. 1:24000 scale.

After creating a 1:24000 scale background, I used Arc Toolbox to convert the LASD file (directly surrounding the site) to a raster file, then from a raster file to an ASCII file for use in Arc Scene. Following the same steps I used for the Spear Finger site, I displayed the raster file

floating on a custom surface and set the path to the ASCII file. To display properly, I had to add a step and convert the layer elevation from meters to feet. I selected a standard deviation stretched symbology, changed the "n" factor to 2, and selected an inverted burgundy-yellow-blue color ramp. I then exported 2D and 3D images, from a very close view point, in AI, JPEG, TIFF, and WRL formats.

To bridge the zoom level between the 1:24000 scale image and the close-up view, I created an "in-between" zoom level background. For this background, I downloaded the Cherokee County ASC files then followed the steps used in the Spear Finger site. In ArcScene, I experimented with different color ramps then set the path for the custom surface to the Cherokee County ASC file. I exported wide view 2D and 3D images of the area in WRL, AI, JPEG, and TIFF formats.

At this story-site, I incorporate aerial and terrestrial lidar data. I used Cyclone to prepare the terrestrial lidar data for imaging. I imported the scan into Navigator then opened a TruSpace window to view and manipulate the point cloud. Viewing the point cloud from the perspective of the scanner set opposite the scene, I decreased the point width rendering to the lowest setting, reduced the point cloud density, and colored the scene according to the hue intensity map and then the scan color and exported images of both colorations in BMP, JPEG, and TIFF formats through the ModelSpace navigation view.

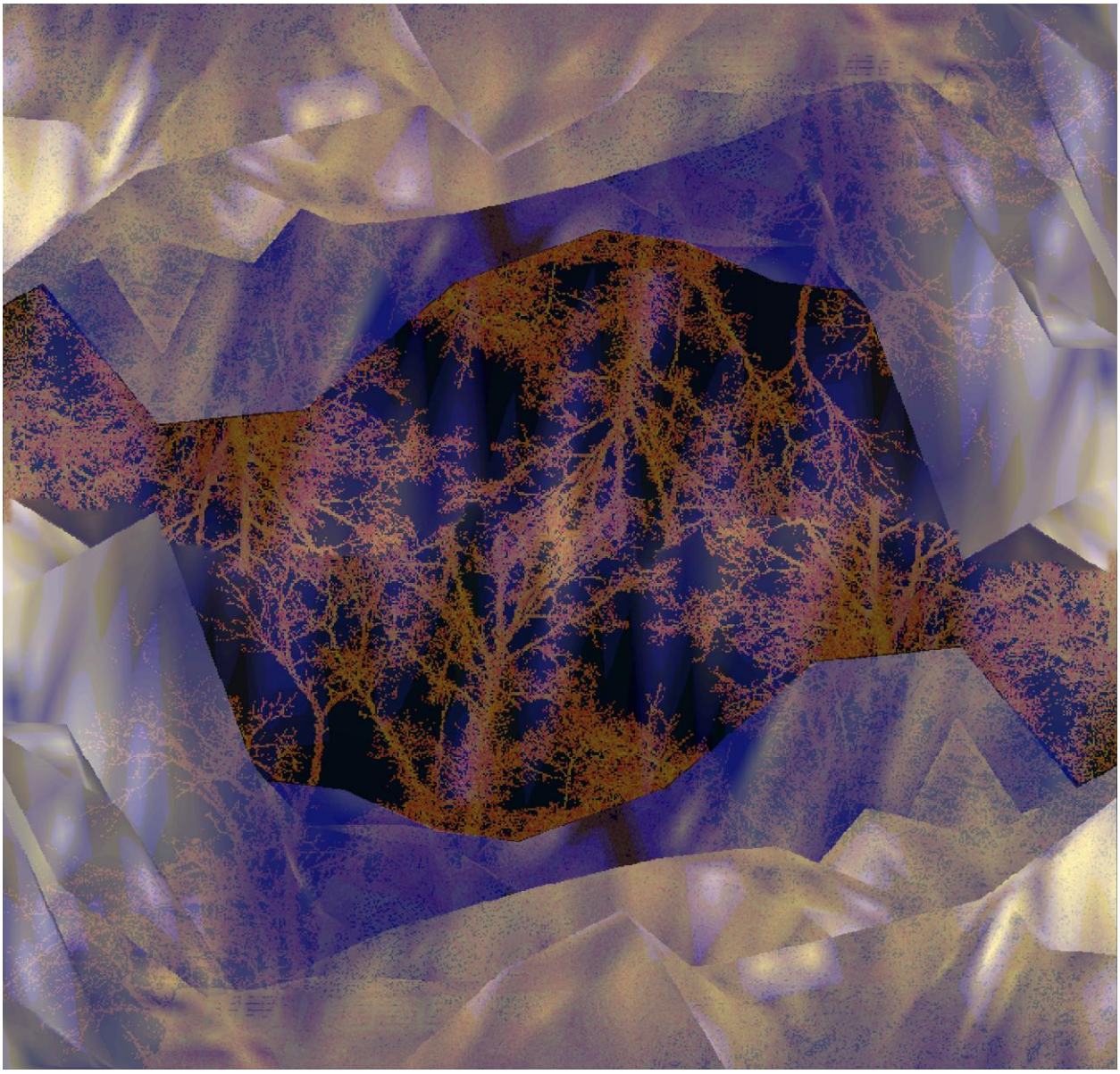

Figure . Leech Place level 2 scene, aerial lidar floated on a grid in ArcScene, with insertion of superimposed terrestrial lidar. Image then inverted and stitched together with original in Microsoft Ice to simulate The Leech peering through the water to the world above.

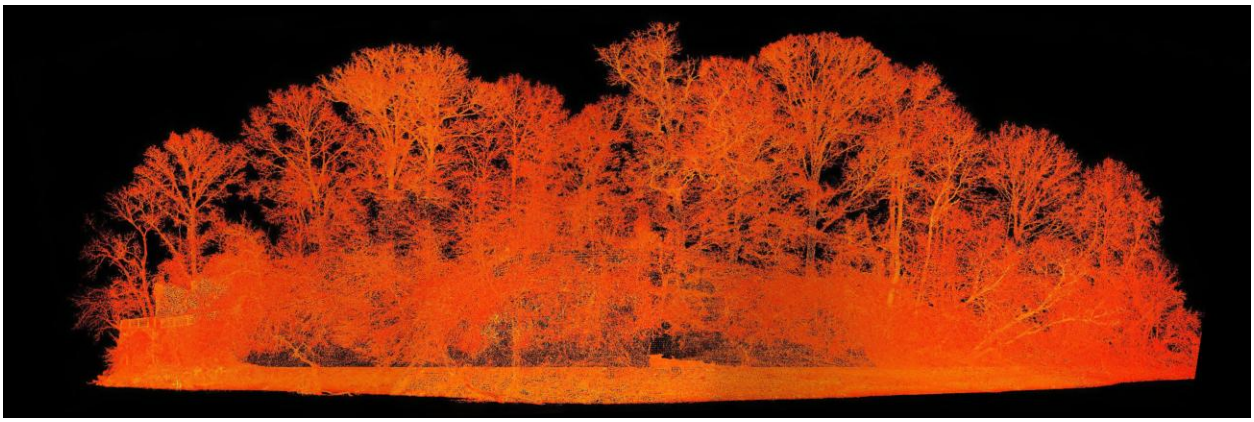

Figure . Leech Place, scene level 3, terrestrial lidar point cloud images of a portion of the rocky ledge overlooking the river, stitched together with PhotoStitcher.

ANIMATION, AUDIO, AND PRESENTATION PLATFORM

After reviewing several open-source GIS and ESRI product options, I chose ESRI's ArcGIS Explorer (ArcExplorer) as the platform for this project (I discuss the decision making process in greater detail in Chapter Four). Although ArcExplorer provided many of the qualities I was looking for in my final map presentation, it did present some challenges. Lidar files cannot be read directly in ArcExplorer, and setting different zoom levels for each individual layer is not possible. To overcome the lidar obstacle, I used the images I had exported earlier. And in instances where I needed a wider view of the lidar scene, I simply exported images of the scene in sections, then stitched the images together, using a combination of PhotoStitcher[6] and Microsoft Ice, to create a panoramic display.

Within ArcExplorer, I loaded the background images for the story-sites and attempted to create individual zoom levels for each layer of the map: a world view, followed by a homeland

[6] PhotoStitcher is budget-friendly software available for download at www.photosticher.com. A free version of the software is also available but does not allow the resulting stitched images to be saved.

view, followed by an icon view, followed by the site itself, but this presented another challenge. I had hoped that ArcExplorer would work similar to ArcMap, where certain layers can be set to render only at a given scale level, but this was not the case. Pre-set zoom levels can be activated in ArcExplorer, but it renders all of the layers at that scale and does not allow layers to "turn on and off" automatically according to the pre-set. This meant that all of the layers were turned on all of the time, resulting in a very messy (and in my opinion, ugly) presentation. To keep the map view simple and clean, I decided to include the background images with the audio files in a separate, storytelling portion of the project. I then created separate files in ArcExplorer for each map level and story-site.

For the storytelling portion of the project, I searched for a suitable presentation platform that would allow me the option to create my own visual and embed a vocal. [7] One platform appeared promising, but when linked to the map, took over five minutes to load and direct the viewer to the site, resulting in a lengthy delay and a very awkward transition. I then turned to the possibility of using video editing software as the platform for viewing the site images while listening to the story. Although a video would not be interactive, I could position it in such a way that the viewer could still interact with the map itself while playing the video.

I chose Windows Movie Maker software to create the storytelling portion of the project, for several reasons: I did not have to go through the extra step of compressing or resizing all of my images to the same size (the software took care of this automatically), I could adjust the viewing time of each image manually to complete a single cycle of images corresponding with the length of the vocal (the other programs I experimented with either looped the images

[7] Since the intended purpose of this thesis is not the review of audio/video software, I choose not to mention the names of the software reviewed and will only include the names of the software I actually used in the project.

automatically to correspond with the length of the audio file, or simply stopped on the last image while the audio continued to play), and I was not limited to the types of audio files I could upload to the program. When I needed to resize an audio file, or clip portions of the audio file out, I used Audacity, another freely available software program.[8] After creating my movie files I downloaded WinFF[9] software to convert the default Windows Movie Maker format (WMV) to other formats as needed (e.g. XviD, MOV, AVI). I then created a link to each story-site in ArcExplorer. I chose ArcGIS online as the platform for accessing the story-site map. Since all GIS data pertaining to the EBCI must be stored locally on the Tribal GIS server, access to the online map content is restricted. The Cherokee homeland story-map is password protected and accessible with permission from the Eastern Band of Cherokee Indians Department of Cultural Resources. Images of this process are included in Chapter Five (Construction of an Indigenous HGIS) of this thesis.

THE STORY-SITES IN STORIES

Judaculla

The name Judaculla (or Jutaculla) is a corrupted version of *Tsul'kalu*, a Cherokee word meaning "he has them slanting" and the name given to the "slant-eyed giant" (Mooney, 1900:477). In 1768, John Haywood learned of an invisible person, whom he mistakenly refers to as *Tuli-cula*, who takes a wife from among the Cherokee (Haywood, 1823:280-281). The versions of the story told to Mooney (1900) by Swimmer and John Ax, also include the slant-

[8] I downloaded Audacity through the CNET site at http://download.cnet.com/windows/audacity-developer-team/3260-20_478914.html?tag=contentBody;span-publisherDescriptionWrapWrapper.

[9] WinFF is a free video convertor software available online at http://winff.org/html_new/downloads.html.

eyed giant taking a Cherokee wife. Swimmer and John Ax's versions contain great amounts of detail and explain how Tsulkalu captured the attention and affection of a young Cherokee woman.

After carefully observing the needs of the family, Tsulkalu, "the great Lord of the game" (Mooney, 1891:342), furnished an unending supply of meat for the young lady's mother, thereby winning the girls heart, her loyalty, and her commitment in marriage. The mother, curious about her new son-in-law, asks to meet him. The daughter arranges a meeting and gives her mother specific directions on how not to offend the giant. The mother disregards the directions and the giant becomes very angry. He leaves his young wife and retreats to his mountain home, known to the Cherokee as *Tsul'kalu' Tsunegun'yi*. Eventually, Tsulkalu returns for his bride, and after producing a child she follows him to Tsunegunyi. During their retreat to the mountain, she gives birth to another child (Mooney, 1900:337-339).

At this point the stories differ slightly. In Swimmer's version of the story, the girl's older brother—noticing the loneliness of his mother, looks for the girl and her children. During his search he comes across the footprints of Tsulkalu and begins to follow them. He then comes across children's footprints mixed in with those of Tsulkalu.[10] Eventually he discovers the cave of the family and is able to visit with his sister. The brother hopes to persuade her to return with him, but she will not leave her husband. Four[11] years later, while on a hunt with her husband near the home of her family, the girl visits her family and invites them to meet her husband early the next morning. Once again the family does not follow instructions and arrives too late to meet Tsulkalu. The brother is determined to meet the husband, so he once again follows them to

[10] Although Mooney does not mention the name of the place, he does mention that the Cherokee who know the area can still find the footprints in the rock at that place (Mooney, 1900:339).

[11] The number four is sacred to the Cherokee people.

Tsunegunyi where he persuades his sister to speak with her husband on his behalf. After she speaks with Tsulkalu, he agrees to meet the family and members of the community. He then gives his wife specific instructions for her brother to give to his family and to the community on how to prepare for meeting "the Lord of the game". These instructions included ceremonial cleansing and purification and were to be followed exactly. Unfortunately, one person did not follow the instructions. As a result, Tsulkalu became very angry and told the family and the community (representative of the Cherokee people) they would never see his face (Mooney, 1900:339-341, 477).

The Ax version of the story differs from Swimmer's version. According to Ax, it is the father and mother who search for the girl and are given instructions to fast for seven days in preparation for the meeting—four days before travelling, two days during travel, and one day after arrival. When they arrive at the mouth of the cave, the home of their daughter and Tsulkalu, they are able to hear the drum and see their daughter dancing below. But they cannot enter until the fast is complete. Unfortunately, the father, weak-willed from hunger, sneaks a bite of food and breaks the fast, short of the allotted time. In that moment, the ground closes up, the cave and dancers disappear, and the mother and father are alone on the mountain (Mooney, 1900:477-478).

Among the Cherokee of Oklahoma, a "Tsuhl'gûl"[12] story is told by Siquanid (1964). This story was handed down to him from his father who heard it from his mother (Siquanid's grandmother). In this story Tsuhlgul is just one of many "Tsunhil'gûl" who lived in the old Cherokee country. This giant race of men pulled up large trees with their bare hands, held huge containers of water (as big as a 65 gallon barrel) with a single hand, and loved women. Every

[12] Oklahoma Cherokee often drop the first or last syllable of a word

night, beginning at sunset, Tsuhlgul would "whoop it up" on the big mountain he called home. With four whoops, he would travel the mountain from west to east, then the next night from east to west, alternating back and forth every night beginning at sunset. Two daughters, curious about "the whooper", ask their father to help them see him. The father agrees and calls in seven[13] medicine men. These men come up with a plan to intoxicate Tsuhlgul by making a liquor type drink and pouring it into very large cups which they placed in the giant's path. The plan was successful and the giant became drunk and lethargic. The daughters were then able to sneak up on him for a glimpse of his face, but ran away in fear when they saw his slanting eyes. The Tsuhlgul approached the old men and asked if he could have one of the young women for his wife. One of the old men (presumably the father) responded that he could have both of them. The Tsuhlgul then accompanied the young women down the mountain to their home where he lived and used his strength to help the family. After some time, the Tsuhlgul's eyes wandered and he became desirous of one of the neighbors daughters. This neighbor lived about a mile away, and Tsuhlgul visited him often but always kept his face averted from the two daughters. The daughters devised a plan to see the giant's face, but after seeing it, they shouted out "The big man has slanting eyes!" then ran away in fear. This angered the Tsuhlgul. He left the area and travelled until he found a group of Tsunihlgul more rowdy then himself. After joining the group, "God" allowed the giants to live among the Cherokee, but the group was always stealing the women of the Cherokee, who were drawn to their wickedness, leaving the normal sized Cherokee men without women. So, God then decided to send the Tsunihlgul to the west, to the end of the world, where they live today (Siquanid, 1964:65-69).

[13] Seven is also a sacred number for the Cherokee.

Although Siquanid's story has been viewed as another version of the Tsulkalu story (Kilpatrick and Kilpatrick, 1964:190), I do not believe Siquanid is telling a story about the legendary Judaculla (from this point forward I will use the English version of the name as often as I can to avoid confusion between Tsuhlgul and Tsulkalu). I believe he is simply telling a story about a man from the race of very tall people who came to visit the Cherokee. These exceptionally tall people appear briefly in the Mooney archive through a story related by James Wafford, a Cherokee man who emigrated to Indian Territory on the Trail of Tears. Wafford shared with Mooney a story told to him by his grandmother. His grandmother, born sometime during the mid-1700s, heard the story from the old people. Wafford tells of a race of very tall people, nearly twice as tall as the average Cherokee, with eyes set slanting in their heads. The Cherokee called them Tsunil'kălû, "the slant eyed people", because their eyes looked like those of the giant Judaculla (Tsulkalu). Long before his grandmother's time, this race of people visited the Cherokee from a place "far away where the sun goes down". The Cherokee accepted them into the community and they stayed for a length of time then returned to their homes in the west (Mooney, 1900:391).[14] Wafford's story reinforces what I suggested earlier, that Tsulkalu and the Tsuhlgul are not the same being.

Another indication that the Tsuhlgul is not Judaculla is the time it takes for the Tsuhlgul to cross a mountain. According to Siquanid, it takes the Tsuhlgul the time span of four whoops to travel from one side to the other. On the other hand, Judaculla is able to jump (or stride) from mountain top to mountain top (Skinner, 1896; Ziegler and Grosscup, 1883; UCE, 2013), and in

[14] In 1823, Haywood writes about the bones of "giants" discovered in East and West Tennessee (Haywood, J. 1823. *The Natural and Aboriginal History of Tennessee, Up To The First Settlements Therein By The White People, In the Year 1768*. Nashville: George Wilson, pp. 193-200.)

the process create “bald” spots where his feet touched the tops of the high mountains (Skinner, 1896; Ziegler and Grosscup, 1883).

The geographic area traversed by Judaculla encompasses parts of Georgia and North Carolina. In North Carolina, some of the geographic locations include the Devil’s Court-house, Court-house Mountain, Judaculla Bed Chamber (also known as Judaculla Old Field), Kanuga Town on the Pigeon River (the home-town of Judaculla’s wife), Pigeon Gorge, Looking Glass Rock, Shining Rock, Pilot Mountain, a place near Little Snowbird creek near Robbinsville, Tanasee Bald, and Cullowhee (or Jutaculla-whee), and in Georgia the locations include Blood Mountain, Yonah Mountain, Enchanted Mountain, the Devil’s Pulpit, the Devil’s Dwelling, and a place near Brasstown Bald (Ashcraft and Moore, 1998; Foster, 1885; Haywood, 1823; Knight, 1914; Lanman, 1849; Mooney, 1900; UCE, 2013; Ziegler and Grosscup, 1883). Curious as to the extent of Judaculla’s travels, I used the measuring tool in ArcMap to draw a polygon around the area. Much to my surprise, the area traversed by Judaculla contains over 2,000 square miles. The stories across the Judaculla landscape will eventually be included in the digital story-map, but since they are not a part of the first phase of this project, I will not discuss them in this thesis.

In addition to the landscape features, several petroglyph sites attributed to Judaculla are scattered across the region. The largest and best preserved petroglyph is located in Jackson County, North Carolina, on a large soapstone boulder. This site is known as the Judaculla Rock and I have included this location in the first phase of my story-map project.

Mooney briefly mentions the Judaculla Rock in his report. He describes it as a “large soapstone slab covered in rude carvings” (1900:407), and recorded the local white population interpretation of Indian tradition, which attributed the “scratches” on the rock to the large giant who jumped from his farm on the mountain to the creek below (Mooney, 1900). On the 1886,

North Carolina Cowee quad sheet, Mooney (n.d.) simply marks the area with a small circle and the letters JROK. He does not provide field notes for the Rock site, but does provide markings and locations for two additional Judaculla sites located on the same quad (Table 3). Additional Cherokee Site transcription notes provide the location of the Rock and question the "rude carvings" as possible petroglyphs (Mooney and Walker, n.d.).

While working at the site I listened to many conversations, between members of the North Carolina Rock Art Project, Dr. Riggs, Mr. Holland, and Mr. Parker (the landowner whose family donated the site for heritage preservation), about the markings on the Judaculla Rock. One conversation attributed the large diagonal line across the face of the rock as the line separating the spiritual from the physical. The spiritual being the realm of Judaculla, and the physical being the human world. One dared not cross the line without first preparing themselves, through cleansing and ceremony, to enter the spiritual realm. Another conversation equated the diagonal line with the location of the Tuckasegee River and the Cherokee villages surrounding the area.

A Cherokee Elder, who I will refer to as UCE, shared with me knowledge about the Judaculla Rock site. The following is an edited version of the information presented to me.[15]

A time came when it was no longer feasible for Judaculla to exist with humans. Before he left, he revealed his secrets to the people: instructions for talking to the plants and animals, instructions for ceremony, and formulas for medicine. He put all of this in the layers of the rock. The Cherokee village located near the rock was present all year long; they did not move with the seasons. After Judaculla's departure, this village was charged with guarding, protecting, and caring for the rock.

[15] Because of the subject matter, this Elder wished to remain anonymous, but felt the information was important to share. Of the information shared with me, I present only the portions relevant to this story.

Medicine Men from each village gathered at the rock at specific times throughout the year to conduct ceremony, following the instructions outlined on the rock. All of the Cherokee villages sent persons to the sacred place for medicine that could only be made on the rock using the formulas. Medicines were not only made for individuals, as requested by a medicine keeper, but were also made for administering to the entire Cherokee population during ceremony or in response to a vision calling for nationwide protection.

Medicines were dispersed to the people in accordance to the map contained within the rock. The map is just one of many layers contained in the rock. Another layer is believed to contain the location of stars. The old ones knew how to read the multi-dimensional layers. This knowledge was preserved for a long time among certain Cherokee people. Even the Cherokee who were forced to move to the West retained this knowledge and for a long time, designated persons would travel from the West and join up with designated Eastern Cherokee to hold ceremony at the rock (UCE, 2013).

When I asked Cherokee Elder, Jeremiah Wolfe (2013) about the Judaculla Rock, he indicated that he did not understand the markings on the rock, nor did he know of anyone who did. But he did say that the markings were not Cherokee writing, they were "more like a map" (Wolfe, 2013).

Uktena

As early as 1765, story elements of a snakelike creature known to the Cherokee as Uktena[16] began to appear in the historical archive. In his memoirs, Lieutenant Timberlake writes of an exceptionally beautiful stone now in the possession of a medicine man after being torn

[16] The term uktena is used for the singular and plural expression of the form.

from the head of a serpent monster killed by an extraordinarily bold Cherokee (Timberlake, 1765: 47-79). James Adair (1775), in his account to the Mother Country, writes of rattlesnakes,[17] "of a more enormous size than is mentioned in history", that inhabit the dark places between the headwaters of the northern branch of the lower Tennessee river and the headwaters of the Tuckasegee, roaming the gaps and valleys between the two high mountains, and waiting for prey which is attracted and then paralyzed by their hypnotic gaze. The monster rattlesnakes, also referred to as "bright old inhabitants", are described as having a large place on their foreheads "as big as an egg," that reflects the rays of the sun in various, brilliant colors, causing the being to appear chameleon-like. Even after death, the "carbuncle" continues to illuminate light when removed from the forehead of the creature (Adair, 1775:87, 237-238).[18] These "bright old inhabitants" appear again in the writings of Skinner (1896), but this time the carbuncle is described as a crown of dazzling brightness.

Apparently, the dangers imposed by the uktena were very serious, and even seeing one could instigate death: "On starting a journey, should one see a snake called the u-ka-te-ni, it was a sure sign of death in the family before his return" (Butrick, n.d.(a):241; Butrick, n.d.(b):103).

The Mooney archive contains numerous stories about the uktena, "The Keen Eyed", (Mooney, 1900:297) as told to him by Swimmer, John Ax, James Blythe, other members of the Eastern Band of Cherokee, and a western Cherokee referred to as Wafford. These stories contain various physical descriptions of the uktena, its origin, its interactions with people and other deities, its geographic locations, and two distinct versions of how it was killed (Mooney,

[17] Adair's use of the word "rattlesnake" is incorrect for his reference to the uktena. Giant rattlesnakes did exist, but they did not possess the strength or powers of the uktena, and their foreheads did not contain a crystal of light.

[18] After learning of the monsters, Adair then expresses his disappointment with the Cherokee men for believing the "superstitious traditions" which prevented them from showing him the place of its habitation.

1900:252-3, 297-301, 345-347, 436, 458-462). From these stories we can pick-up on certain commonalities about the uktena:

> The first creature was made from a human by the Little Men,[19] at the request of the Cherokee, to kill the Sun who hated the people of the earth for never being able to look her straight in the eyes without making ugly faces. The physical features of the uktena include a large girth—"the diameter of a tree trunk", horns on his head, a large diamond [or crystal] on its forehead, and glittery colorful scales that spark like fire along its length. Anger and jealousy of the people's reverence for the rattlesnake[20] caused the uktena to turn against the people and become bitter and dangerous. The people then requested he be sent to live with the other dangerous creatures, and he now moves through the deep places in rivers, the isolated places within the landscape, and the dark places of high mountain passes (Mooney, 1900:252-253, 297, 299).

Distinct differences exist among the Mooney collaborators on how to kill the uktena and the circumstances surrounding its death, with the stories falling into one of two categories. The first category includes the stories which attribute the death of the uktena to a Shawnee medicine man, known to the Cherokee as *Aganunitsi*, who bargained for his personal freedom from captivity in exchange for the capture and death of the uktena, and the removal of the *Ulunsuti*, (the bright stone on the uktena's forehead) and its return to the Cherokee people. In this version of the story, Aganunitsi traverses the mountain gaps in the Cherokee landscape from north to south, passing through places such as "The Lizard Place", "The Frog Place", and "The Leech Place" before finally catching the uktena at Gahuti Mountain. After discovering the creature, the

[19] The Little Men are called *Anisgaya Tsunsdi* which translates to "Thunder Boys." They are the sons of Selu and Kanati (Mooney, 1900:247-248).

[20] The swiftness of the rattlesnake saved the people from the Sun before the uktena could act (Mooney, 1900:253, 297).

Shawnee runs swiftly down the mountainside, until he can no longer hold his breath. Where he stops, he builds a circle of fire from pinecones, and inside of the circle he digs a deep trench. He then sets the pinecones on fire and heads back-up the mountain where the uktena is sleeping. Following the specific directions of the people, he shoots an arrow at the seventh spot from the head—the place of the uktena's heart, then turns and runs back down the mountain and jumps into the circle of fire. During its death, the Uktena's poison and blood (which is also poisonous) pours from the body of the snake, but the Shawnee man is protected within the fire and the fluids run into the trench. Where the blood filled the trench, a black water lake formed. The women used this lake to dye the cane for their baskets (Mooney, 1900:297-300, 461).

The second category of stories shares no commonalities with the first category. In these stories, the uktena is killed by a Cherokee boy hunter who comes upon a scene in the forest where the uktena is fighting with a man. The uktena is coiled around the man, squeezing the life out of him. The boy hears the struggle and comes to the aid of the man shooting the uktena clear through with an arrow. As it turns out, the man is actually the "Red Man of the Lightning" also known as Kanati, who then rewards the hunter with a gift of medicine—a formula to ensure successful hunting, and shows the boy how the uktena's scales can be used for healing (Mooney, 1900:300-301, 461-462).

Robert Bushyhead, an Eastern Band Cherokee born in 1917, told a version of the story similar to those of the second category in Mooney's archive. However, Bushyhead's version provides significantly more personal details and refers to the man saved by the hunter as "Thunder"[21] (Duncan, 2008:94). Bushyhead explains that the formula Thunder gives to the hunter in appreciation for saving his life from the uktena, could also be used to invoke protection

[21] Thunder is another name for Kanati.

from anything that causes harm; he had seen his mother use the formula often and knew of its power, and thus knew the story to be true (Bushyhead, n.d.)

In Oklahoma, several stories exist about the Ukten (Kilpatrick and Kilpatrick, 1964) which also fit within the first and second categories of the Mooney archive. Siquanid,[22] a Cherokee storyteller born in the early 1900s, tells a version of how a large snake transformed into the Ukten with the help of two Cherokee boys who listened to the snake and fed him after he convinced them of how weak and hungry he was. This version includes a battle between Thunder and the Ukten, and tells how one of the boys, under Thunder's direction, shoots and kills the Ukten in the seventh spot. Siquanid incorporates many Cherokee beliefs (of a sacred nature) in this version as one of "the things they told long ago" (Siquanid, 1964).

Versions of the story told by Yan'sa (1964) go into great detail and also include elements of the sacred. In one version, the Cherokee came together to decide "the right way"[23] to attack the Ukten. On the seventh day they chose a man (also referred to as a youth) to carry the weapon used for killing the Ukten. The man searched and found the Ukten, took aim, and shot him in the seventh spot. He repeated this for seven days. On the seventh day the Ukten died and the Cherokee removed the scales for the medicine they contained (Yan'sa, 1964:46-47).

In another version, Yan'sa also tells of a battle between the Ukten and Thunder similar to those in the second category of the Mooney archive. Yan'sa provides great detail of the battle. In this version, the boy shoots the Ukten, the Ukten grows weaker and Thunder grows stronger and louder, the boy shoots a second time, and the same thing happens. The fourth time, Thunder makes the loudest rumble the boy has ever heard and the Ukten dies. At the end of the story,

[22] English name, Willie Jumper (Walker, W. 2004. "Thunder and the Ukten." In Swann, B. ed., *Voices from Four Directions*. Lincoln: University of Nebraska Press, p. 357.)

[23] "The Right Way" is prevalent in the Cherokee philosophy of Duyuktv.

Thunder rewards the boy's help with friendliness and kind-heartedness towards human beings—though Thunder's sound remains fierce (Yan'sa, 1964:51-53).

In 1883, William Eubanks, an Oklahoma Cherokee, tells a version of the story that contains similarities with the elements later found in Mooney's second category of stories, and a couple of elements that are unique only to this version. According to Eubanks, the "horned snakes" were a race of snakes that lived in ancient times. These snakes were as bright and glittery as the sun and their powers of "fascination" caused all who gazed upon them to run toward them, wherein the person was quickly devoured. Only the great hunters, protected by a certain medicine, could kill these snakes by shooting them in the seventh stripe. The last of this race of snake was killed by the Shawnee man (the prisoner of the Cherokee who bartered for his freedom), who located it high up in the mountains of Tennessee. A unique element of this story is the words uttered by the Shawnee prior to killing the snake. After creating a circle of fire with pinecones, the Shawnee walked up to the snake. As soon as the snake raised its head, the man shouted, "Freedom or death!", then shot the snake in the seventh stripe before jumping into the circle of fire—safe from the poison that flowed out of the snake as it died. Four days after the killing, the Cherokees went to the place of the death and gathered fragments of the snake's bones and scales, for "good fortune in love, the chase[24], and war". A black water lake formed in the place where the snake was killed, and the Cherokee women used the water to dye "the sticks" for their baskets (ten Kate, 1889:55).

Another Oklahoma Cherokee, Dalala, born during the 1890s, tells a version of a story that contains elements later found in both categories of the Mooney archive (Kilpatrick and Kilpatrick, 1964). Dalala tells of how a deer hunter, lost in the woods, finds shelter with an old

[24] Based on similarities between the other stories, I presume "the chase" is referring to the act of hunting.

couple who then hold him captive but still allow him to hunt. During a hunt, he crosses paths with an old man and shares with him his dilemma. The old man tells him how to escape and gives him the tools necessary to do so. During his escape he comes in contact with a large river where he encounters an Ukten, who then gives the hunter a ride across the river on his back. But the Ukten's ferocity combined with his ability to spew deadly fumes and kill at will scares the people. They ask the hunter to kill the Ukten and give him specific directions on how to do so. Following these directions, the hunter makes seven fires in the direction of his escape, shoots the Ukten in the seventh spot, and then runs in the direction of the fires. When he reaches the last fire, the Ukten is dead and the hunter is safe, far enough away from its deadly fumes (Dalala, 1964).

My interview with EBCI Elder Jeremiah (Jerry) Wolfe produced another version of the uktena story. In Mr. Wolfe's version, the prisoner was a Creek Indian who bartered for his release by a promise to kill the big uktena snake, remove the crystal from its head, and bring the crystal back to the Cherokee people. The Creek Indian first travelled to Northern Alabama where he located a big, gigantic black snake, but it wasn't the uktena. He then travelled to East Tennessee where he found a gigantic watersnake, but it was harmless, and it wasn't the uktena. Finally, the Indian came back around to the local area where he found the uktena. While being careful not to gaze upon the snake, as this would be fatal, the Creek man gathered wood and laid it in a large circle, surrounding the snake. He then lit the wood at different positions around the circle, and as the flames came together, they burned the snake to death. The Creek then cut the crystal from the uktena's head and presented it to the people. The crystal itself remained alive and ended up with a medicine man who kept it for several years, feeding it to keep it alive (Wolfe, 2013).

Prior to sharing the story of the uktena with me, Mr. Wolfe first reminisced on the strength and power of the uktena, which was "so strong it made dents in the rocks as it travelled the rivers". It could also travel across the land. The uktena was extremely powerful; it didn't have to bite you to kill you, "just seeing it was death" (Wolfe, 2013). These characteristics of strength and power are echoed throughout Eastern and Western Cherokee uktena stories (Mooney, 1900; Kilpatrick and Kilpatrick, 1964; Arch, 1998), and are revealed in the landscape.

A place in the Tuckasegee River known as *Ukten'na-tsuganun tatsun yi*, "where the uktena got fastened" (Mooney, 1900) is a site where the uktena became stuck while trying to make his way upriver. In his struggles to get loose, he pried up some large rocks which are now visible in the bed of the river, and left deep scratches on others along the bank (Mooney, 1900:410). On the 1886 NC Cowee quad sheet, Mooney (n.d.) marked the spot where the uktena got fastened and gave a description of the site location. According to Cherokee collective memory, the location marked by Mooney is not correct (Holland, 2012). I have included the Ukten'na-tsuganun tatsun yi site in the initial phase of my interactive story-mapping project and have corrected the location to reflect Cherokee collective memory.

Spear Finger

Within Cherokee story-telling, two names appear for a being of similar character, *U'tlûñ'tă*[25] and *Nûñ'yunu'wĭ*.[26] Both beings possessed a spear-type finger that they used to impale victims in order to remove their livers (for consumption); both were enclosed in an

[25] Ten Kate uses the names *Uilata* and *Nayunu'wi* (ten Kate, H. 1889. "Legends of the Cherokees." *The Journal of American Folklore* 2(4):54).

[26] The Western Cherokee shorten the name to Nuy'unuw' (Kilpatrick, J.F. and Kilpatrick, A.G. 1964. *Friends of Thunder; Folktales of the Oklahoma Cherokees*. Dallas: Southern Methodist University Press, p. 59).

impenetrable outer shell made of stone; and both dwelt within Whiteside Mountain (*Sanigilâ'gĭ*). The differences, between these two beings, are seen in their physical appearance and in their choice of prey. Utlunta, most notably dressed as an old woman, preyed on children, while Nunyunuwi, usually dressed as an old man, preyed on adults—generally male adults. Equal attention is given to Utlunta and Nunyunuwi in both Eastern and Western Cherokee collective memory (Mooney, 1900).

The word Utlunta literally translates to "he or she has it sharp" (Mooney, 1900). Versions of the story equate the meaning of "sharp" with an awl or spear-like protrusion that is either located on the lower palm of the hand, or is an extension of the forefinger (Mooney, 1900; ten Kate; 1889; Terrell, 1892; Littlejohn, 1998; Wolfe, 2013). During the telling of two of the stories, Utlunta is also referred to as Nunyunuwi because of her impenetrable skin (Mooney, 1900; ten Kate, 1889). Nunyunuwi is translated to mean stone coat-on, stone-shield, stone-jacket, stone-dress, or stone-clad (Kilpatrick and Kilpatrick, 1964; Mooney, 1900; Speck and Broom, 1941; Ten Kate, 1889). Throughout the stories, Utlunta is most often referred to as Spear-Finger and Nunyunuwi's is referred to as Stone-man, Stone-Coat, or Stone-Clad. For this paper, I will refer to the beings as Utlunta or Spear-Finger, and Nunyunuwi or Stone-Coat.

When appearing in the same story or when the stories are told by the same author, Utlunta and Nunyunuwi are assumed to be a married couple who inhabit Whiteside and roam the country looking for victims (Mooney, 1900; ten Kate, 1889). When roaming about, they would not always appear as an old woman or man, but could disguise themselves as anything or anyone; their ability to speak the Cherokee language allowed them to take the form of any Cherokee not present (Littlejohn, 1998; Long, 1951; Mooney, 1900; ten Kate, 1889; Terrell, 1892; Wolfe, 2013). Stone-Coat could also make himself invisible (Long, 1951). Within

Cherokee collective memory, the stories of Utlunta and Nunyunuwi contain individual and combined elements.

Earlier stories of Utlunta and Nunyunuwi, from the 1800s, provide little detail and contain a mixture of elements that are separated out in the later stories. The earliest stories are gleaned from the Cherokee as early as 1883. Eubanks, a Cherokee and former Senator at Tahlequah, tells the story of the "Nayunuwi" or "Uilata"[27] (ten Kate, 1889); two rock-skinned beings with sharp-pointed steel hands who dressed like Cherokee and spoke the language. These beings roamed around killing children, and sometimes adults, in order to fill their hunger for human livers. The male Uilata attacked and killed hunters and other people who travelled far from their homes, while the woman Uilata used trickery, such as offering child care services, to gain access to her victims. After gaining access to a child, the woman would pierce the child's brain with her steel hand, take the liver from the child's body, and disappear. As in the story of Spear-Finger, the woman Uilata is killed with an arrow that pierces her heart. But, in Eubanks version, it is a topknot bird that first tells the warriors to aim at the heart and a jay bird that tells the warriors the location of the heart. When Uilata dropped dead, her stone jacket broke into pieces and the people saved the pieces as sacred amulets to bring good fortune in war, hunting, and in love. After the death of the female Uilata, the male Uilata leaves the area and disappears somewhere in the north[28] (ten Kate, 1889:53-54).

In 1883, Ziegler and Grosscup published a traditional Cherokee story told to them in North Carolina. According to the unnamed source, during an epidemic of smallpox, a devil, in

[27] These two names are used interchangeably by the author of the story.

[28] The Western Cherokee collaborators, who worked with Kilpatrick and Kilpatrick, briefly mention a Stoneclad being who came and went among the people. This being frightened the people, but one day it disappeared and never came back; "he was just taken away by God". (Kilpatrick, J.F. and Kilpatrick, A.G. 1964. *Friends of Thunder; Folktales of the Oklahoma Cherokees*. Dallas: Southern Methodist University Press, pp. 60-61.)

human form, was tracked by Cherokee warriors to a cave near the headwaters of the Tusquittee. Upon finding him, the warriors shot at him with poisoned arrows, but with no success. The skin of the devil was impenetrable. Laughing in ridicule, the devil simply took the arrows shot at him and threw them back at the warriors. This continued for several rounds, with no change in the results. Noticing the disheartened countenance of the warriors, a little yellow songster bird spoke to the warriors and told them of the devil's vulnerable spot; a place on one finger, that if hit, would result in instant death. The warriors shot at the devil again, but this time one of the arrows hit the fatal spot, the devil died, and the devastating plague of smallpox ceased (Ziegler and Grosscup, 1883:24).

The version of the story published in 1892, by James W. Terrell[29], a longtime friend of the Cherokee, is very similar to the version published by Ziegler and Grosscup. These are the only two versions of the story that mention a devil (or demon) associated with a sickness. The Terrell version of the story contains much more detail than the 1883 version, and as such, I believe Terrell could be the unnamed source of the Ziegler and Grosscup story.

In the detailed Terrell version, the story of "iron finger" takes place before the white men settled the area. Within a cave located on Tusquittee Mountain, was the residence of a demon with an iron finger. Within the valley of the Tusquittee, the demon would watch the homes of the Cherokee. If he saw a family member exit a house, he would immediately take on the form of the absent member, enter the house, select a victim, and lull the victim to sleep. Once asleep, the demon would use his iron finger to pierce the victim's side and remove their liver and lungs. The

[29] James W. Terrell, a friend and apprentice to William Holland Thomas, the white Chief of the Eastern Band of Cherokee, ran the daily operations of a tannery located in Quallatown, while acting as dispersing agent for the Cherokee, and substitute Chief during Thomas' visits to Washington D.C. The Cherokee of North Carolina viewed James Terrell as a life-long friend. (Godbold, E.S. Jr., and Russell, M.U. 1990. *Confederate Colonel and Cherokee Chief, The Life of William Holland Thomas*. Knoxville: University of Tennessee Press, pp. 20, 59-60.)

wound healed immediately, leaving no pain and no outward mark. After the victim awoke, he would carry on his normal daily activities, oblivious that anything had happened, but would gradually weaken and eventually die. The area around the demon quickly became depopulated causing great alarm and concern among the Cherokee. Realizing the source of the deaths, the Cherokee began a widespread search for Iron-Finger. After a time, they located his home, but none dared to enter on account of his finger. At this point, the story follows the same line as the Ziegler and Grosscup version, with a couple of exceptions: the bird who revealed the secret was a wren, and the sickness was a wasting sickness, not a plague of smallpox. The "wasting sickness" was halted for a period of time, but eventually the demon's descendants learned the ways of their father and from time to time would secure a victim of their own (Terrell, 1992:25-26).

The Nunyunuwi story presented in the Mooney (1900) archive is a version told to him by Swimmer. In this version Stone-Coat, taking the form of an old-man with a cane, walked the mountains looking for Cherokee hunters to kill and eat. The old-man's cane contained magic and he used it to not only seek out his victims, but also as a stone-bridge to cross rivers. Covered in a skin of solid rock, the man was difficult to kill. But one day a medicine-man, alerted by a hunter that Stone-Coat was headed that way, devised a plan to kill him. Seven Cherokee women were chosen to remove their clothing and line-up along the path travelled by the old-man. These women were considered unclean (according to their time of the month) and the medicine-man knew the sickness of the women would kill the old man. As the old-man passed each woman, he cried out at their terrible condition and grew weaker. When he reached the seventh woman, he vomited blood and fell to the ground. The medicine-man then drove seven sourwood stakes (sourwood was chosen based on its power over the spells of witches) through the old-man's body

and pinned him to the ground. When night came, the people piled wood around Nunyunuwi and set him on fire. As he burned, he revealed his secrets and sang his hunting songs for calling all the animals of the woods and mountains. After he was burned to a pile of white ash, the ashes were raked and underneath was discovered a magic ulunsuti[30] stone and a lump of red-clay paint. The medicine man kept the stone, for his private use, then painted the villagers with the red-clay.[31] While each villager was being painted, he could pray for one of three things: successful hunting, a specific working skill, or for long life, and the gift was granted (Mooney, 1900:319-320, 468-469).

The version of this story told by Eastern Cherokee member, Will West Long (1951), is similar to Swimmer's version, but contains much more detail. According to Long, Stone-Coat travelled between villages, secretly killing the Cherokee and removing their livers. This caused quite a stir among the people, for until that point, no one had ever died. At one village, Stone-Coat, taking the form of an orphan boy, was adopted into a Cherokee family. One by one, the family's natural sons turned up dead with their livers removed. Suspecting the orphan boy, the father approached the Chiefs' council and told them of his suspicions. They agreed the best course of action, at that point, was to observe the orphan boy and allow the medicine men to come up with a plan. After some time, and several more deaths, one of the medicine men, after discovering the weakness of the killer, approached the council with a plan to snare and destroy the killer. This plan is much the same as the one described by Swimmer, however, the cycle of the women had to occur during the full moon, and they did not completely disrobe but simply laid along the path with their legs uncovered. Stone-Coat's attraction to beautiful women aroused his curiosity and he passed by. As he did so, he began to vomit blood and grow weak. Knowing

[30] Ulunsuti is the same word used for the stone found on the Uktena.
[31] This is considered a sacred act among the Cherokee.

he was about to die, Stone-Coat instructed the Cherokee people to come together, build a fire from basswood, and surround him with it. When the fire was lit, Stone-Coat told them of the lesson they had learned, the lesson of suffering. He told them it was pre-determined they should learn "the depths of suffering and the joy of relief". He then instructed them to learn the songs he was about to sing: songs to cure the diseases he would leave behind as a punishment for killing him, songs and dances for their social life, and songs of formulas and medicines. He also told the people that his ashes would contain powerful pieces of stone that once formed the coat of his body, and that these pieces of stone would contain powerful medicines and songs to help each individual decide on a "life calling" not only for themselves but also their descendants. These medicines and songs were unique for each purpose and were filled with power that enabled each life calling to be fulfilled (Long, 1951:13-16).

The story of Spear-Finger, as presented in the Mooney (1900) archive, is quite different from the story of Stone-Coat, and is a combination of the stories told by John Ax and Swimmer, of the Eastern Band, and James Wafford of the Western Cherokee. In this version of the story, Spear-Finger, disguised as an old woman, would often follow the children as they walked the trails picking strawberries, or approach them as they played in the villages. If she caught the attention of a child, usually a little girl desiring affection, she would coax the child away, comb her hair with her spear-finger and lull her to sleep, then stab her and remove the liver. Utlunta would also enter Cherokee households, disguised as a family member or friend, where she would stab a member of the family and remove the liver, all in one inconspicuous stroke. The Cherokee were never safe from the threat of Spear-Finger. This resulted in much suspicious and caution toward each other and strangers.

To keep Utlunta from destroying everybody, the Cherokee held a council to determine a course of action. Cherokee from across the land gathered together and after much discussion a decision was made to trap her in a pit where the warriors could attack her. The people dug a deep pit in the middle of a trail, then covered it with branches and disguised it to look natural. To draw the attention of Spear-Finger, the people then set the brush on fire so it would smoke. The smoke did its job; Spear-Finger approached slowly then fell into the pit as she walked over it. The warriors immediately jumped out and began to shoot arrows into the pit, but the arrows could not pierce her skin of stone. A titmouse, perched on a tree, sang a song which the warriors interpreted as directions to shoot Utlunta in the heart. Assuming her heart was in the same place as theirs, they aimed at her chest but to no avail, the arrows simply bounced off. A chickadee then flew down and landed on Spear-Finger's right hand and the warriors realized her heart was located at the place of the awl, so they began shooting at her hand. Eventually an arrow hit the spot and Spear-Finger was killed. Since that time the Cherokee view the titmouse as a liar and the chickadee as a truth-teller (Mooney, 1900:316-9, 466-468).

In the version of the story told by Kathy Littlejohn (1998), it is a young boy who learns the secret of how to kill Spear-Finger. After helping a small bird stuck in a honeysuckle vine, the bird perches on the boys shoulder and thanks him for helping her by telling him where to locate the heart of Spear-Finger. The boy tries to tell his father, but the father is too busy helping to set the trap for Spear-Finger. He then tries to tell his mother, but before he can get the words out, Spear-Finger arrives at the scene and falls into the trap. Chaos ensues with Spear-Finger screaming and foaming at the mouth as rocks and arrows bounce off of her. At that point, the young boy decides to share his secret with the strongest warrior. He tells the warrior to look at the tip of Utlunta's spear-finger, and there he would see her heart. The warrior listened to the

boy, looked for the place on the tip of her finger, shot it with an arrow, and killed Spear-Finger. After that, the boy became a hero among the people and they listened to him (Littlejohn, 1998:62-66).

Cherokee Nation Elder, and former Deputy Chief of the Cherokee Nation, Hastings Shade, tells a story of Spear-Finger that contains combined elements of Spear-Finger and Stone-Coat. Using modern day terminology, Shade refers to the being as a female witch, a very mean conjurer who used her spear-finger to get "into the liver and heart of humans". The Cherokee wanted to get rid of her because she was the only one who knew these things—"the only one who had that learning". At this point in Shade's version of the story, elements of the Stone-Coat story appear. A medicine man is consulted who tells the people, the only way to get rid of Spear-Finger is through the aid of seven menstruating women. Spear-Finger, passing by the women, grows weak and is overtaken by the Cherokee men who tie her up and throw her in a pit of fire. As she burns Spear-Finger chants the secrets of medicine, both good and bad, and the people listen, and learn (Teuton, 2012:238).

During my interview with Eastern Band Cherokee Elder, Jeremiah Wolfe, he referred to Spear-Finger as Nuyv unawi, and interpreted the meaning as "clothed in stone". Mr. Wolfe also referred to the being as a disguiser capable of disguising itself however it wanted—for instance, a grandma or a grandpa. According to Mr. Wolfe, it was a child, a little girl, who lured Spear-Finger into the trap. After killing Spear-Finger, the people gathered wood and brought it to the site. They began to burn the body and as it burned, the fire started singing. It sang songs, sacred songs, songs for curing, for healing, for medical purposes; it sang all those songs, and all the way was good, everything was good. But when midnight came, the songs changed. They changed to

evil, the fire sang out evil songs as it burned and the people learned the evil as well as the good. Evil came into the world through the burning of Spear-Finger (Wolfe, 2013).

The extent of the area travelled by Utlunta and Nunynvi in search of their victims is revealed in the Mooney archive (1900:317, 319, 467). Pointing to the mountains of the area, these stories explain how Nunyunuwi was partial to walking the ridge lines, while Utlunta sought out the heads of streams and the dark passes of Nantahala. One of her favorite places on the western side of the mountain range is a gap where the trail along the Chilhowee Mountain descends to the river. And in Blount County, Tennessee, near the mouth of Citico creek is a place called Utluntunyi which translates to "the sharp-finger place", named by the Cherokee in response to the frequentness of Spear-Finger's visits to that site. At some point in time, Spear-Finger devised a way to traverse the ruggedness of the Cherokee country more easily; she attempted to build a bridge through the air (Mooney, 1900:467). Using her extraordinary strength, Spear-Finger picked up huge rocks and banged them together, cementing them in place. She began the building process on the top of "Tree Rock" (*Nûñyû´-tlu'gûñ'yĭ*) near the Hiwassee River, and worked her way towards Whiteside Mountain, but before she could finish, lightning struck the bridge and scattered the rock fragments across the ridge. These fragments are still visible today.

Other than circling the location of Whiteside Mountain in red, Mooney (n.d.) did not provide any additional field notes or map notations on the 1886, North Carolina Cowee quad sheet. Mooney's report to the Bureau (1900) and Cherokee collective memory have verified Whiteside Mountain as the home of Spear-Finger and Stone-Coat; I have included this location in the first phase of my story-map project.

Leech Place

The Leech Place is a story-site that many North Carolina Cherokee are familiar with. The details of the story may not be well-known, but community members do know that somewhere near Murphy there is a place on the river where a big leech once lived. Mooney (n.d.) does not provide a location for the Leech Place site on the 1886 TN NC Murphy quad sheet, but he does mark the Murphy town-site. In other Cherokee Site notes (Mooney and Walker, n.d.) Mooney does reference Tlanusiyi "Leech Place" as a former important Cherokee settlement (Table 3), and in his report to the Bureau (Mooney, 1900) he provides several stories and references about "The Great Leech of *Tlanusi'yi*".[32] Tlanusiyi is located in a section of the Valley River that runs through Murphy, North Carolina. Near the mouth of the river is a deep hole, bordered on one side by a large rock wall and on another side a natural rock ledge that people once used to cross the river.[33] Mooney recorded the stories of the leech as told to him by Swimmer and Chief Smith of the Eastern Band of Cherokee, and James Wafford of the Western Cherokee. [34]

According to Swimmer and Chief Smith, a red and white striped leech lived in deep hole in the Valley River. Seen only one time by some men of the nearby village, the Leech was described to be as big as a house, when it was rolled up, and when it unrolled; it spanned the length of the rock. The motions of the giant leech moving about in the deep pool of water, caused the water to stir like an angry, foamy sea, and also caused water spouts to rain down and large waves to sweep across the area. These waves often caught unsuspecting passersby and carried them down into the water. Their bodies would later be found on the banks with their ears and

[32] "Tlanusiyi" (also called Tsanusiyi) translates to "leech place".

[33] The damming of the Hiwassee River now causes the Valley River to back-up, making it difficult to see the rock ledge that once protruded out of the water.

[34] Mooney also refers to "others" as confirming the story but does not reveal who the others are.

noses eaten off. This caused great turmoil among the people of the nearby village, and they began to fear the place and avoid crossing the river.

A young man, who scoffed at the stories of the Leech and discounted the warnings of his elders and fellow community members, decided that he alone could save the people from the monster. Preparing himself for war, he dressed in his finest buckskin and decorated himself with paint. He then sang a warrior/victory chant as he made his way to the river. When he reached the river he continued walking across the rock ledge. About half way across, the water began to swirl and foam. Before the young man had a chance to react, a huge wave swept across the area and the young man was never seen again (Mooney, 1900:329-330, 474).

James Wafford, adding to the stories surrounding the Leech, tells of two young women who ignored the warnings of their friends concerning Tlanusiyi. The story dates to 1838, just before the Removal. One young mother, tired of eating "the fat meat" [35] convinced her friend to go fishing with her at the place of the leech. Stopping on the rock ledge that crosses the river, the mother sets her baby down so she can prepare her line. After a few moments, a wave swept over the ledge. The mother barely had time to grab her baby before it was pulled into the water and thankfully, the three of them were able to escape with their lives (Mooney, 1900:330, 474).

Wafford also told Mooney the Leech had wings and could fly and told him of an underground waterway which connected Tlanusiyi on the Valley River with a second Tlanusiyi on the Nottely River (Mooney, 1900:474-475). Apparently this underground water tunnel allowed the Leech (or leeches) to move back and forth between the two areas. The underground

[35] This exclamation made by the young woman is significant as it points to a time when the Cherokee people were in holding camps, waiting for Removal. During this period of holding, everything about Cherokee life was disrupted. Conditions were deplorable and food was rationed. Cherokee, accustomed to a diet of fresh fish, wild game, vegetables and fruits, were reduced to eating cakes of ground meal and pork—an exceptionally fatty meat.

connection between the two locations is mentioned by Lanman in 1849, where he describes the experiment conducted by the locals to prove its existence—a marked log, placed purposely in the Nottely pool, was successively found floating in the Valley River pool (Lanham, 1849:64).

The version of the story told to me by Jeremiah Wolfe (2013) begins with a family walking along a trail that followed the [Valley] river. While they were passing the "deep hole of water", something came up out of the water and "snatched up" one of their children. After this event, people weren't allowed to walk that part of the trail any longer and had to take a detour. No one was allowed to go to that hole of water, especially the children. But one morning, two brothers, about 12 and 14 years of age, took their dad's canoe to go fishing. They rode the river to the big hole of water and crossed it, hoping they would see what was in the water. After crossing, they climbed the rock cliff on the side for a better vantage point of the hole, but they still didn't see anything. While climbing back down the cliff, one of the boys noticed a large boulder perched on the top of the cliff. The boys climbed up to it and after examining it, decided they would come back the next day and somehow roll the boulder into the hole of water to see what would happen.

The next day, they returned to the boulder. They decided to make the boulder white-hot before rolling it into the river. So they gathered up some wood, built a fire, and heated up the rock. When it turned white-hot, they pried it loose with some poles and it rolled down into the hole, boiling the water. The boys stood at the edge of the cliff, watching the water boil. Suddenly a big body floated to the top of the water and was carried a little ways downstream where it lodged in the shoals. The body was so large it covered the river. Then a second body, just a little smaller than the first, floated up and was carried to the shoals where it joined the first body. The boys waited, but no more bodies came up, so they headed home. When they arrived, their dad

was waiting on them. Somehow he knew they had been at the big hole of water, the forbidden place, and he was set on punishing them for their disobedience. The boys convinced their Father to listen to their story before deciding punishment. He listened and after hearing what they had to say, he headed to the river to see if they were telling the truth; the boys followed close behind. When they arrived at the overlook, the Dad saw the big orange bodies lying across the river, just the way his boys had told him. His boys had told him the truth, they had killed the leeches, using the skills that came naturally to them; they had accomplished a "big job". Mr. Wolfe then explained that those who know the language refer to this place as Tsanusiyi (Wolfe, 2013).[36]

While visiting the Valley River site, I saw the cliff where the boys had rolled the rock into the deep hole of water. And although the area was flooded, I could make out the rock ledge that was once used by the Cherokee to cross the river. The Tsanusiyi Valley River site is included in the first phase of my story-map project.

Kituwah

Several theories exist concerning the origin of the Cherokee. These theories are generally based on studies conducted by ethnohistorians, archaeologists, and other scholars (Dickens, Jr., 1979). The majority of these theories conclude that the Cherokee originate from somewhere other than the place we call our homeland. Within Cherokee collective memory, four stories remain which address the issue of origin (Teuton, 2012). Two of these stories include elements of migration, and depending on the version of the story, the migration takes place from either the

[36] Mr. Wolfe told a more in-depth version of the story to Ken Blankenship, Director of the Museum of the Cherokee Indian. This detailed version is printed in the *Cherokee Heritage Trails Guidebook.* (Duncan, B.R. and Riggs, B.H. 2003. *Cherokee Heritage Trails Guidebook.* Chapel Hill; University of North Carolina Press, pp. 179-181.)

upper world or star-world, or from a sinking island (Teuton, 2012). The other two stories do not include elements of migration.

The first of the non-migration stories attributes the origin of the Cherokee to a meeting of the Great Council of the sky world. In this story, the three beings of the Great Council, decided to create a place for their permanent home. They begin with the world one level below the sky. After three attempts, they create a place that was just right for habitation, in the third world below the sky. The beings then absorb themselves into a single spirit-man, prior to inhabiting their newly created world. Upon habitation, the spirit-man creates a beautiful landscape, and then creates a man and woman from red clay. The beautiful place is the Cherokee homeland and the red people are the Cherokee (Buttrick, 1884; Foster, 1899).

The second non-migration story is an emersion story of the Cherokee people from the land they call home. The "lower-town" Cherokee speak of a time long ago when the people awoke and crawled out of a hole in the ground (Foster, 1899). A prayer given in 2002, by Cherokee Elder Benny Smith, addresses the seven directions and contains a passage for the "down" direction, and expresses gratitude to the "way of the low" for "calling us out of the Earth" (Smith et al., 2010). This act of emersion is linked with the Cherokee word Keetoowah (or Kituwah)[37, 38] which literally translates to "coming to the top or coming out" (Teuton, 2012: 40). According to Cherokee traditionalist Hastings Shade, as the people emerged, the Creator gave them the name Keetoowah and from that day forward the people were called the Anigidui

[37] Kituwah, pronounced Gadoowuh, is the spelling used by the Eastern Band of Cherokee. Keetoowah, pronounced Kitoowuh, is the spelling used by the Cherokee of Oklahoma. Both words have the same meaning and I will use the version of spelling associated with the story-teller.

[38] Kituwah is referred to as "Kitlawah" in the 1746 Journal of Cherokee Agent George Pawley. (Pawley, G. 1746/7. "A part of A Jurnell of my Agency to the Charokees." *Journal of Cherokee Studies* 26(1991):11-20.)

(or Anikituwahgi)—the people from the place of coming out or coming to the top (Teuton, 2012). This non-migration belief held by the lower-town (or Underhill) Cherokee is validated through prehistoric archaeological evidence that confirms Cherokee culture from the lower-towns is indigenous to the area (Dickens, Jr., 1979; Sears, 1955). Although the emersion story is generally associated with the lower-town Cherokee, the name Anikituwahgi is typically associated with the middle-town Cherokees.

The lower-town Cherokees also placed Tugalo (also known as Tugaloo and Tugala) at the center of Cherokee culture. According to Sickatower, one of the oldest men in the Cherokee Nation around the time of Removal, the "seven mother towns" of the Cherokee, were the original towns of the Nation. Of these mother towns, "Tugala" was known as the "most beloved & head town" of the Cherokee and was the place where the "Old Man of Heaven" brought down the sacred fire and the "Ancient of Days", the "progenitor" of the Cherokee people and culture. When the Old Man brought the fire down, he designated Tugala as the keeper of the sacred flame, instructing the people to continually maintain the fire and never let it die (Payne, J.H. n.d.:119, 129). Tugalo Mound and Town are located on the southwestern bank of the Tugaloo River, near the mouth of Toccoa Creek in present day Georgia (Williams, 2008). In 1960, the river was dammed and with the exception of extreme draught, the Town side is under water while the Mound site protrudes through the top of the lake, giving the appearance of an island (Williams, 2008).

Located within the middle-town area of the Cherokee homeland is a place called Kituwah Mound. This place is significant to the people for many reasons. It was one of seven Cherokee

mother towns (Cummings, 1830), and the main settlement for the Anikituwahgi[39] (Mooney, 1889). The town of Kituwah was considered a "Peace-Town"—a place where someone could go to avoid punishment for committing a crime (Holland, 2012b), but because of its strategic location, the members of the Peace-Town were the main line of protection for the Nation and were responsible for defending against invaders (other Tribes and English Settlers) from the North (Hendrix, 1983). The area of Kituwah was also the home of Yonaguska (or Yanagunski), one of the most influential Cherokee chiefs during the time of Removal (Mooney, 1900). The actions and council of Chief Yonaguska were instrumental in the decision of some Cherokee families to acquire "removal exemption status" and brave the hardships confronting them in order to remain in a portion of the Cherokee homeland—a portion that later became the core of the Eastern Band of Cherokee Indians (Bird, 2003). I believe it was the importance of the Kituwah site which impelled Yonaguska to remain, for in addition to the reasons mentioned earlier, the most significant aspect of the Kituwah Mound is its' role in Cherokee culture. The Kituwah Mound is the birthplace of the Anikituwah[40] (Belt, 2011; Duncan and Riggs, 2003; Holland, 2012; Townsend, 2003; Wickliffe, 2012).

Throughout the Mooney archive, the Kituwah Mound is mentioned several times. It is described as an ancient town no longer in existence, which was still honored during ceremonial occasions, had a history of producing the most culturally traditional members, and was considered the "original nucleus of the tribe" (Mooney, 1900:15, 225). A better understanding of

[39] Recent archaeological investigations evidence Kituwah as "the largest continuous village and mound complex in western North Carolina", confirming the significance of the site to the Cherokee people. (Riggs, B. H. and Shumate, S. M. 2003. *Archaeological Testing at Kituhwa 2001 Investigations at Sites 31Sw1, 31Sw2, 31Sw287, 31Sw316, 31Sw317, 31Sw318, and 31Sw320*, report prepared for the Eastern Band of Cherokee Indians Cultural Resources Program. Chapel Hill, NC: University of North Carolina, p. 73.)

[40] Anikituwah translates to "the people of Kituwah" and is often used among the Cherokee people of North Carolina.

the importance of Kituwah in Cherokee society requires a return to oral tradition. Over the past few years, I have overheard conversations and discussions about the Kituwah Mound and from this I pieced together a generalized history of the site. According to tradition, it is at the Kituwah Mound where the Cherokee first received their cohesiveness as a people group (Holland, 2013; Riggs, 2012, 2013a). A long time ago, Cherokee holy-men came together and went to the top of what is now known as Clingman's Dome, where they received the laws of governance, ceremonial instructions and the fire of life—the eternal flame of the Cherokee (Wickliffe, 2012). The Kituwah flame was kept burning by the Fire-keepers; it was not allowed to go out (Townsend, 2003). During ceremonial times, runners were sent to Kituwah Town for hot coals (fire starters) to carry back to their communities.[41] In the late 1700s, Kituwah Town was destroyed by the English invaders and the eternal fire was moved to another sacred Cherokee town, but some say the fire still burns deep within the mound (Townsend, 2003). During the forced emigration, the eternal flame went with the ceremonial grounds Fire-keepers to Indian Territory and burns to this day (Hamilton, 2005).

While conducting research in Cherokee, North Carolina, I met with a Cherokee Elder who provided more detail to my limited understanding of the place of Kituwah. According to the Elder, prior to being called Cherokee, seven persons from seven towns had visions which told them to go to the top of the Dome. This happened independently, and upon arrival, each one was surprised to see the others. Once all seven were gathered, they received fire at the Dome and laws for the people. After receiving the fire, the seven did not know where to house the fire, but

[41] According to Cherokee tradition, the ashes contain the sacred essence of the Kituwah fire. (Riggs, B. H. and Shumate, S. M. 2003. *Archaeological Testing at Kituhwa 2001 Investigations at Sites 31Sw1, 31Sw2, 31Sw287, 31Sw316, 31Sw317, 31Sw318, and 31Sw320*, report prepared for the Eastern Band of Cherokee Indians Cultural Resources Program. Chapel Hill, NC: University of North Carolina, p. 72.)

they saw a rainbow. They decided to house the fire at the end of the rainbow. They followed the rainbow and it led them to the place now known as the Kituwah Mound. This became the beginning of a more unified culture; the Cherokee culture (UCE, 2013).

Archaeological studies conducted at the Kituwah Mound site, estimate close to ten thousand years of continual habitation (Pluralism Project, 2004). But the Mound today looks very different from the Mound of old. Between 1820 and 1996, the Cherokee did not have ownership of the Mound site, and during this period of time the Mound was disked and reduced in size from approximately fifteen feet to five feet in height (Duncan and Riggs, 2003).[42] However, the Mound is still revered by the Cherokee people. Ceremonies are once again performed at Kituwah, Cherokee people from all over the country regularly visit and pay homage to the birthplace of the Cherokee, and annually, a Kituwah celebration and mound building event takes place on-site.

On the 1886, NC Cowee quad sheet, Mooney (n.d.) marked the location of the "Kituwha" mound and simply referred to it as an abandoned settlement of the Cherokee where prisoners used to be released. He also described the location of the mound and former dance ground, and the current condition as being planted in corn (Mooney, n.d.) The Cherokee Site notes (Mooney and Walker, n.d.) briefly mention the importance of the place (Table 3). Basing my decision on Cherokee collective memory and the importance of the site to the Cherokee people, I chose to include the Kituwah Mound site in the first phase of my Cherokee story-map.

[42] The plowing and disking of mound sites throughout the U.S. was (and still is in some cases) a common practice among farmers attempting to level their fields for agricultural production. (Saunders, J. 1996. "Speeding Ahead of the Plow." *The Delta Endangered*, Spring 1996, 1(1). National Park Service, U.S. Department of the Interior, Archeology Program, Online Archive. [cited July 7, 2013]. Available from http://www.nps.gov/archeology/cg/vol1_num1/speeding.htm.

Table . Mooney field and map notations. (Mooney, n.d. Manuscript 3318, National Anthropological Archives, Smithsonian Institution) and (Mooney and Walker, n.d. Manuscript 2425-b, National Anthropological Archives, Smithsonian Institution).

Five Focus Sites - Mooney Maps and Field notes		Quad Sheet	type of marking on front	comments on map and location of comments	transcription of field notes	Additional transcription notes
1	Judaculla Rock	NC Cowee	small circle labeled JROK	none	none	Cherokee Sites: Jutaculla Rock - Head of Tuckaseegee R. Jackson Co. N.C. north bank Cany Fork about 1 mile above Moses Cr. Soapstone slab with rude carvings (petroglyphs?)
		other markings and notes for Judaculla on NC Cowee quad sheet:			#23 - Tsudikalui - on north bank opp. #22 "where he (Tsudikalu) urinated" yellow rock in river with round hole, about 1/2 mile above Deep Cr. (it is said, was so made.)	
					#24 - Tsulaginui - "where the foot print is". Short distance below #23, because of rock there and print of foot and deer, track Tsulkalu and a deer. Now blasted our by RR.	
2	Kituwah Mound	NC Cowee	pyramid shape, 17	field notes on reverse side	mound between RR (railroad) and river about 3/8 mile below creek #15, now planted in corn. Plain from Railroad. Prisoners released there, in old war, by Cherokees, below at bend in river called Gakatiyi "place to set free". Later, settlement there, abandoned in 1819. Dance ground was below mound and near railroad.	From Cherokee Sites: #50 - Kituwha - (Kettooah, Kittowa) Important settlement on Tuckaseegee R. extending from above junction of Oconaluftee down nearly to Bryson City (Charleston), Swain Co. N.C. Mound From Swain Co.: 50 - Kituwha - Settlement on Tuckaseegee R. from Oconaluftee R. to Charleston - Mound opened by Valentine (?)
3	Ukten'na-tsuganun tatsun yi	NC Cowee	marked on map as 16*		Tsuganutatsui - "where it (uktena) got fastened" Story. About 1/2 mile below last creek, rock marks on river bank, sometimes covered by water. (They say Uktena was going down river in straight course and got caught here at bend and could not pass.)	
	*location marked by Mooney does not line-up with Cherokee collective memory which places the location of the event approximately 1/2 mile down river.					
4	Leech Place	TN NC Murphy	town site marked	none	none	From Cherokee Sites: #93 - Tlanusiyi - "Leech Place". Former important settlement at junction of Hiwassee and Valley R. present site of Murphy, N.C. Cherokee Co. From Cherokee Co.: 93-Tlanusiyi-Settlement on site of Murphy
5	Spear Finger - Whiteside Mountain	NC Cowee	Whiteside mountain circled in red	none	none	

CHAPTER FIVE

CONSTRUCTION OF AN INDIGENOUS HISTORICAL GIS

When I began this project, I envisioned two digital story-maps, one in Cherokee and one in English, where viewers would choose a language version, then open the finished map (online) and maneuver through the homeland of the Cherokee, while zooming (changing the map scale) in and out across the landscape. The map would initially open to a spherical world view centered on a Cherokee artistic representation of the Cherokee homeland. The view would then automatically zoom to the scale-level of the Cherokee homeland where the viewer would enter and examine a "Natural-Earth" type rendering of the landscape. Upon activating a pre-determined scale level of the scene, icons would appear on the map; these would be the locations of the story-sites. The viewer, attracted to the "glowing" icons, would then click on a site. Once the icon was activated, it would instantaneously open a new window containing a background scene composed of either lidar or a blend of lidar and imagery, with the coordinates for the site appearing in a lower corner of the scene. The ground sites would provide a 360 deg view and the larger sites would provide a fly-though view. Another glowing icon, embedded within the background scene, would activate an animated story-teller who would then tell the story of the site. I envisioned the story-teller as a simple animated flame, or fog, flickering or waving in and out as the story was told. While listening to the story, the viewer could continue maneuvering throughout the background. At the end of the story, the story-teller would disappear, the scene would close and the viewer would automatically be taken to the pre-set zoom level of the story-site icons.

To create such a map, I needed to work with software that could provide 360 degree viewing; user controlled zooming capabilities; and the tools to create animation with embedded audio files. Many programs exist that provide the tools necessary to create animated audio scenes, but these types of software do not yet work within GIS mapping programs. The only mapping platform I found that could facilitate some of what I had envisioned was Google Earth. In Google Earth, I could create a pop-up for the background scene, and within that background, create another pop-up for the scene with animation and audio. However, the end product was clumsy, looked awkward, did not flow smoothly, and did not contain many of my desired elements. Also, after speaking with the Supervisor of the Eastern Band Cherokee Cultural Resources Department, I was informed that Google Earth was not an acceptable platform for this culturally sensitive map, and so I could not use it for this project. After reading the Google Terms of Service [1] I understood his reluctance to use a Google platform and agree with his decision.

While reviewing and experimenting with the various software applications, I realized I did not possess the programming and graphics skills necessary to implement such software. After

[1] By using Google Earth software, the user agrees to be bound by the Google Terms of Service. The Google Terms of Service "Your Content in our Services" section, states that content uploaded or submitted to any Google Service gives Google, and those they work with, "a worldwide license to use, host, store, reproduce, modify, create derivative works (such as those resulting from translations, adaptations or other changes we make so that your content works better with our Services), communicate, publish, publicly perform, publicly display and distribute such content. The rights you grant in this license are for the limited purpose of operating, promoting, and improving our Services, and to develop new ones. This license continues even if you stop using our Services (for example, for a business listing you have added to Google Maps). Some Services may offer you ways to access and remove content that has been provided to that Service. Also, in some of our Services, there are terms or settings that narrow the scope of our use of the content submitted in those Services. Make sure you have the necessary rights to grant us this license for any content that you submit to our Services." [cited July 7, 2013]. Available from http://www.google.com/help/terms_maps.html, and http://www.google.com/intl/en/policies/terms/).

letting go of the vision in my head, I began to explore other options and tools for creating my digital story-map.

I returned to the basics of my project, to create an interactive map that was simple and easy to control, flowed smoothly between sequences and gradients, produced an engaging visual and audial presentation, provided downloadable geographic coordinates for site visits, allowed viewers to upload pictures taken at the sites to a designated site-visit section of the map, and most importantly, was housed on a secure platform that allowed the Eastern Band Cherokee to regain full control and ownership of the map elements and the intellectual property associated with the map content. These priorities led to my decision to use ESRI's ArcGIS Explorer as my mapping platform and ArcGIS online as the vehicle for accessing the content (as allowed by the EBCI Tribal GIS and Cultural Resources Department).

ArcGIS Explorer (ArcExplorer) provides an uncomplicated user interface for viewers of all ages. ArcExplorer also provides 2d and 3d map viewing options. Since the story-map revolves around the Cherokee homeland, I set the view to 3d, centered the world view on the homeland, then set the view as the default when opening the map. Next I created a 'Background' folder and added the following items: a shapefile of the homeland (set to hollow), the Tribal Seals of the Cherokee Nation, Eastern Band Cherokee, and United Keetoowah Band[2], and a text-file for the title—"Cherokee" in syllabaric format. I then created two re-set views, a Cherokee World View (Figure 35) and a Cherokee Homeland view (Figure 36), and placed them at the top of the Contents window. I created a second folder for the story-sites and uploaded the GPS waypoint coordinates to the folder in GPX format, and then created an All Cherokee Story-Sites

[2] I had previously clipped the seals, using a circle polygon, and georeferenced them in ArcMap for creative placement in the scene—not for coordinate value.

view (Figure 37) and placed it in the folder. I set the story-site labels to hover so they will appear if the viewer hovers near or clicks on the story-site icon.

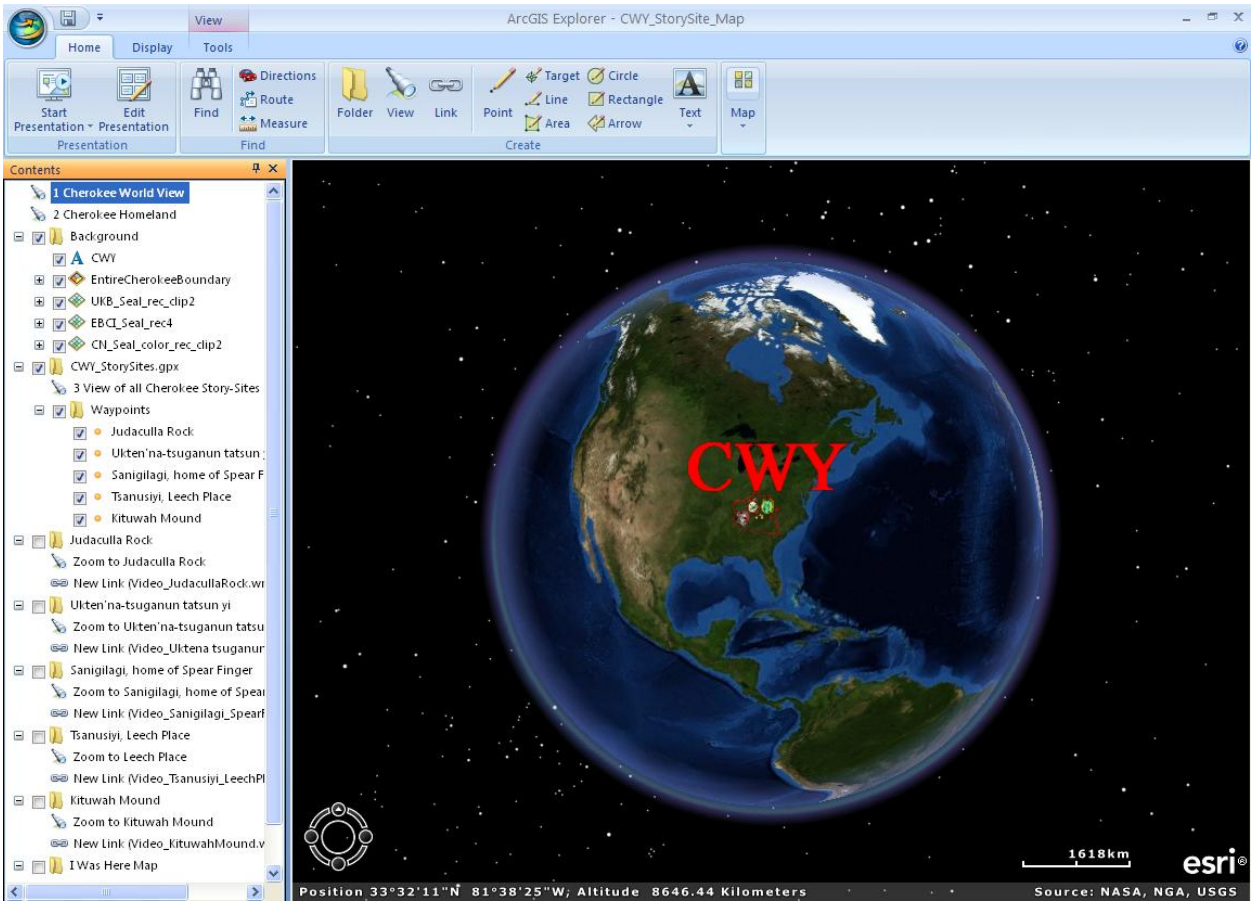

Figure . ArcExplorer, Cherokee world view.

I created folders for each story-site, then created a zoom-level view and video link for each story-site and placed these items in the corresponding folder. The result is a simple navigation through the sequence of folders. The viewer simply clicks on view links or video links; there is no need to turn layers on and off. Because the map is set to 3d view, the user is able to enter into the map scene and control the tilt and viewing angle of the Basemap imagery while the video is playing (Figure 38). This feature will allow viewers to peruse the landscape,

encouraging repeat views of the story-sites within the map. Another feature of the map allows viewers to download site coordinates. When the viewer zooms to the level of a story-site,

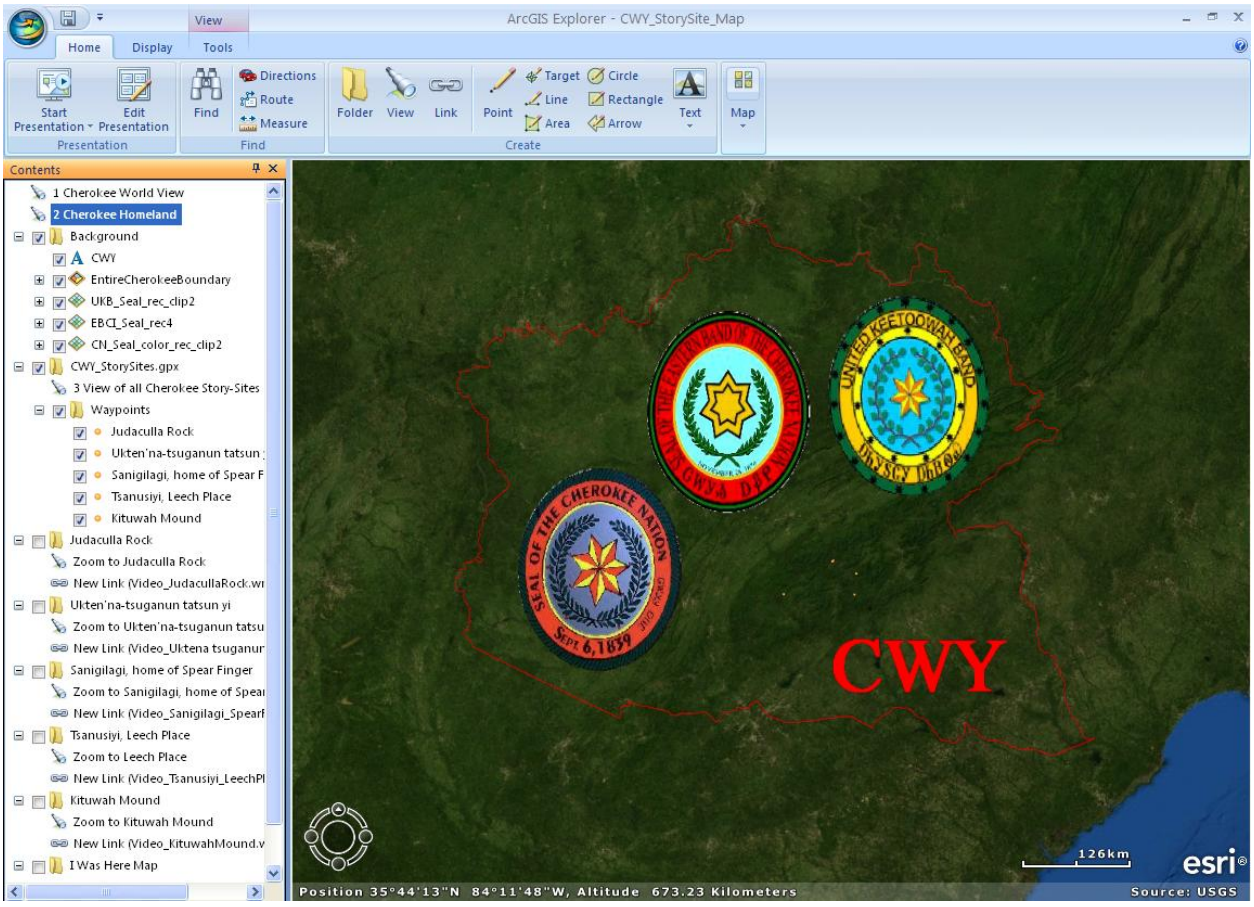

Figure . ArcExplorer, Cherokee Homeland view.

clicking on the story-site icon brings up a window (Figure 39) that contains site coordinates and an email option for downloading them.[3] This window also has an option for locating the item in the Contents window. This feature is useful for locating the video link connected with the site, especially when the list grows to several hundred story-site locations. When uploaded to ArcGIS online, the story-map will be loaded as a read-only map; changes made by viewers will not be saved.

3 This feature can only be activated by loading the coordinate data in GPX format, it will not work if the data is loaded as a shapefile.

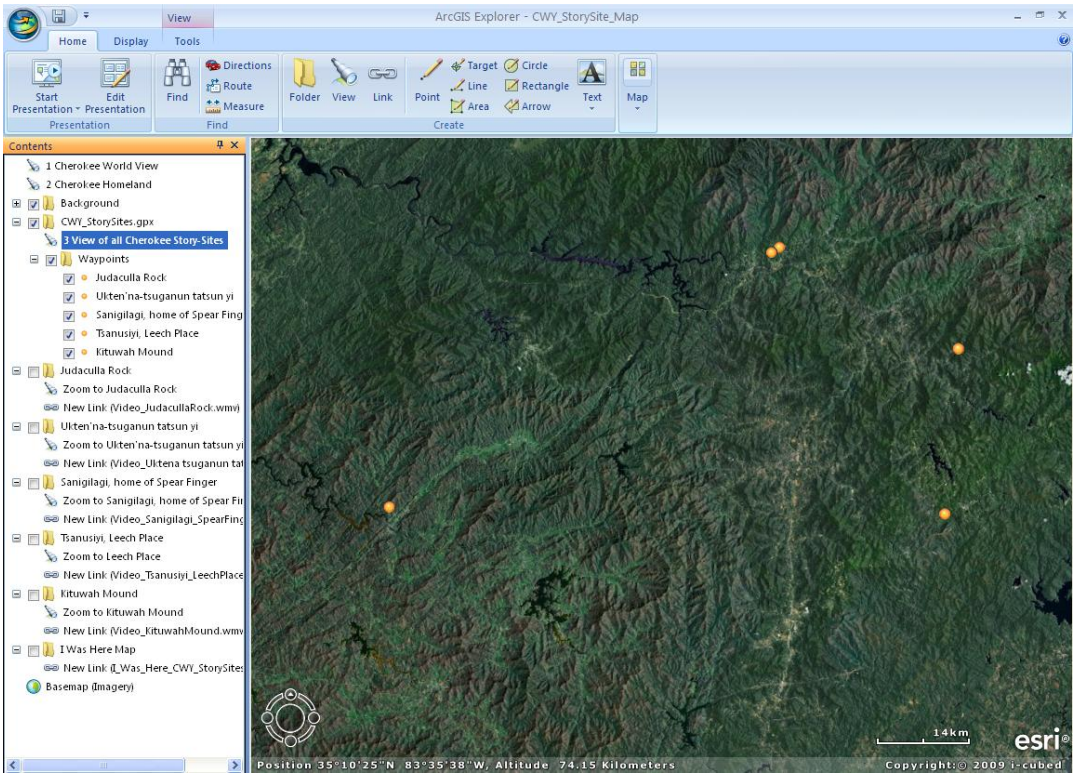

Figure . ArcExplorer, all story-sites view.

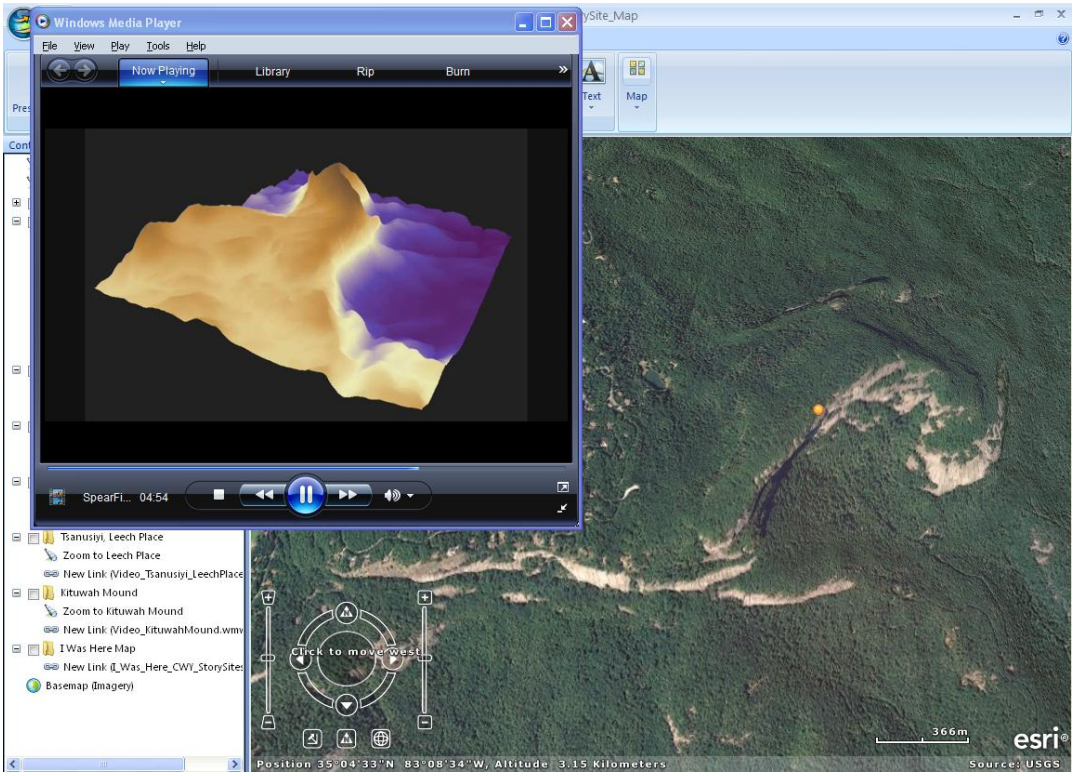

Figure . ArcExplorer, example of story-site video over the 3d map with zoom, tilt, and viewpoint controls.

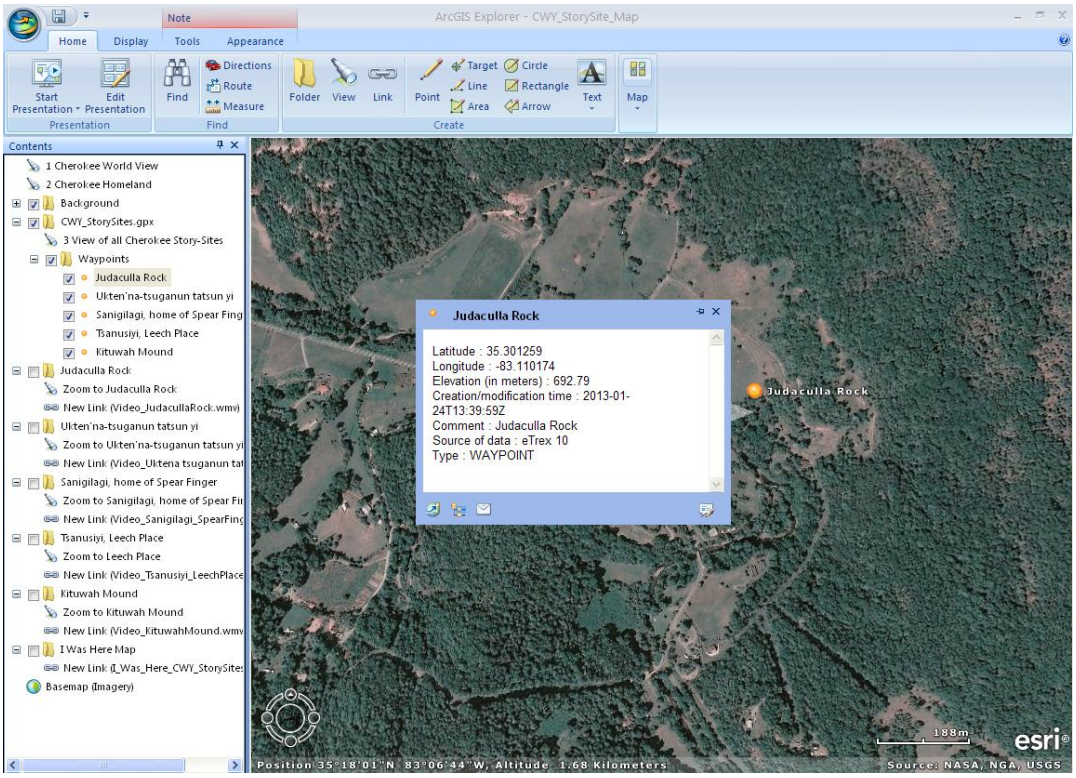

Figure . ArcExplorer, example of pop-up window with waypoint coordinates.

The last folder created and listed in the Contents view of the map, is an “I was Here” folder. Under this folder I created a link to a separate 2d ArcExplorer map with the default view set to the homeland (Figure 40). In this map, viewers can upload images of their site visits (Figure 41). If the images are captured on a smart phone, tablet, or other device with GPS activation, the images will load as geo-tagged files to the location of the site in the map. If the images are captured in a non-GPS active format, then the viewer can first zoom to the site on the map, then upload the image and select the option to automatically geotag the image to the screen shot. Once the image is in place, it will appear in a pop-up window when selected. The image layer will automatically save to the top of the Contents window. This requires manual movement to the site folder. This is accomplished by either dragging it into the corresponding site folder or using the ‘Move to Folder’ option under the Tools tab (Figure 42). Since the purpose of the map

is to encourage site visits, The “I Was Here” map contains minimal files: the shapefile for the outline of the homeland, a text file for the title, and the story-site waypoints GPX file (the site points are represented by mini EBCI Seals), leaving plenty of space for geotagged images. This map will allow users to save the map contents after images are added.

Although the presentation may not provide the immersive environment I hoped to achieve, it does provide an interactive environment. Returning to the basics of my project helped me to focus on the important aspects of the Indigenous Historical GIS.

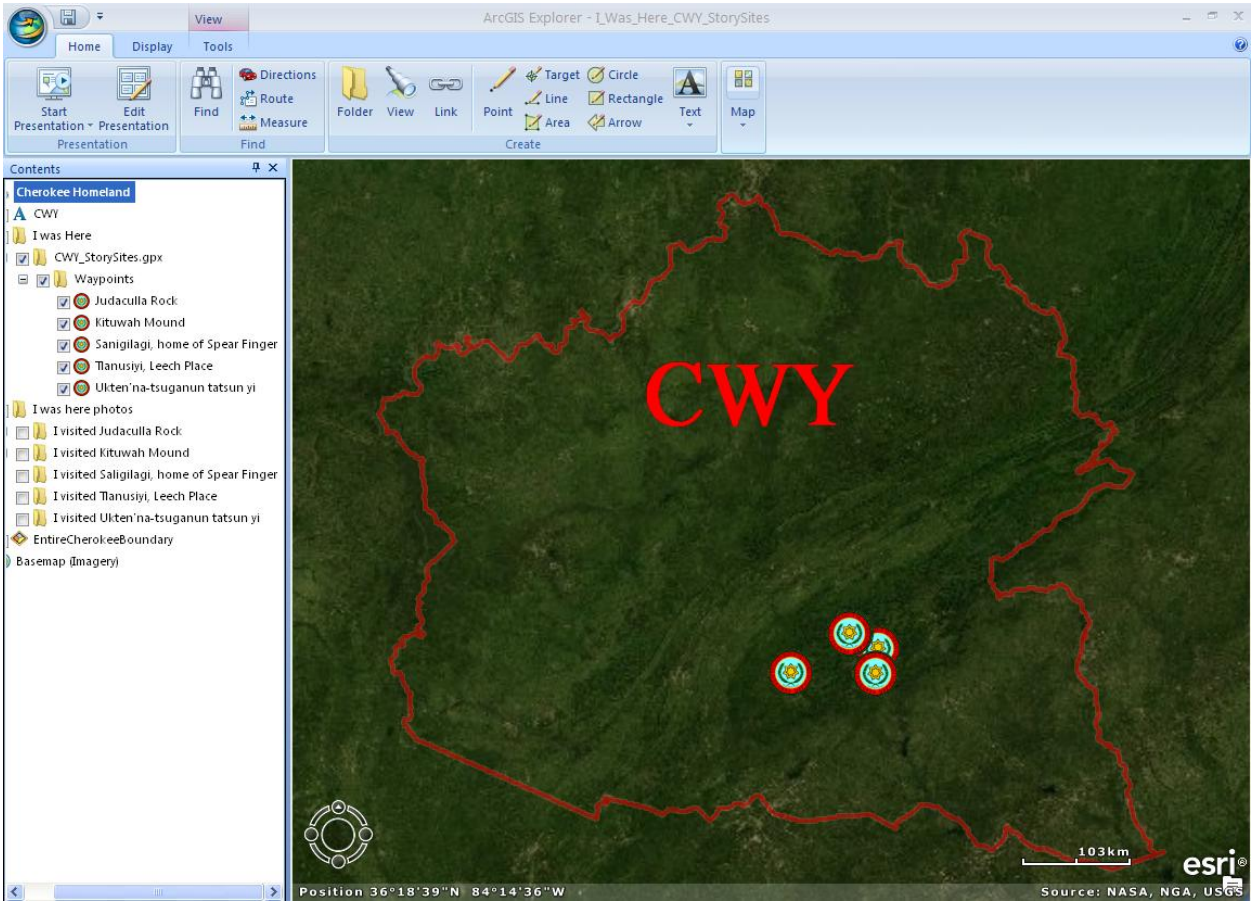

Figure . ArcExplorer, “I Was Here” linked map.

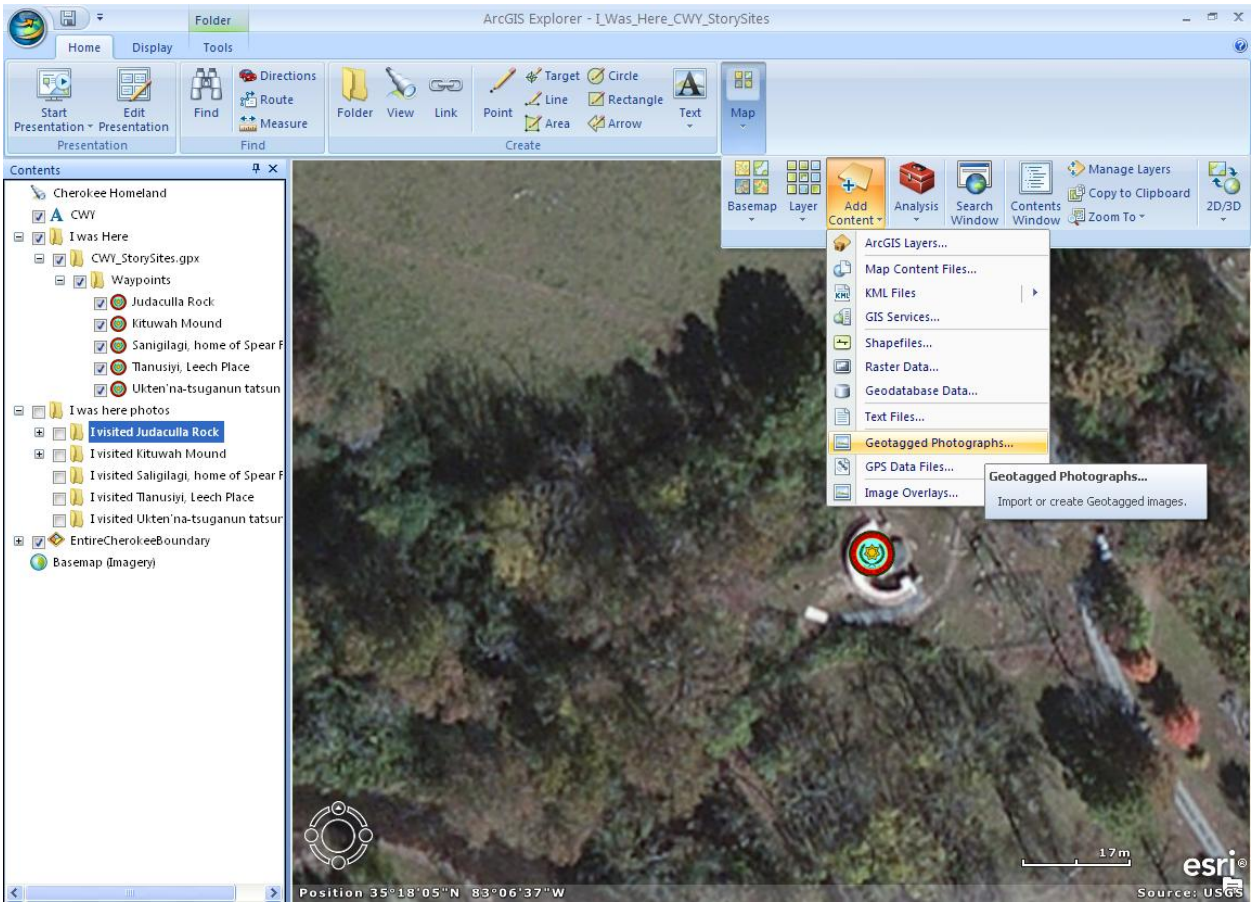

Figure . ArcExplorer, uploading images to I Was Here map.

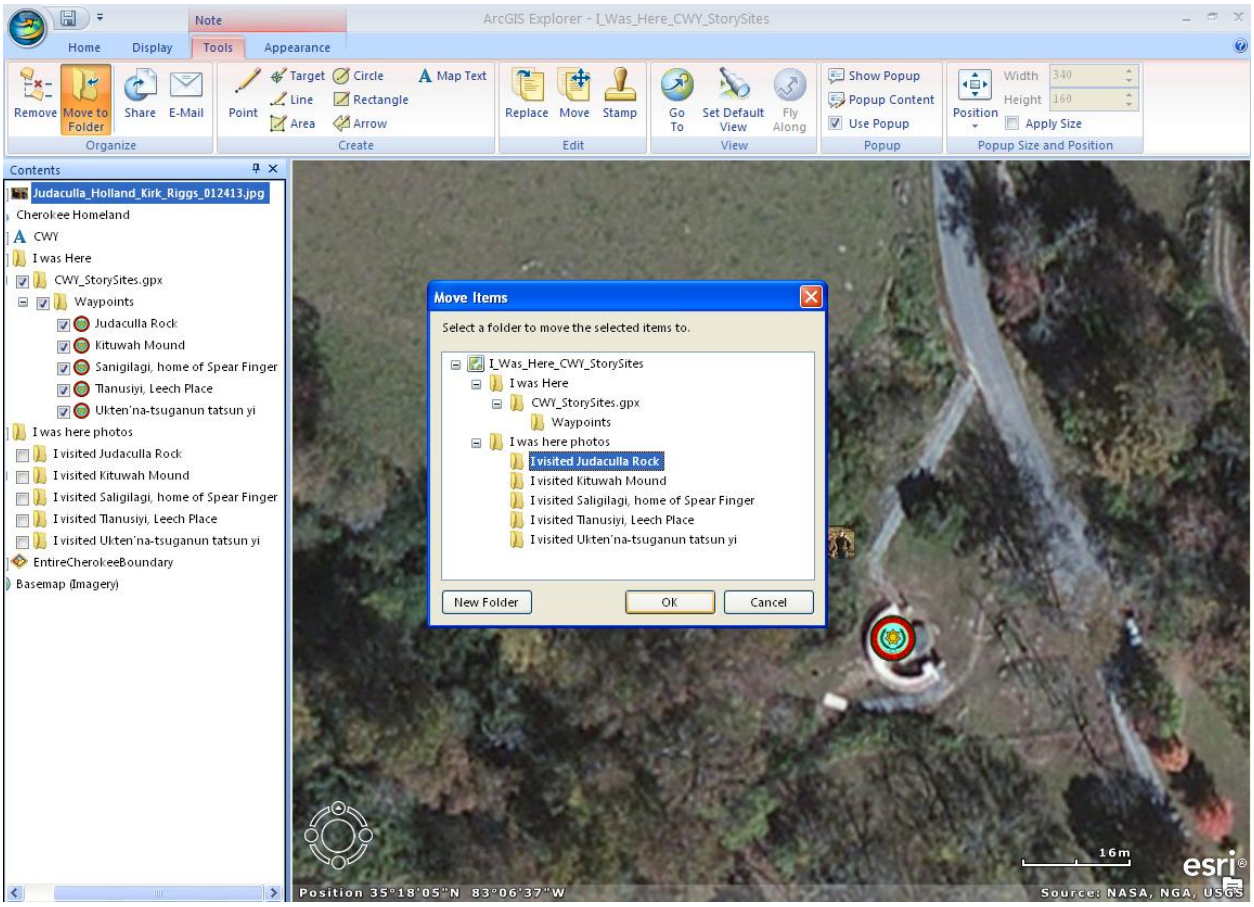

Figure . ArcExplorer, moving uploaded images into their designated folder.

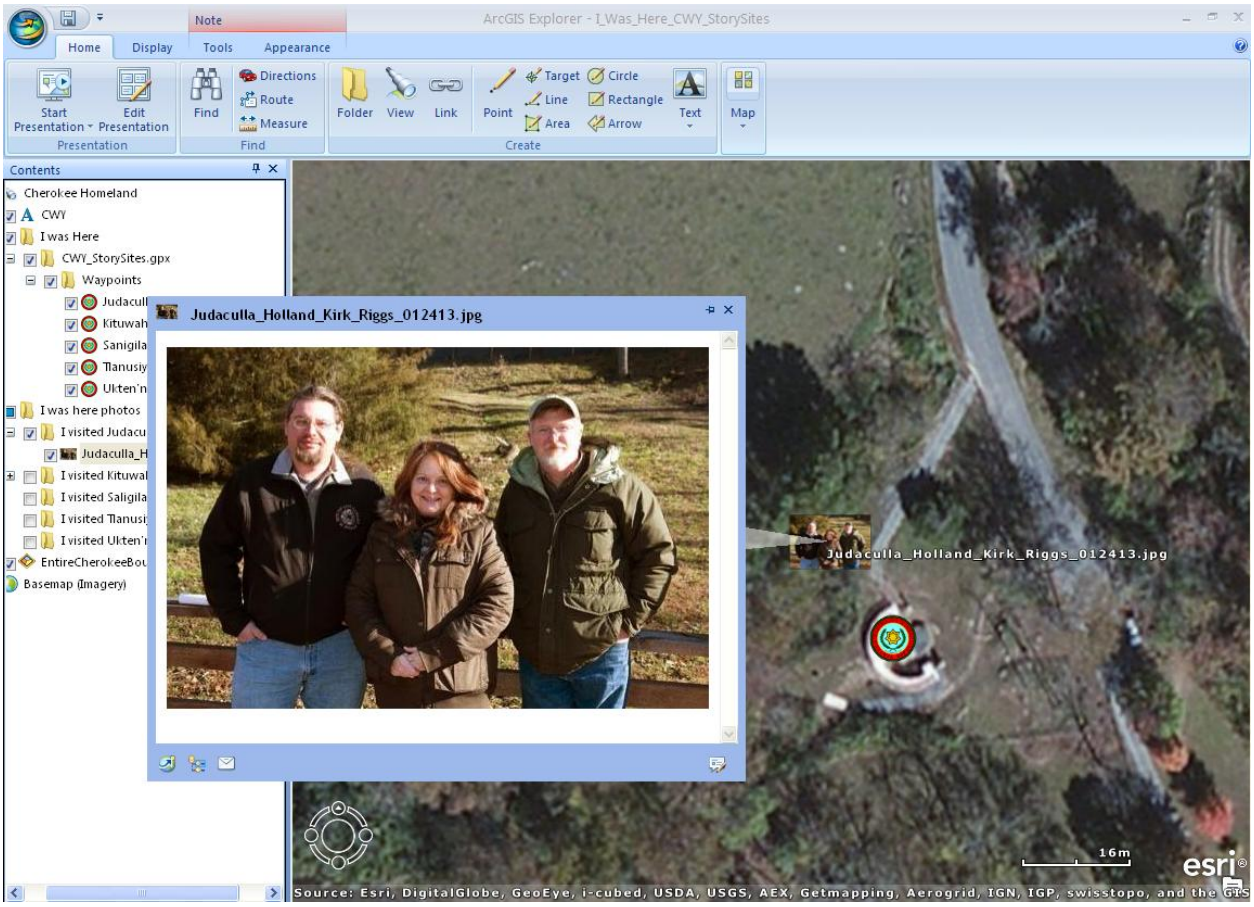

Figure . ArcExplorer, "I visited the Judaculla Rock" photo image pop-up.

I am currently working with the EBCI Tribal GIS Manager, David Wyatt, to disseminate the story-map to the Cherokee community. Mr. Wyatt is testing the components of the story-site and companion map and setting up the ArcGIS Online user accounts and online virtual store that will house the links to the story-site videos and "I Was Here" map. Translating the stories into the Cherokee and English languages takes time. At this point, temporary video files are in place for testing. These files will be replaced as translations of the stories are made available in both language formats.[4] Dissemination of the maps to the community (and other users) will occur

[4] The Cultural Resources Department is currently working with a group of Cherokee Elders to translate the stories for each site. This is a long process. Each translation can take several

through the EBCI Tribal GIS department. I will have access to the maps to add, update, and change content as directed by the EBCI Cultural Resources Department.

months. Due to length of time involved, I chose to work around the absence of the translated files and continue the project with temporary testing files.

CHAPTER SIX

DISCUSSION

In this research, I set out to transform the Mooney archive into a digital map to engage and inspire Cherokee youth to learn and explore the stories of their homeland. In this section, I evaluate the extent to which I answered the questions which have guided that intention.

1. **What is the extent of information contained in the Mooney archive?**

As discussed in Chapter Three, Mooney's work among the Cherokee resulted in volumes of data collected on Cherokee culture and tradition. Mooney's sincerity earned him a place in the community where Cherokee Elders and Traditionalists freely shared with him their culture, syllabaric writings, knowledge of medicine, and knowledge and traditions of the landscape. The maps and field notes contained in the Mooney archive provide glimpses of the knowledge shared with him and are better understood within the context of the additional archival components—Mooney's reports to the bureau and his journal articles. The archive in its entirety provides greater documentation of Cherokee culture, but it is not an exhaustive investigation. As Mooney himself acknowledged, time and space dictated the parameters of what he could include in his writings (Mooney, 1900:11-12). So although the scope of Mooney's work among the Cherokee produced the largest body of ethnographic inquiry to date, it is only a roughly sketched outer layer of the culture and traditions of the Cherokee; it is not a complete picture.

2. How can I complement, correct, broaden, and heal this information with the archive of Cherokee collective memory?

Cherokee collective memory provides insight into the roughly sketched outer-layer drawn by the Mooney archive. This is evident in the story-site material covered in Chapter Four of this thesis. The Mooney archive contains detailed coverage of stories surrounding Judaculla, Uktena, and Spear Finger, but provides minimal information about the Judaculla Rock site, the Leech Place, and the Kituwah Mound. Understanding these sites required a return to oral tradition and a review of Cherokee collective memory.

Cherokee collective memory complemented the information contained in the Mooney archive by providing greater detail, additional story-lines, and in some instances a better understanding of the site itself—especially in the case where sites were connected with spirituality or religion. In the stories surrounding the Kituwah Mound, Cherokee collective memory also provided Cherokee perspective on the origin of the Cherokee people. This is different than the historical "scholarly" sketch provided by Mooney in his writings and is an example of how Cherokee collective memory healed the information contained in the Mooney archive.

3. **What is the homeland the EBCI seeks to represent?**

As discussed in Chapter Two, the homeland of the Cherokee people is vast; every part of it contains cultural stories. At some point in the future, the EBCI would welcome the inclusion of stories from across the landscape into the story-site map. Access to this knowledge will require partnerships with members of the Cherokee Nation and UKB. These partnerships and the inclusion of additional knowledge will strengthen the Cherokee mission of "One Fire"— the Cherokee people, although separated by Tribal jurisdiction and politics, are of One Fire, sharing in origin, tradition, and culture (CTC, 2012).

4. **How can geospatial technologies be used to engage and inspire Cherokee youth?**

As detailed in Chapters Three and Four, the story-map components are built on geospatial technologies (GT). I used lidar and remotely sensed imagery to capture and create visually beautiful and interesting story background scenes, and GPS and GLONASS to capture accurate waypoint coordinates. I built map layers in ArcMap and ArcScene to display in the video presentations and to display in the default map views. I used ArcExplorer as the completed map interactive presentation platform and ArcGIS online as the vehicle for accessing the map.

Throughout the creation of the story-map, I continually questioned the contents of the map: Are the scenes visually engaging? Are the interactive portions simple to use for all ages? Is the map interesting enough to encourage repeated viewings? Does this map provide the tools necessary to find story-site locations in a real world setting? Will the "I Was Here" linked map encourage site visits? If the answer was 'no' to any of the questions asked, I worked on the component until I was satisfied that the GT used in the map would engage and inspire Cherokee youth to learn and explore the stories of their homeland.

LIMITATIONS OF THE STUDY

The limitations of a study such as this are numerous. These limitations include time, weather, access to interviews, access to sites, financial costs, access to and knowledge of software programs, and limitations of technology—such as the creative limitations of ArcExplorer.

In ArcExplorer I was not able to automatically turn layers on and off at pre-set zoom levels. This resulted in all of the layers beings turned on all of the time, unless the viewer turned the layers off manually. In an effort to simplify the map and eliminate the need for viewers to

manually turn layers on and off, I added the layers to the story-site videos instead of displaying them in the map. Another limitation of ArcExplorer is its inability to read lidar files. ArcMap is the only ESRI product that can read lidar data (once it is converted to a readable format). Lidar data must be drawn in ArcMap, then exported as a TIN or image file for display in the other ESRI products. This limits the ways in which lidar data can be displayed.

FUTURE CONSIDERATIONS & NEXT STEPS

The initial phase of the Cherokee Homeland Story-Site map only contains five of the more than six hundred sites represented in the Mooney archive. The next steps for this project will be to add the remaining Mooney sites, beginning with the ones that have already received aesthetic lidar treatment: Saligugi, gihli dinehuhi, and Ukten'na utansi nastun yi, followed by the additional sites listed in Tables 1 and 2. After the initial list of thirty-one sites is incorporated into the map, I will then add sites as directed by the EBCI Cultural Resources Department.

The story-map in its current form meets the desired outcomes for this project, but, the presentation is not at the level of sophistication I had envisioned for the technologically advanced generations of users. As the mapping effort progresses, I will continue to seek out software that is compatible with my original vision for this project—the creation of an interactive, immersive map environment complete with animation and audio files. Some of the software I plan to experiment with includes Autodesk 3ds Max, Unity 3d, Maya, and other advanced gaming platforms. In the event ESRI compatible software does not yet exist for such a vision, it may be necessary to develop an extension which will allow me to achieve my goal. Meeting this goal will result in a more seamless, simple to use, and visually engaging presentation.

With the completion of this thesis, ownership of this project will transfer to the EBCI Cultural Resources Department. All future story-site research, including EBCI Elder interviews, is at the discretion of the Department, and will take place according to their schedule and time-frame. It is my hope that future research, in addition to following the procedures outlined in this thesis, will also include interviews of Cherokee Nation and United Keetoowah Band of Cherokee members in order to gain a better understanding and broader perspective of present day Cherokee memory in relation to homeland sites.

SIGNIFICANCE OF THE STUDY

Using the combination of GT and a Cherokee perspective, I create a story-map for presenting the ancient stories of the Cherokee homeland in a way that weaves traditional and modern culture into its components. In accordance with Cherokee tradition, these stories are presented orally (not textually) in the Cherokee language (an English language version is also available for non-Cherokee language speakers). However, the medium of presentation is modern—an interactive digital story-map with story backgrounds created from a blend of geospatial technologies. Although some may view the interactive story-map as a discontinuance of oral tradition, I believe it will enhance the use of oral tradition among the younger generations who will hear and see the stories (more than one for each site) of their landscape and retell these stories in their own words.

Many Cherokee young people live among the stories of their landscape, but these stories go unnoticed. They are ignored and obscured by changes in the landscape. Learning the stories through this interactive story-map allows the viewer to see and hear the stories without the distraction of modern encroachment. Hearing the stories while viewing the landscape images

provides for a deeper understanding of the story-site. This is also accomplished through place name maps and story-tellers, but not to the degree of a combined audial and visual experience. The interactive Cherokee story-site map is sensitive to the subtleties of oral tradition. The material contained in the map can easily be altered or supplemented with new material to represent the subtleties. This allows the story-sites to grow and evolve with the Cherokee people; contributing towards a fuller understanding of the relationship between the Cherokee and their homeland.

Demonstrating what is possible when Indigenous collaboration is synthesized with geospatial technologies (GT), this project benefits Cherokee people by providing historical content in an accessible medium for educating Tribal citizens of their ancestral homeland and by contributing towards Cherokee language preservation programs. This project benefits educators by providing a tool to teach Cherokee geographical history in a way that incorporates Cherokee knowledge and modern technology. It benefits the GIS community by demonstrating how Indigenous HGIS can be used for historical and cultural purposes. And, it demonstrates how the development of Indigenous HGIS in the form of interactive digital story-maps can serve the preservation of other Indigenous cultural and geographical histories.

This project also contributes towards the promotion of Science, Technology, Engineering and Math (STEM) disciplines among Cherokee students, grades K-12. Working through the components of the interactive story-map, students gain hands-on experience with geospatial technologies. Students view images captured with LiDAR, zoom in and out of a map base created in a GIS, download coordinates to a GPS or other form of smart technology, and upload pictures to a linked map. In addition to the practical applications of GT, this project illustrates the

creative uses of GT and demonstrates how projects, when developed through Cherokee perspective, can benefit the community and society as a whole.

Indigenous people groups continue to experience losses to a dominant, conquering society. These losses are often mentioned in connection with land and freedom. Yet another loss, not often mentioned but equally important, is the loss of Indigenous perspectives and interpretations in the historical archive of a dominant society. This project focuses on correcting a portion of the archive through the inclusion of Cherokee interpretation of geographic history. In this way, it fills a gap in the literature caused by the absence of Cherokee perspective.

CHAPTER SEVEN

CONCLUSION

"The idea of place is intrinsic, without it we float."
-Tom Belt, Cherokee

Often I have heard it said that oral tradition is alive; it is ever-changing. After weaving my way through the maze of stories connected with a particular place in the Cherokee homeland, I realize how true this is. Cherokee stories connected with the landscape are numerous. Some of the stories presented in this work have remained fairly consistent throughout time, while others have changed and evolved with the passage of time. For me, it is not so important that stories remain the same across Cherokee time and space, but that there are stories at all. Understanding that the Cherokee had multitudes of stories tied to their landscape tells us something significant about Cherokee culture—place is important. The homeland of the Cherokee holds stories in every nook and cranny of the landscape. "Every rock, every river bed, everything holds a story" (UCE, 2013). And this practice of associating stories with the landscape did not cease with the forced removal to Indian Territory. For the Cherokee in the West, a storied landscape is just as important as it was in the homeland.

When retelling stories of the homeland, the Western Cherokee frequently begin or end their narrative with the words, "a long time ago" or "in the old country". When appropriate, new stories are added to storylines originating in the old country, as is the case with stories about the "little people" or animal stories. But, for Cherokee to feel at home in their new country, required new stories associated with a new place. These stories are what allowed the Cherokee to become familiar with their new land. Stories were created as individuals traversed the landscape: events happened along the path; these events were relegated to memory, then told and retold in keeping

with an oral society. “We don’t write anything down, we commit it to memory” is a phrase I have often heard Mr. Andy Girty, a Cherokee Nation Elder, use when speaking about Cherokee culture. He says it is the stories that help us remember, they help us remember who we are and how to live (Girty, 2013), and they help us find our way through the landscape.

My *elisi* (Cherokee for grandmother), Sarah Kirk, sometimes speaks of her growing up years in the Cherokee Nation (Oklahoma) and how her Aunt Maggie would send her to “get this or that”. Aunt Maggie (in the Cherokee language) would say, “Sarah, I need you to go to the place where the berries grow or go to the place of the watercress” then proceed to give her oral instruction on how to locate it, something like: “go up the mountain following the creek, you’ll pass an open spot, then pay attention and you’ll see two rocks in the creek. Cross over those rocks and continue up the creek. Keep your eye on the water and you’ll see the watercress”. All of this was committed to memory, and with each direction a place name was created—the place of the open spot on the dark side of the mountain, the place of the rocks in the creek. Each place name held a story, and these familiar stories, passed down from generation to generation, became the mental map for traversing the landscape. For the Cherokee people, connecting a story to a place in the landscape is fundamental, for if one knows how to traverse the landscape, knows the stories of the landscape, and knows every place by name, then that is the person who is “at home” in the land.

When I began this Cherokee homeland project, I pre-judged the Mooney archive and grouped it in with the other ethnological and historical research of that time period. In my Cherokee world-view, Mooney is a *yoneg* (Cherokee term for white man), and I did not think it possible for him (in the late 1800s) to write about Cherokee culture in an unbiased manner. After discovering errors in the archive during my precursory examination, I perceived my bias to be

true and projected the archive to be full of errors. I was wrong. As I studied the Mooney archive, I realized the great pains Mooney took to record Cherokee cultural stories exactly as they were told or presented to him. When interpreting his findings, he did so in a manner that was respectful of Cherokee culture. And with the exception of the origin of the Cherokee people, he did not rely on the work of other scholars to draw conclusions, comparisons, or parallels between Cherokee culture and Anglo-American culture.

As a result of this project, I have come to the conclusion that the Mooney archive is an invaluable resource, but, it is not the final authority nor is it the only resource for understanding Cherokee culture. The Cherokee people are the keepers of Cherokee culture. Cultures are alive and Mooney's archive, although extensive, is limited by time and space. Within Cherokee memory, many interpretations of homeland sites exist. This is confirmed by the stories reviewed in this project. To understand Cherokee culture and oral tradition requires more than a single source of reference or a place name written and preserved on a map, it requires the collective memory of the Cherokee people accumulated over thousands of years. Mooney's archive contributes greatly to this project, but without the Collective Memory of the Cherokee people, a deeper understanding of the sites recorded by Mooney would not be possible.

I take sole responsibility for any errors or misinterpretation of Cherokee culture contained in this study.

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MAP SHOWING THE CHIEF LOCATION AND LANDS OF THE EASTERN BAND OF CHEROKEES, IN CHEROKEE, JACKSON, GRAHAM, AND SWAIN COUNTIES, NORTH CAROLINA.

Figure . 1890 Census Map of the Eastern Band of Cherokee locations and lands in North Carolina and adjoining states (Blarrington, H. 1890. "Map Showing the Chief Locations and Lands of the Eastern Band of Cherokees. In North Carolina and the States Adjoining." In Donaldson, T. 1892. *Extra Census Bulletin. Indians. Eastern Band of Cherokees of North Carolina*. Eleventh Census of the United States. Washington, D.C.:United States Census Printing Office.).

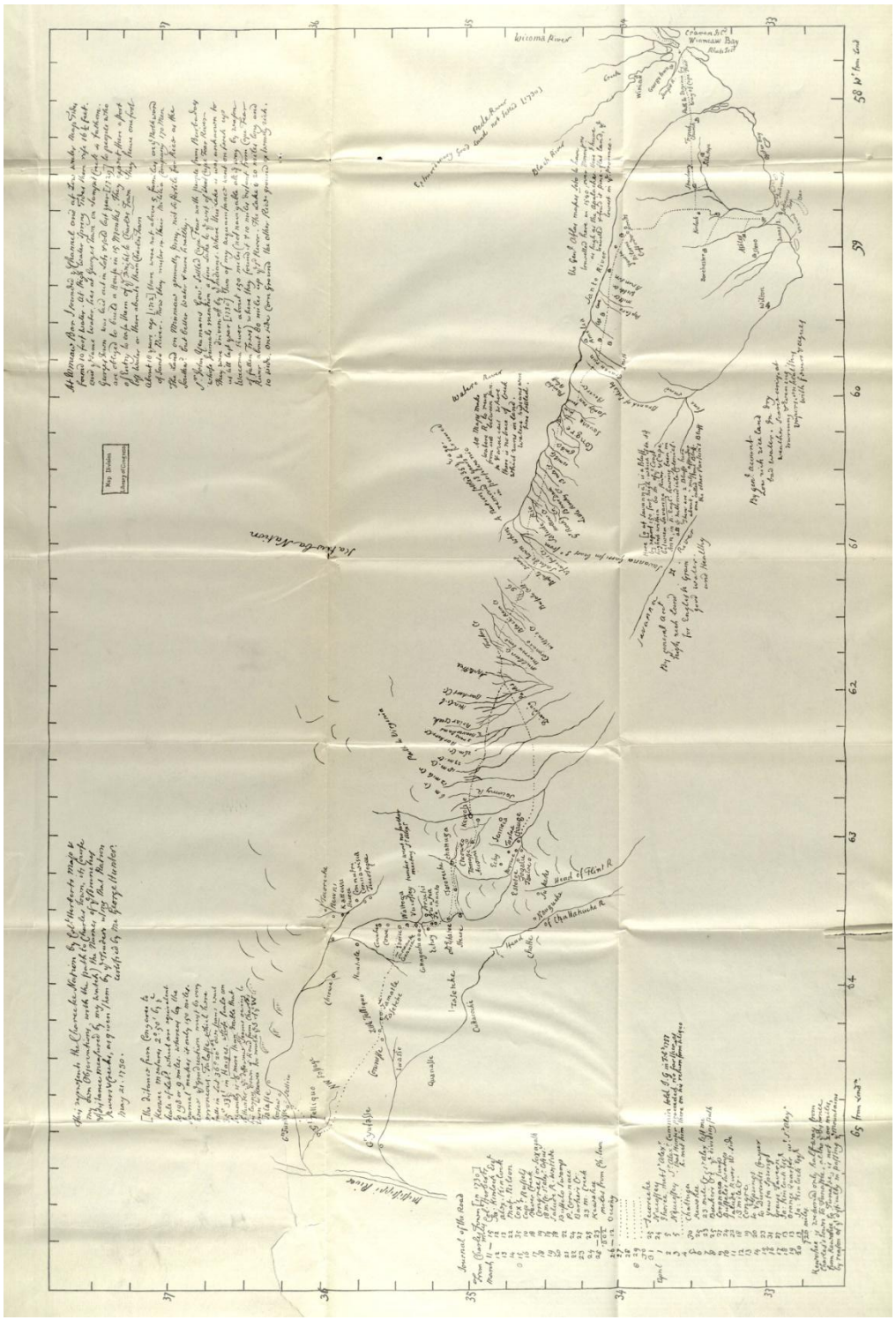

Figure . Map of Cherokee lands and settlements in 1730. (Salley, A. S. Jr. 1917. "George Hunter's Map of the Cherokee Country and the Path thereto in 1730." With Comments by A.S. Salley, Jr. Secretary of the Commission. *Bulletins of the Historical Commission of South Carolina.—No. 4.* Columbia, SC: The State Company.)

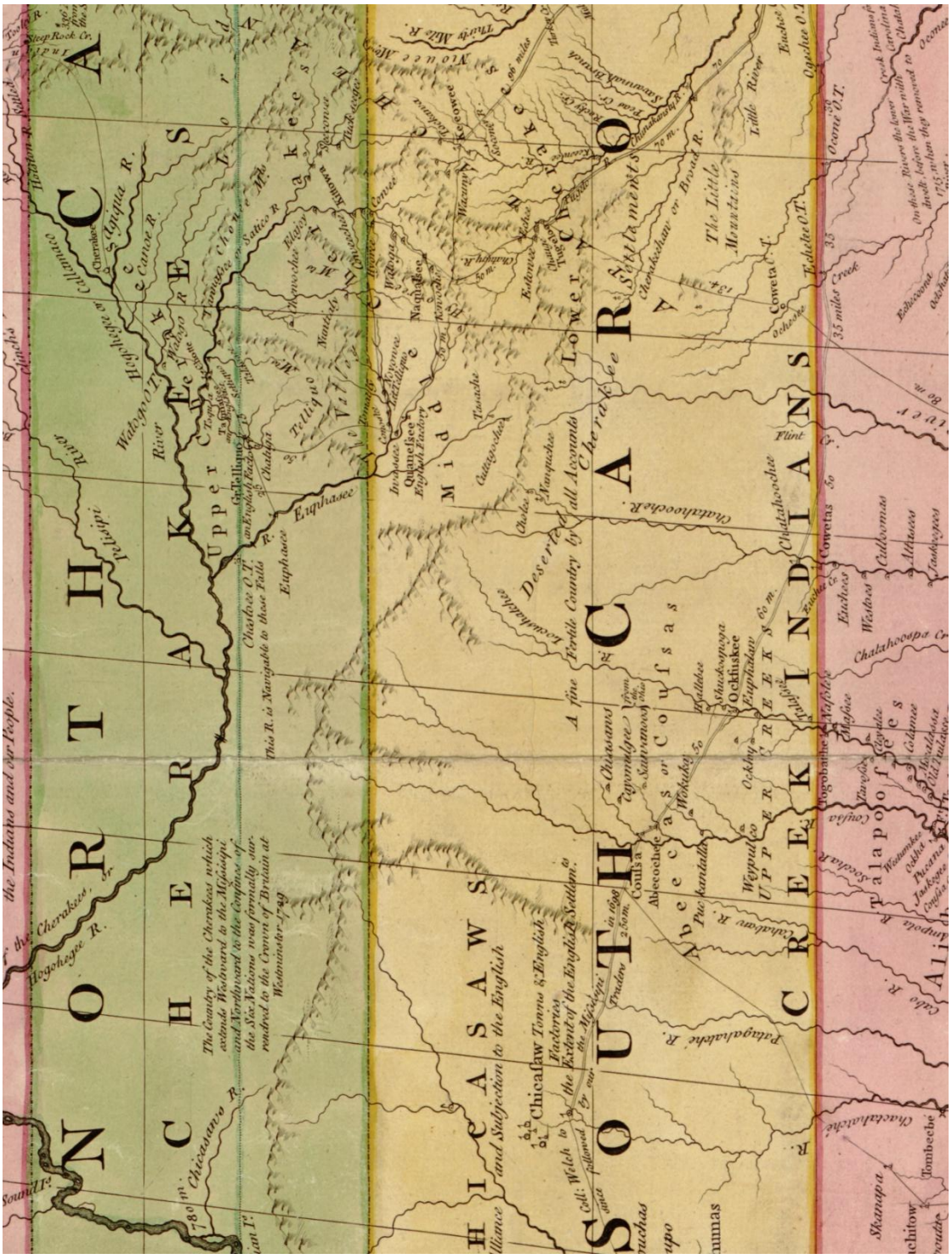

Figure . An excerpt from the map drawn in 1755, by British cartographer John Mitchell. This excerpt focuses on the then current and former lands of the Cherokee. (*A Map of the British and French Dominions in North America with the Roads, Distances, Limits, and Extent of the Settlements, Humbly Inscribed to the Right Honourable, The Earl of Halifax, And the other Right Honourable The Lords Commissioners for Trade Plantations, By their Lordships, Most Obliged, and very humble Servant Jnº Mitchell*. Published by the Author, February 13, 1775, according to Act of Parliament, and Sold by And:Millar opposite Katharine Street in the Strand.)

Appendix . KU IRB Approval with Adult Informed Consent

KU RESEARCH & GRADUATE STUDIES
The University of Kansas

12/7/2012
HSCL #20554

Deborah Kirk
[redacted]
Lawrence, KS 66046

The Human Subjects Committee Lawrence Campus (HSCL) has received your response to its expedited review of your research project

20554 Kirk/Pearce (GEOGRAPHY) Visualizing the Cherokee Homeland through Indigenous Historical GIS: An Interactive Map of James Mooney's Ethnographic Fieldwork and Cherokee Living Memory

and approved this project under the expedited procedure provided in 45 CFR 46.110 (f) (7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

The Office for Human Research Protections requires that your consent form must include the note of HSCL approval and expiration date, which has been entered on the consent form(s) sent back to you with this approval.

1. At designated intervals until the project is completed, a Project Status Report must be returned to the HSCL office.
2. Any significant change in the experimental procedure as described should be reviewed by this Committee prior to altering the project.
3. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at http://www.rcr.ku.edu/hscl/hsp_tutorial/000.shtml.
4. Any injury to a subject because of the research procedure must be reported to the Committee immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity. If you use a signed consent form, provide a copy of the consent form to subjects at the time of consent.
6. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.

Please inform HSCL when this project is terminated. You must also provide HSCL with an annual status report to maintain HSCL approval. Unless renewed, approval lapses one year after approval date. If your project receives funding which requests an annual update approval, you must request this from HSCL one month prior to the annual update. Thanks for your cooperation. If you have any questions, please contact me.

Sincerely,

[redacted]

Stephanie Dyson Elms
Coordinator
Human Subjects Committee Lawrence

cc: Margaret Pearce

Human Subjects Committee Lawrence
Youngberg Hall I 2385 Irving Hill Road I Lawrence, KS 66045 I (785) 864-7429 I HSCL@ku.edu I www.rcr.ku.edu/hscl

KU RESEARCH & GRADUATE STUDIES
The University of Kansas

Approved by the Human Subjects Committee University of Kansas, Lawrence Campus (HSCL). Approval expires one year from *Dec 07, 2012* HSCL # *20554*

Adult Informed Consent Statement

Visualizing the Cherokee Homeland through Indigenous Historical GIS: An Interactive Map of James Mooney's Ethnographic Fieldwork and Cherokee Living Memory

INTRODUCTION

The Department of Geography at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time.

PURPOSE OF THE STUDY

The purpose of this research is to aid in the preservation of Cherokee homeland knowledge using geospatial technologies, Cherokee perspective, and historical archive. The goal of this research is the creation of an interactive story-map of Cherokee homeland sites. The digital map will direct users to sites where they can visually explore images while listening to cultural stories about the site. If this project is approved, I will create a Cherokee language version for use in the Eastern Band Cherokee Kituwah Preservation and Education Program. I will also create an English language version of the interactive map for educational, historical, and cultural programs not fluent in the Cherokee language. Cherokee Tribal members from the Eastern Band Cherokee, Cherokee Nation, and United Keetoowah Band, could access the Cherokee and English versions of the maps without restriction. However, Eastern Band Cherokee Tribal authorities and councils would determine whether or not content from the map should be made available to the general public.

PROCEDURES

Volunteers will tell the stories associated with the sites on the map. I will record these stories for the interactive portion of the map. These will be audio recordings, not visual recordings. I imagine each recording will take approximately 5-15 minutes depending on how many times we need to start over.

Initially, I will focus on 20 sites for this project. After the initial map template is developed, additional sites will be added as time and Cherokee interpretation of the sites move forward.
I only need the recordings as I build the project. Once completed, the recordings will remain with the EBCI Cultural Resource Office.

If you would like to volunteer to tell the story, in Cherokee or English, of one of the culturally significant stories in the map, you will be asked to speak into a microphone while your voice is recorded. This procedure will take approximately 5-15 minutes. Your voice will then be entered into the interactive map and all who view the map (both Cherokee and non-Cherokee people) will hear your voice narrating the story of the site. EBCI Tribal authorities will determine the final content for the maps made available to the general public—outside Cherokee communities.

RISKS

There are no known risks associated with volunteering for this project, other than sitting for 5-15 minutes while your voice is recorded.

BENEFITS

Your participation in this project will benefit Cherokee and non-Cherokee societies. For Cherokee society, your involvement will benefit the language and cultural preservation programs of the Eastern Band Cherokee, Cherokee Nation, and United Keetoowah Band Cherokee. For non-Cherokee societies, your involvement will contribute toward a better understanding of Cherokee homeland knowledge and oral tradition by using Cherokee perspective to represent and when necessary to correct and re-interpret the written archive of historical ethnographer James Mooney.

PAYMENT TO PARTICIPANTS

Participants in this study will not receive payment.

PARTICIPANT CONFIDENTIALITY

Please indicate your preference for confidentiality by placing your initials next to one of the following statements:

_____ I consent to the use of my name when documenting or publishing material associated with my vocal recording of the story.

_____ I do not consent to the use of my name and prefer to leave my identity unacknowledged when documenting or publishing material associated with my vocal recording of the story.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

By volunteering to record your voice for this story, you agree to waive your right to cancel the inclusion of your voice recording, in the interactive story-map of Cherokee cultural sites, at any point in the future. Removing your voice from the map would result in an absence of an audial story for the specific site included in the map and would present a hardship for Cherokee language and historical preservation programs.

However, if you indicated your consent to the use of your name when documenting or publishing material associated with the vocal recording, you may withdraw this consent at any time by sending a

written request to: Deborah Lyn Kirk, University of Kansas, Department of Geography, 1475 Jayhawk Blvd., Lawrence, KS 66045-7613.

If you cancel your consent for identity, the researcher will discontinue the use of your name associated with your vocal recording. Your vocal recording will continue to be used in the interactive story-map.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

_____ _____

Print Participant's Name Date

_____

Participant's Signature

Researcher Contact Information

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