‘THE SAME RIVER’: INTERPRETING THE EASTERN AGRICULTURAL COMPLEX AT RED RIVER GORGE, KENTUCKY

by

CLARISSA VASHTI GEARNER

(Under the Direction of Robert Vick)

ABSTRACT

The Eastern Agricultural Complex was an independent center of plant domestication in eastern North America that arose during the Late Archaic and Early Woodland periods. Eventually, the Eastern Agricultural Complex was largely replaced by the Three Sisters crop complex that originated in Central America, save for the use of squash and sunflower. The Pottsville Escarpment region of Eastern Kentucky, and especially the Red River drainage area, contains significant archaeological evidence of the Eastern Agricultural Complex. This thesis will detail the history of the Pottsville Escarpment region and the Eastern Agricultural Complex, and will outline several modes of interpreting this significant period in human history at the Red River Gorge Geological Area, including updating interpretive signage, creating a demonstration garden, and developing a contemporary foodways program.

INDEX WORDS: Interpretation, Kentucky, Eastern Agricultural Complex, Indigenous Agriculture, Cultural Landscape Conservation

‘THE SAME RIVER’: INTERPRETING THE EASTERN AGRICULTURAL COMPLEX AT RED RIVER GORGE, KENTUCKY

by

CLARISSA VASHTI GEARNER

Bachelor of Science, Western Kentucky University, 2019

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF HISTORIC PRESERVATION

ATHENS, GEORGIA

2023

‘THE SAME RIVER’: INTERPRETING THE EASTERN AGRICULTURAL COMPLEX

AT RED RIVER GORGE, KENTUCKY

by

CLARISSA VASHTI GEARNER

Major Professor:	Robert Vick
Committee:	Eric MacDonald
	James Brooks
	Jon Endonino

Electronic Version Approved:

Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
August 2023

DEDICATION

This work is dedicated to my parents for all of their guidance and support, and to Eastern Kentucky, my home.

ACKNOWLEDGEMENTS

I would like to thank Dr. Robert Vick for his guidance throughout this process, and my committee for taking time out of their schedules to aid in the approval of this work.

Additionally, I would like to thank Dr. Jon Endonino, Dr. Kristen Gremillion, and Dr. Renée Bonzani for their help in identifying resources to aid in my research, Dr. Gail Wagner for providing photographs of Eastern Agricultural Complex crops, and Daniel Boone National Forest personnel Megan Krietsch, Matthew Davidson, and Mary O'Malley for their guidance and support.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

CHAPTER 1: INTRODUCTION

Figure 1.1. A rockshelter. Red River Gorge, Kentucky.

The Pottsville Escarpment region of Eastern Kentucky has significant archaeological evidence of an independent Archaic-period center of plant domestication known as the Eastern Agricultural Complex. The Eastern Agricultural Complex includes domesticates of the species little barley (*Hordeum pusillum*), maygrass (*Phalaris caroliniana*), marsh elder (*Iva annua*), goosefoot (*Chenopodium berlandieri*), erect knotweed (*Polygonum erectum*), sunflower (*Helianthus annuus*), and squash (*Cucurbita pepo).* Besides sunflower and squash cultivars, the domesticated versions of

these plants are now extinct.[1] Because the Eastern Agricultural Complex is a fairly new discovery to modern archaeology, many cultural sites in Kentucky have yet to include it in their interpretative exhibits and signage.

The first goal of this thesis is to summarize the history of archaeological, anthropological, and scientific research on the Eastern Agricultural Complex in the form of a literature review. This history begins during the 1930s with the first discoveries of archaeological evidence of some of the plants later associated with the Eastern Agricultural Complex. The next significant period in this history is the 1980s, when the idea of the Eastern Agricultural Complex as an independent center of plant domestication became more widely accepted. Since the 1980s, further archaeological and scientific research has been conducted to elucidate more details about the domesticated species and the people who domesticated them.

The next goal of this thesis is to outline the geological, geographical, ecological, and human history of the Pottsville Escarpment, with a focus on the Red River Gorge Geological Area, a popular recreational site within the Daniel Boone National Forest that has also been designated as a National Natural Landmark and a National Archaeological District. Red River Gorge has an important geological and ecological landscape that includes sandstone arch and rockshelter formations and old growth forest characteristics (Figure 1.1). Outlining this history will provide a context for understanding how geology and geography shape ecology and human history, and how the Eastern Agricultural Complex fits into the history of Red River Gorge.

[1] Smith, Bruce D. "The Cultural Context of Plant Domestication in Eastern North America." *Current Anthropology* 52, no. S4 (2011): S471-S484; Mueller, Natalie G., Andrea White, and Peter Szilagyi. "Experimental Cultivation of Eastern North America's Lost Crops: Insights into Agricultural Practice and Yield Potential." *Society of Ethnobiology* 39, no. 4 (2019): 549-566.

After the broader geological, geographical, ecological, and human history of the Pottsville Escarpment region are outlined, the next goal of the thesis is to detail the development and history of the Eastern Agricultural Complex specifically. This will include a description of each of the plant species associated with the complex, and a description of how the features of the Pottsville Escarpment, like rockshelters and soil fertility, affected the development of the crop complex. Important archaeological sites in the region that are associated with patterns of human cultural development and the Eastern Agricultural Complex itself will also be described.

Finally, the primary goal of this thesis is to use case studies of other indigenous cultural landscapes and historic sites in North America, and best practices in the fields of museum studies and historic preservation, to determine an appropriate approach to interpreting the Eastern Agricultural Complex at Red River Gorge. Ultimately, the recommendations for interpretation presented in this thesis will include updated interpretive signage, the creation of a demonstration garden, and the development of a contemporary foodways program that utilizes Eastern Agricultural Complex crops. It is also the recommendation of this thesis that all future interpretive projects be developed in partnership with tribal groups whose ancestors lived in the Pottsville Escarpment region.

RESEARCH METHODS AND SOURCES

The sources utilized in this thesis include historic and contemporary journal articles, especially those dealing with archaeological research of significant sites related to the Eastern Agricultural Complex, personal communication with Dr. Jon Endonino, Dr. Kristen Gremillion, Dr. Renée Bonzani, Megan Krietsch, Matthew Davidson, and

Mary O'Malley, a May 2022 visit to Red River Gorge, and official webpages of the National Forest Service and FIND Outdoors, historic sites, tribal groups, and other organizations. Geology and geography resources used include the Kentucky Geological Survey, administered by the University of Kentucky, and the National Park Service. The principal resources on the ecology of the Pottsville Escarpment region were the 2004 field guide *Wildflowers and Ferns of Kentucky* by Thomas G. Barnes and S. Wilson Francis, and Thomas McFadden's 2018 Eastern Kentucky University thesis, "The Vascular Flora of the Red River Gorge in Powell, Menifee, and Wolfe Counties Kentucky." The principal source for human history was the 1996 book *Kentucky Archaeology*, edited by R. Barry Lewis. The principal source for information on Eastern Agricultural Complex crops, in addition to published journal articles, was the 2014 compendium *New Lives for Ancient and Extinct Crops*, edited by Paul E. Minnis. The chapters on maygrass by Gayle J. Fritz, goosefoot by Kristen J. Gremillion, marsh elder by Gail E. Wagner and Peter H. Carrington, and little barley by Karen R. Adams were referenced. The Lady Bird Johnson Wildflower Center website, administered by the University of Texas at Austin, was also referenced for information on wild types of Eastern Agricultural Complex species.

LITERATURE REVIEW

The Eastern Agricultural Complex

Literature associated with the Eastern Agricultural Complex begins with the archeological discovery of seed caches that did not reflect our understanding, at the time, that agriculture in North America began solely in Mesoamerica with the domestication of maize, beans, and squash. While archaeological remains associated

with plants that are now understood to be part of the Eastern Agricultural Complex were discovered as early as 1876, these were not given much attention until the 1920s and 1930s.[2] Over the next 50 years, archaeological research revealed the cultivation of crops like goosefoot, marsh elder, and sunflower. However, until the 1980s the only crops of these seed assemblages that were accepted to be truly domesticated were marsh elder and sunflower. Closer research of seed specimens beyond marsh elder and sunflower during the late 1970s by authors like Asch and Asch, Smith and Yarnell, and Cowan, and a series of conferences in the 1980s that focused on Indigenous American agriculture, made it so that the Eastern Agricultural Complex began to be widely accepted as a distinct and independent center of plant domestication.[3]

Research since the 1980s has further elucidated the timeline and characteristics of domestication, food processing, and foodways associated with the Eastern Agricultural Complex. This research has largely utilized traditional archaeological techniques, but more recent research has shifted to include experimental cultivation of Eastern Agricultural Complex crops to better understand how they were harvested and processed, and begin to understand the domestication process.

Heritage Interpretation

Heritage interpretation deals with the lives and cultures of people who live in the past and present. Research has been done, largely in the twentieth and twenty-first centuries, to analyze and explain how and why care must be taken to respectfully and accurately interpret peoples' history and heritage. Freeman Tilden's seminal 1957 book

[2] Fritz, Gayle J. "Multiple Pathways to Farming in Precontact Eastern North America." *Journal of World Prehistory* 4, no. 4 (1990): 387-435.
[3] Fritz, Gayle J. "Multiple Pathways to Farming." 1990; Cowan, Wesley C. "From Foraging to Incipient Food Production: Subsistence Change and Continuity on the Cumberland Plateau of Eastern Kentucky. (Volumes I and II)." Doctoral Dissertation, University of Michigan, 1985.

Interpreting Our Heritage, and its subsequent editions, have been key publications in creating a framework for heritage interpretation across the country. Tilden's *Interpreting Our Heritage* contains six principles.[4] The first principle states that effective interpretation should relate to the audience on a personal level. The second principle posits that interpretation goes beyond simple fact; it is not simply a recitation of information. The third principle asserts that interpretation is an art, and that interpretation as an art form can be taught. In his fourth principle, Tilden puts forth the idea that interpretation should be provocative and stimulating. In the fifth principle, he expresses that interpretation should convey the whole, rather than parts. The final principal expressed that interpretation aimed at children should not be a watered down version of interpretation aimed at adults, but should take a different approach entirely. Tilden's guiding principles have been utilized by the administrators of many cultural heritage and natural sites, including National Parks.

When considering how to update existing interpretation at Red River Gorge, and create new interpretive material, Tilden's principles and other publications dealing with heritage interpretation can be used as a guiding framework. Since the topic of this thesis deals with Native American cultural heritage, publications regarding Indigenous cultural heritage specifically have been sought out. Such publications, along with Tilden's *Interpreting Our Heritage*, will be referenced further and discussed in the fourth chapter of this thesis, titled Interpretation.

[4] Freeman Tilden, *Interpreting Our Heritage* (Chapel Hill: University of North Carolina Press, 1977).

CHAPTER 2: HISTORICAL BACKGROUND

INTRODUCTION

This chapter will outline the geological, geographical, ecological, and human history of the Pottsville Escarpment region. The purpose of this chapter is to provide a regional context in which the Eastern Agricultural Complex developed. Geology, geography, and ecology shape human culture and cultural developments, so relevant periods in geologic history, geographic events, and ecological evolution will be covered. The human history leading up to, during, and after the development and implementation of the Eastern Agricultural Complex will be covered as well.

Red River Gorge sits within a region of Eastern Kentucky known as the Pottsville Escarpment. The Pottsville Escarpment forms the western margin of the Cumberland Plateau or Appalachian Plateau region, and is also known as the Cumberland Escarpment. According to Michael Collier, the term escarpment comes from the military term escarp, which is a "slope or banked wall that lies at the foot of a rampart." The term escarpment refers to "a long line of cliffs, a continuous ridge, or a series of hills that because of faulting or erosion rises abruptly from a level or gently sloping plain or plateau."[5] The Pottsville Escarpment abuts a narrow region of cone-shaped hills known as the Knobs, which encircles the lower two-thirds of the Bluegrass region of Central Kentucky, and the Mississippi Plateau region (also known as the Highland Rim and Pennyroyal) south of the Knobs. The Kentucky Geological Survey breaks down Eastern

[5] Lopez, Barry and Debra Gwartney. *Home Ground: Language for an American Landscape* (San Antonio, Texas: Trinidad University Press, 2006), 126.

Kentucky into four subregions: the Cumberland Escarpment, Cumberland Plateau, Mountain and Creek Bottom, and Pine Mountain subregions. The Kentucky Geological Survey's defined boundary of the Cumberland Escarpment subregion will be used to define the Pottsville Escarpment region in this thesis.[6] Eastern Kentucky is also referred to as the Eastern Coal Fields and Appalachian Highlands region. Maps of Kentucky related to geology and geography are included in Appendix A.

GEOLOGY AND GEOGRAPHY

Deep geologic time may not have an obvious relationship to human culture, however the effect that geologic layers have on soil composition and geography effects plants and animals, and those effects, and the geography itself, then impact how human culture develops in a region. The three periods of deep time that have the greatest impact on the geology of Eastern Kentucky and the Pottsville Escarpment region are the Mississippian, Pennsylvanian, and Quaternary periods. The Mississippian and Pennsylvanian periods are the first and last half, respectively, of the Carboniferous Period. The Carboniferous is only differentiated into the Mississippian and Pennsylvanian periods in North America, but they form distinct rock layers in Eastern Kentucky and thus are important to distinguish. The Mississippian Period is considered to have lasted from 358 million to 323 million years ago,[7] while the Pennsylvanian Period lasted from 323 to 298 million years ago.[8] Mississippian and Pennsylvanian rock

[6] Andrews, William, 2009, Eastern Coal Field Region; Lexington: University of Kentucky, Kentucky Geological Survey.
[7] "Mississippian Period—358.9 to 323.2 MYA." Geologic Time Periods in the Paleozoic Era. National Park Service, April 28, 2023.
[8] "Pennsylvanian Period—323.2 to 298.9 MYA." Geologic Time Periods in the Paleozoic Era. National Park Service, April 28, 2023.

layers dominate the bedrock of Eastern Kentucky. The Quaternary Period is the current geologic period.[9] It is generally divided into two epochs: the older Pleistocene Epoch, lasting from 2.58 million to 11,700 years ago, and the Holocene Epoch lasting from 11,700 years ago to today. Some geologists and historians have proposed designating a new epoch to denote the period of history in which humans have had a significant impact on the environment, including the use of nuclear weapons and the effects of anthropogenic climate change. This epoch is often known as the Anthropocene, and is proposed to begin around 1950.[10] Within the Quaternary Period, the Pleistocene Epoch will be the focus of this chapter. The Pleistocene Epoch aligns with the most recent period of a series of global cooling events known as ice ages. The last of these, known as the Last Glacial Maximum, staring around 21,000 years ago, was an important period of both geological and human history.[11] Much of the geological and geographical features of the Pottsville Escarpment arose during the Pennsylvanian, Mississippian, and Pleistocene periods.

The Pottsville Escarpment marks the western edge of the Breathitt Formation, a Pennsylvanian rock formation that covers most of Eastern Kentucky.[12] Along the escarpment, the Breathitt formation intertongues with the Pennington, Lee, and Borden formations, which are all Mississippian rock formations. Much of the Appalachian Mountains had already emerged by the Mississippian period, but what is now Kentucky was still underwater. That resulted in the creation of shale and sandstone, then

[9] "Quaternary Period—2.58 MYA to Today." Geologic Time Periods in the Cenozoic Era. National Park Service, April 27, 2023.
[10] “Anthropocene.” National Geographic, May 20, 2022.
[11] Smith, Dave. "The Pleistocene Epoch." UC Museum of Paleontology. University of California, Berkeley, June 10, 2011.
[12] "Geologic Map of Kentucky." Kentucky Geological Survey. University of Kentucky, August 16, 2019

limestone as the seas cleared.[13] The Pennsylvanian Period saw a mixture of marine and non-marine environments in Kentucky as the Mississippian seas retreated.[14] Shallow seas further created more limestone, and peat swamps created bituminous coal deposits. The two regions of Kentucky known for coal mining, the Eastern Coal Fields and Western Coal Fields regions, are both marked by Pennsylvanian rock formations[15]. The Red River Gorge Geological Area contains segments of the Lee Formation, the Breathitt Formation, and the Nada member of the Borden Formation[16]. Limestone and sandstone formations play an important role in the Eastern Agricultural Complex. The role of this geology in settlement patterns and soil fertility will be further explored in the Human History section of this chapter and in Chapter Three.

Throughout human history, geologic formations like caves and rockshelters have acted as natural shelters for people to live or rest. The erosional properties of sandstone and limestone contribute to the distinctive geologic formations of the region: limestone caves, sandstone rockshelters, and sandstone arches. Caves form when acidic subterranean water dissolves limestone over thousands of years.[17] Rockshelters form when a cliff face has upper layers, like the Lee sandstone conglomerate, that are more resistant to erosion than the lower layers, creating a naturally sheltered area at the base of cliffs.[18] Weathering also creates a pattern on sandstone cliff faces called honeycomb weathering, which is a common and distinctive feature on sandstone rockshelters and

[13] "Mississippian Period." Kentucky Geological Survey. University of Kentucky, January 05, 2023.
[14] "Pennsylvanian Period." Kentucky Geological Survey. University of Kentucky, January 5, 2023.
[15] Rice, Charles L. "Pennsylvanian System." Contributions to the Geology of Kentucky. United States Geological Survey, January 9, 2001.
[16] "Geologic Map of Kentucky." Kentucky Geological Survey, 2019.
[17] Carey, Daniel I. Kentucky Landscapes Through Geologic Time, Map and Chart 200, Series XII, 2011. Kentucky Geological Survey.
[18] Lovett, Richard A. "Sandstone arches form under their own stress." *Nature*, (2014).

boulders in Red River Gorge (Figures 1.1 and 2.1). A process called frost weathering creates natural arches.[19] Frost weathering occurs when water infiltrates small cracks in the rock, then freezes, expanding and creating larger cracks. This process creates arches by water pooling in lower sections of a cliff or fin, weakening the rock as the freeze-thaw cycle continues. Pressure from overlying rock layers and further erosion create the arch.[20] Red River Gorge has more than one hundred natural arches.[21]

Figure. 2.1. Honeycomb weathering on a stone. Red River Gorge, Kentucky.

While limestone and sandstone deposits form perhaps the most important geological formations in the region, alluvial deposits created during the Pleistocene Epoch also play an important role. The Pleistocene Epoch spans the time when modern

[19] "Geologic Formations." Arches National Park Utah. National Park Service, November 19, 2021.
[20] Lovett, Richard A. "Sandstone arches," 2014.
[21] History." Red River Gorge. Red River Gorge.

humans evolved and their migration across the Bering Strait into North America, during the Last Glacial Maximum. By the end of the Pleistocene, humans had populated North and South America.[22] Quaternary glaciation was extensive north of Kentucky, but did not extend into Kentucky. However, glaciation still impacted ecology in Kentucky. Glacial meltwaters from northern glaciation induced sediment deposits along the Ohio River and its tributaries.[23] These areas are known as alluvial deposits and are associated with highly fertile valley soil. Alluvial deposits are significantly more abundant in western Kentucky, but are scattered throughout the Pottsville Escarpment region.

In addition to geology, the geography of the Pottsville Escarpment region—and the larger Cumberland Plateau region—is also an important factor in understanding the history of human settlement in Kentucky. Both topography and hydrology play important roles in human history. The Kentucky Geological Survey categorizes the Pottsville Escarpment region as containing segments of Carter, Clinton, Elliot, Estill, Greenup, Jackson, Laurel, Lee, McCreary, Menifee, Morgan, Powell, Pulaski, Rockcastle, Rowan, Wayne, and Wolfe counties.[24] While many regions of Appalachia are characterized by long, straight ridges, the Cumberland Plateau region is characterized by shorter, winding ridges with narrow valleys. During the Carboniferous Period, uplift raised the Cumberland Plateau region to about 2,000 feet above sea level. Over the next 300 million years, erosion by stream action, wind, and frost weathering dissected the plateau to create the topography that exists today.[25] The ridges of the Cumberland

[22] Smith, Dave. "The Pleistocene Epoch." 2011.
[23] Carey, Daniel I. Kentucky Landscapes Through Geologic Time, 2011.
[24] Andrews, William, 2009, Eastern Coal Field Region.
[25] Niquette, Chuck M., Gwynn Henderson, and Ellen A. Dugan. 1984. *Background to the Historic and Prehistoric Resources of Eastern Kentucky*. Alexandria, Virginia: Bureau of Land Management, Eastern States Office.

Plateau have an average elevation of 1,400 feet. While uplift and dissection created the Cumberland Plateau, the folding of rock layers formed the higher elevation Ridge and Valley region of the Appalachian Mountains. Along the southeastern edge of the state, folding action has created much higher mountains than the Cumberland Plateau, like Pine Mountain.[26] The highest peak in the region (and in Kentucky), Black Mountain, is over 4,000 feet in elevation.[27]

In the narrow valleys and floodplains between the mountain ridges lies the many streams and rivers the make up the region's watersheds. The Pottsville Escarpment contains four major rivers, all tributaries of the Ohio River: the Little Sandy, Licking, Kentucky, and Cumberland Rivers, from northernmost to southernmost.[28] The Licking, Kentucky, and Cumberland Rivers flow across the escarpment from east to west. The Little Sandy River follows the eastern edge of the Escarpment region from north to south in Elliot and Carter counties. Some significant riverine landmarks in the escarpment region are Cave Run Lake, Cumberland Falls, the Rockcastle Narrows, and Red River Gorge. The Red River, a tributary of the Kentucky River, is designated as a Wild and Scenic River by the National Wild and Scenic Rivers System.[29]

ECOLOGY

The Pottsville Escarpment region, as defined by the Kentucky Geological Survey, aligns with three ecoregions defined by the United States Geological Survey.[30] Those

[26] Carey, Daniel I. Kentucky Landscapes Through Geologic Time, Map and Chart 200, Series XII, 2011. Kentucky Geological Survey.
[27] "Black Mountain Conservation Easement." Kentucky Energy and Environment Cabinet. Commonwealth of Kentucky, Accessed May 30, 2023.
[28] Andrews, William, 2009, Eastern Coal Field Region.
[29] "History." Red River Gorge. Red River Gorge.
[30] Andrews, William, 2009, Eastern Coal Field Region.

regions are 70h, the Carter Hills ecoregion and 70g, the Northern Forested Plateau Escarpment ecoregion, both of which are subregions of the Western Allegheny Plateau ecoregion (70), and 68c, and the Plateau Escarpment ecoregion, which is a subregion of the Southwestern Appalachians ecoregion (68).[31] All three ecoregions are largely forested in mixed-mesophytic forests. Due to sandstone and shale bedrock, the soil is primarily slightly acidic, with pockets of neutral pH soil where the bedrock is limestone. This geological diversity allows plants that require more acidic soil to exist near plants that require more neutral soil.[32]

Dominant deciduous canopy species include sugar maple (*Acer saccharum*), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and northern red oak (*Quercus rubra*).[33] Coniferous species are less abundant, but include Eastern white pine (*Pinus strobus*), Eastern red cedar (*Juniperus virginiana*), Eastern hemlock (*Tsuga canadensis*), and Virginia pine (*Pinus virginiana*).[34] Canada yew (*Taxus canadensis*), a relatively small evergreen, exists sparsely in the region, and Red River Gorge marks the southernmost edge of its native range (Figure 2.2).[35] American chestnut (*Castanea dentata*) was historically a dominant canopy species in the region prior to ink disease and chestnut blight decimating populations during the nineteenth and twentieth centuries.[36] There are currently efforts by the SUNY College of

[31] Woods, A.J., J.M. Omernik, W.H. Martin, G.J. Pond, W.M. Andrews, S.M. Call, J.A. Comstock, and D.D Taylor, 2002, Ecoregions of Kentucky: Reston, VA., U.S. Geological Survey (map scale 1:1,000,000).
[32] Widingstad, Jason D., Sarah C. Sherwood, Kristen J. Gremillion, and Neal S. Eash. "Soil Fertility and Slope Processes in the Western Cumberland Escarpment of Kentucky: Influences on the Development of Horticulture in the Eastern Woodlands." *Journal of Archaeological Science* 35, no. 6 (2008): 1717-1731.
[33] McFadden, Thomas S. "The Vascular Flora of the Red River Gorge in Powell, Menifee, and Wolfe Counties Kentucky." Master's Thesis, Eastern Kentucky University, 2018.
[34] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.
[35] "*Taxus canadensis*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, October 21, 2022.
[36] Hodgins, Jane. "What it Takes to Bring Back the Near Mythical American Chesnut Trees." U.S. Department of Agriculture, April 29, 2019.

Environmental Science and Forestry to develop blight-resistant transgenic American chestnut trees. However, introduction of these cultivars into the chestnut's historic range is still several years out.[37] Logging and chestnut blight have changed the composition of many of the region's forests. However, pockets of forest have old-growth characteristics, especially within the Daniel Boone National Forest.

Figure 2.2. Canada yew. Red River Gorge, Kentucky.

The first land plants to evolve from a green algae ancestor were non-vascular plants known as bryophytes, which include mosses, liverworts, and hornworts (Figure 2.3).[38] Mosses are extremely common throughout Kentucky, and it is estimated that close to 300 species are present in the state. While there are also many varieties of liverworts and hornworts – over 100 species in Kentucky – they are not as commonly

[37] Jabr, Ferris, "A New Generation of American Chestnut Trees May Redefine America's Forests." Scientific American. March 1, 2014.
[38] Spencer, Victoria, Zoe N. Venza, and Cecily J. Harrison. "What Can Lycophytes *Teach* Us about Plant Evolution and Development? Modern Perspectives on an Ancient Lineage." Evolution & Development 23, no. 3 (2021): 174-196.

observed.[39] Vascular plants evolved after bryophytes; the first were non-seed-bearing ferns and fern allies[40]. As the seas retreated, coal swamps, or mires, emerged in Eastern Kentucky during the Pennsylvanian Period.[41] The most distinct plants of these mires were a type of fern ally called lycophytes: tree-sized plants that could reach 100 feet tall.[42] Fossils of bark segments and root systems from these Carboniferous giants, called stigmaria, are commonly found in the Cumberland Plateau region.[43] While arborescent lycophytes went extinct as the mires dried out, their ground-dwelling relatives remained in the region.

Modern-day lycophytes, like fan clubmoss (*Diphasiastrum digitatum*), stag's horn clubmoss (*Lycopodium clavatum*), and flat-branched tree-clubmoss (*Dendrolycopodium obscurum*), are found in undisturbed forested areas (Figure 2.4).[44] Ferns are also highly common in the region, especially on shady northern slopes with slightly acidic soil (Figures 2.5 and 2.6). Some common ferns include bracken fern (*Pteridium aquilinum*), royal fern (*Osmunda regalis*), and cinnamon fern (*Osmunda cinnamome*a). Some more unusual and rare ferns include adder's tongue fern (*Ophioglossum pycnostichum*) and filmy fern (*Trichomanes boschianum*), the latter of which grows in moist sandstone rockshelter overhangs. An unusual fern called Appalachian gametophyte (*Vittaria appalachiana*) also grows in sandstone

[39] Snider, Jerry A., Susan Moyle Studlar, and Max Medley. "A List of Bryophytes in Kentucky." The Bryologist 91, no. 2 (1988): 98-105.
[40] Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*. Lexington, Kentucky: University Press of Kentucky, 2004.
[41] Smith, Dave. "The Carboniferous Period." UC Museum of Paleontology. University of California, Berkeley, June 30, 2011.
[42] "Types of Trees Preserved as Fossil Tree Stumps." Kentucky Geological Survey. University of Kentucky, Accessed May 16, 2023.
[43] "Fossil of the month: Stigmaria." Kentucky Geological Survey. University of Kentucky, Accessed May 16, 2023.
[44] Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*, 2004.

rockshelters. It only exists in the gametophyte growth stage, giving it a similar appearance to liverworts or hornworts. Other common and diverse fern allies present in the region are the spleenworts. Many of the plants in the Cumberland Plateau region are also common to the Western Coal Fields or Shawnee Hills region of western Kentucky. Both regions are dominated by Pennsylvanian bedrock and have coal beds due to Carboniferous mires.

Figure 2.3. Snakewort, a type of liverwort. Red River Gorge, Kentucky.
Figure 2.4. Fan clubmoss with sporophytes. Rowan County, Kentucky.

Figures 2.5 and 2.6. A fern leaf-tier, the home of a moth caterpillar (left) and maidenhair fern (right). Both in Red River Gorge, Kentucky.

Flowering plants – angiosperms – evolved from a group of seed ferns during the early part of the Cretaceous Period, 145 million to 66 million years ago.[45] Because angiosperms have very successful seed and pollen dispersal, they became the dominant type of plant on land. Many angiosperm families that emerged during the Cretaceous period still exist in the region today. Magnoliids and other early angiosperms were among the first angiosperms to evolve that still exist today.[46] The family *Magnoliaceae* evolved more than 100 million years ago, making them so old that beetles, rather than bees, pollinate them. Cucumber magnolia (*Magnolia acuminata*), big leaf magnolia (*Magnolia macrophylla),* and umbrella magnolia (*Magnolia tripetala*) are present in less-disturbed areas like Red River Gorge (Figure 2.7).[47] Tulip polar is also a Magnoliid, but is common even in previously disturbed areas[48]. Other early angiosperms include those in the custard apple, birthwort, true laurel, water lily, and lizard tail families.[49]

Figure 2.7: Umbrella magnolia. Red River Gorge, Kentucky.

[45] Carey, Daniel I. Kentucky Landscapes Through Geologic Time, 2011.
[46] Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*, 2004.
[47] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.
[48] Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*, 2004.
[49] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.

Other angiosperms are divided into two groups: monocots and eudicots, based on their embryonic leaves, called cotyledons. Monocots have one cotyledon, while eudicots have more than one. Some monocots common to the region are sedges (*Carex* sp.), grasses (various species within the *Poaceae* family), greenbriers (*Smilax* sp.), and rushes (*Juncus sp*.).[50] Monocot wildflowers in the iris, lily, trillium, and orchid families are common to the region (Figure 2.8). Some species, like crested dwarf iris (*Iris cristata*), trout lilies (*Erythronium* sp.), red trillium (*Trillium erectum*), rattlesnake plantain (*Goodyera pubescens*), and crane-fly orchid (*Tipularia discolor*) are reasonably common. Others, like Kentucky lady's slipper (*Cypripedium kentuckiense*), wood lily (*Lilium philadelphicum*), and grass pink (*Calopogon tuberosus*), are rare.[51] Other interesting monocot species include Jack-in-the-pulpit (*Arisaema triphyllum*), bellwort (*Uvularia sp*.), duck-potato (*Sagittaria latifolia*), and unicorn root (*Aletris farinose*).[52]

Figure 2.8. Speckled Wood Lily. Red River Gorge, Kentucky.

[50] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.
[51] Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*, 2004.
[52] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.

Eudicots are by far the most diverse and speciose group of angiosperms in the region and in general. Some eudicots present in the region include *Prunus sp*. fruit trees, *Vaccinium* and *Rubus sp*. berry bushes, and a variety of forbs, vines, bushes and shrubs like viburnum, sumac, milkweed, holly, ragweed, thistle, tickseed, coneflower, mistflower, aster, ragwort, goldenrod, trumpet vine, bittercress, hackberry, valerian, hearts-a-burstin', dogwood, persimmon, rhododendron, azalea, tick-trefoil, gentian, geranium, witch-hazel, hydrangea, St. John's-wort, beebalm, mint, salvia, skullcap, flax, hibiscus, spring beauty, primrose, foxglove, wood sorrel, bleeding-heart, passionflower, phlox, milkwort, cohosh, anemone, meadow rue, hawthorn, bluet, coral bells, nettle, vervain, violet, and grapevine (Figures 2.9-2.11).[53]

Figure 2.9: Four-leaved milkweed with longhorn moths. Red River Gorge, Kentucky (left).
Figure 2.10: A Rhododendron "hell." Red River Gorge, Kentucky (center).
Figure 2.11: Smooth phlox. Red River Gorge, Kentucky (right).

Red River Gorge, and other patches of old growth forest in the region, have sweeping rhododendron "hells," or thickets, interspersed with a high density and diversity of various plant species. However, the biodiversity and species richness has been degraded in much of the forests of the Cumberland Plateau region. Logging, surface mining, functional extinction of the American chestnut, introduction of non-

[53] McFadden, Thomas S. "The Vascular Flora of the Red River." 2018.

native invasive species, lack of traditional landscape management techniques, and removal of keystone species has changed the landscape significantly in large swaths of the region.

HUMAN HISTORY

Humans are thought to have crossed from Eurasia into North America around 16,000 years ago, and populations migrated south throughout the Upper Paleolithic and Neolithic periods.[54] Settlement of North America is complicated and multiple migrations and back-migrations occurred from northeastern Eurasia to northwestern North America. There are thought to be two primary migrations: one 20,000 to 15,000 years ago that occurred over a coastal route near the modern-day Aleutian Archipelago, and another 14,000 years ago that occurred over the Bering Land Bridge. Two large ice sheets covered much of northern North America's land mass at the time: the Cordilleran ice sheet and the much larger Laurentide ice sheet. Around 15,000 years ago, the Cordilleran ice sheet retreated enough to create an ice-free corridor between the two ice sheets that led roughly from present-day Alaska to Montana.[55] This clearing allowed for the first wave of human migration by land to North America. Until recently, it was thought that the Bering Land Bridge was the only migration route. This model of the peopling of the Americas is called the "Clovis-first model." Some of the oldest archaeological sites in the Americas are Huaca Prieta, a 15,000-year-old settlement site in Peru, and Monte Verde, a site in Chile that is at least 14,000 years old. These sites

[54] Lovgren, Stefan. "Clovis People Not First Americans, Study Shows." National Geographic. National Geographic Society, February 23, 2007.
[55] Ullman, David. "The Retreat Chronology of the Laurentide Ice Sheet during the Last 10,000 Years and Implications for Deglacial Sea-level Rise." Vignettes: Key Concepts in Geomorphology. Carleton College, December 16, 2022.

dispute the Clovis-first model of the peopling of North America because they provide evidence that humans were living in the southern tip of South America at the same time as people were thought to be *first* crossing the Bering Land Bridge.[56] While South America may have been peopled separately and earlier than North America, the earliest archaeological evidence for human life in modern-day Kentucky dates to the Paleoindian Period. The poster on the following page provides some visual context to the tools and pottery developed from the Paleoindian to Prehistoric periods (Figure 2.12).

[56] Lovgren, Stefan. "Clovis People Not First Americans" 2007.

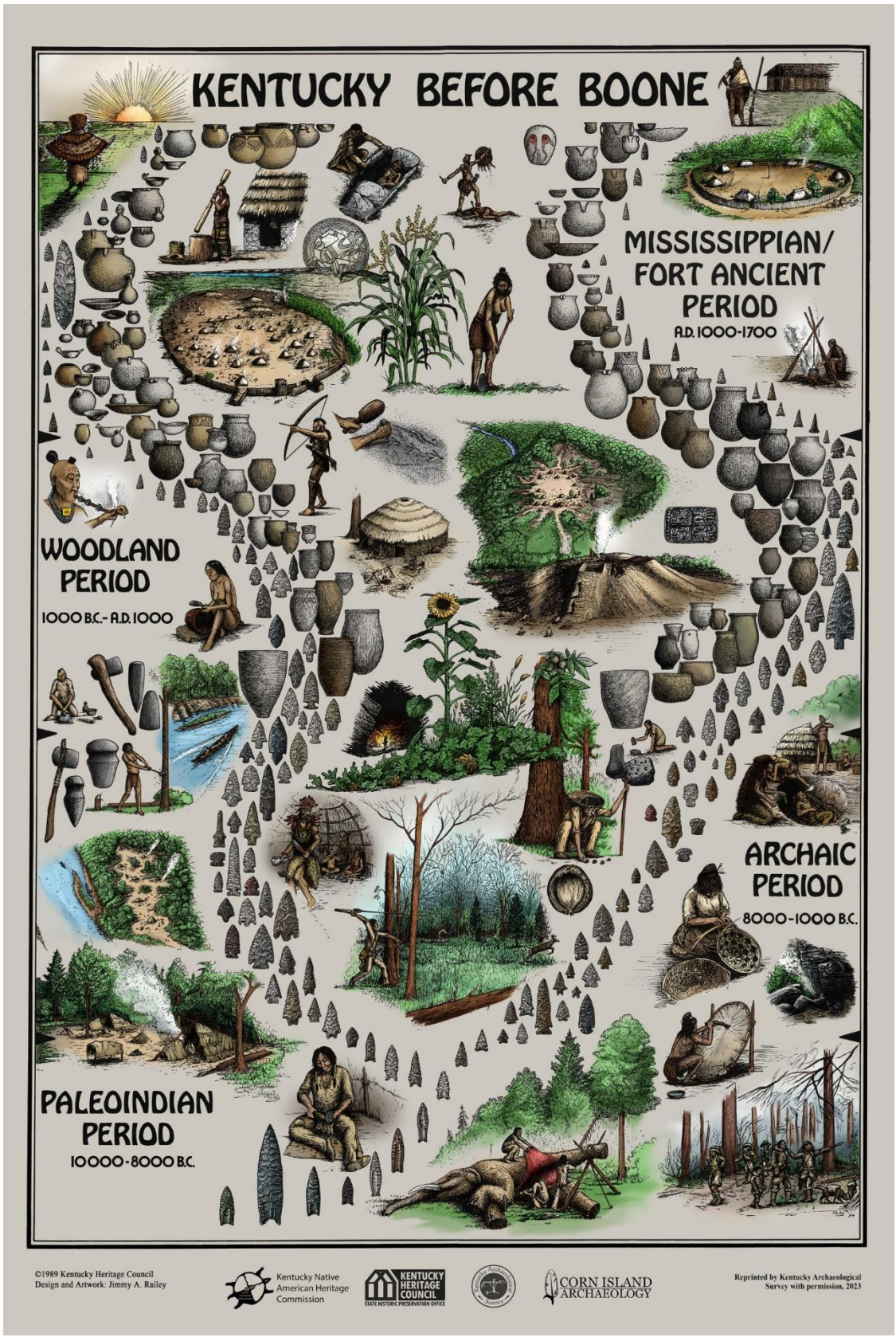


Figure 2.12. “Kentucky Before Boone” poster, prepared by the Kentucky Heritage Council.

Paleoindian Period (9500-8000 BCE)

While the Laurentide ice sheet did not extend into Kentucky, the climate was cooler and moister during the Ice Age than it is today.[57] The fauna of North America were also significantly different than they are today and included megafauna such as mammoths, mastodons, and ground sloths. Just like humans, Pleistocene megafauna crossed back and forth over the Bering Land Bridge, and the ancestors of some of these megafauna still exist in North America and Eurasia today. The earliest human residents of Kentucky were nomadic hunter and gatherer peoples. This period, from 9500 to 8000 BCE, is known as the Paleoindian Period and can be broken down into the Early Paleoindian or Clovis Period (9500-9000 BCE), the Middle Paleoindian Period (9000-8500 BCE), and the Late Paleoindian Period (8500-8000 BCE).

Early Paleoindian, or Clovis, archaeological sites include Big Bone Lick in northern Kentucky and Parrish, Adams, and Savage Cave in western Kentucky. The Clovis Period is so-named for a site in Clovis, New Mexico.[58] Clovis people are known for creating distinctive stone spear points called "Clovis points." Clovis artifacts can be found throughout North America and bear similarities to African and Eurasian stone tools of the same period. Clovis people were considered the oldest inhabitants of North America for a long time, but more recently discovered evidence suggests that people may have ventured over the Bering Strait, by land and sea, as far back as 20,000 years ago.

[57] Tankersley, Kenneth B. “Ice Age Hunters and Gatherers.” In *Kentucky Archaeology*, edited by R. Barry Lewis, 21-38. Lexington, Kentucky: University of Kentucky Press, 1996.
[58] Lovgren, Stefan. "Clovis People Not First Americans" 2007.

Over the course of the Middle and Late Paleoindian periods, stone tools became more diversified, and methods and materials changed.[59] Spear points of this period from the Cumberland River basin are known as Cumberland points. Environmental changes throughout the Paleoindian Period, including continual warming of the climate and glacial retreat, meant that the vegetation of any given area was changing continually.

As the Paleoindian Period continued into the Late Paleoindian Period, spear points became divided into two types, Lanceolate Plano points and Dalton Cluster points.[60] Dalton Cluster points are associated with cave and rockshelter sites in the Midwest and Southeast. The changes in projectile points throughout the Paleoindian Period is correlated with changes in game animal populations. For example, mammoths and mastodons – the largest game that existed in North America by a wide margin – went extinct in North America not long after the arrival of the Clovis people, in part due to a rapidly changing environment.[61]

Changes in Late Paleoindian spear points reflected a transition to hunting and processing smaller game.[62] While foraging strategies supplemented hunting, the sites where Paleoindian people lived were centered around where game could be hunted and processed. Because of this, there is not as much evidence for Paleoindian presence in the rugged terrain of the Cumberland Plateau as there is in the flatter and more open regions of Central and Western Kentucky.

---

[59] Tankersley, Kenneth B. “Ice Age Hunters and Gatherers.” In *Kentucky Archaeology*, 1996.
[60] Tankersley, Kenneth B. “Ice Age Hunters and Gatherers.” In *Kentucky Archaeology*, 1996.
[61] Haynes, Gary. "The Catastrophic Extinction of North American Mammoths and Mastodonts." *World Archaeology* 33, no. 3 (2002): 391-416.
[62] Tankersley, Kenneth B. “Ice Age Hunters and Gatherers.” In *Kentucky Archaeology*, 1996.

Archaic Period (8000-1000 BCE)

The end of the Ice Age brought on significant changes for the people of North America.[63] The period following the Paleoindian Period is known as the Archaic Period, which lasted from around 8000 BCE to 1000 BCE. The Archaic Period, too, can be divided into three subperiods: the Early Archaic (8000-6000 BCE), Middle Archaic (6000-3000 BCE), and Late Archaic (3000-1000 BCE) periods.

The Early Archaic Period was a time of great transition over the next few thousand years, as the Pleistocene Epoch ended and the Holocene began.[64] The most noticeable and distinct change in stone tools from the Late Paleoindian to Early Archaic periods is the presence of a notched base in spear points. During the Early Archaic Period, archaeological evidence suggests that subsistence strategies still heavily relied on hunting rather than foraging: there was a continued presence and diversity in the archaeological record of tools related to hunting and processing animals rather than gathering and processing plants. Archaeological sites like Deep Shelter in Rowan County and Cloudsplitter in Menifee County indicate that people had begun to move into the Pottsville Escarpment region. This could be due to reliance on smaller game as Pleistocene megafauna went extinct, since megafauna like Mammoths did not have as much of a presence in the mountains.

Evidence from the Deep Shelter and Cloudsplitter archaeological sites suggests increased reliance on plants over hunting as the Archaic period continued.[65] Cloudsplitter rockshelter has evidence from around 7000 BCE that Early Archaic people

[63] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, edited by R. Barry Lewis, 39-78. Lexington, Kentucky: University of Kentucky Press, 1996.
[64] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[65] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.

used the site as shelter along their seasonal route to hunt deer and gather nuts. Deep Shelter has similar evidence that it was used as a campsite by Early Archaic hunters. The presence of middens (refuse heaps that have an incredible potential for archaeological information) suggests a more persistent seasonal use of mountain-top sites in southeastern Kentucky. Climatic changes signaled the start of the next phase of the Archaic period.

The Middle Archaic Period was brought on by a period of climatic warming and drying called the hypisthermal climatic interval, from about 7000 BCE to 3000 BCE.[66] Some higher elevation areas in the Cumberland Plateau continued to have boreal forest characteristics into the Early Archaic Period. However, the Middle Archaic period saw a transition to grassland in lowland areas and drier forests in higher-elevation areas. Whitetail deer and wild turkey were important game for Middle Archaic people, and nut trees, like hickory, continued to be vital foraging sources. Shellfish, like river mussels, became a more important food source. Stone tools, and tools of other materials, like antler, continued to develop, and tools for processing plant material, like pestles, were common. A new type of hunting weapon, the atlatl, came into use during the Middle Archaic Period and allowed hunters to throw spears much further. While many populations were still seasonally transient, some sites along the Ohio and Tennessee-Cumberland River valleys saw more intensive, long-term occupation.

The hypisthermal climatic interval ended around 3000 BCE, and the climate started a period of cooling that lasted until recently, with anthropogenic climate change setting off a period of global warming.[67] The staple diet of Late Archaic people was

[66] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[67] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.

similar to the Middle Archaic Period; whitetail deer and hickory nuts were dominant, supplemented by small mammal and bird game, river mussels, fruits, seeds, and other nuts. Foraging for plants that would soon be domesticated, like goosefoot, marsh elder, and erect knotweed, was typical.

By the end of the Late Archaic period, evidence of cultivation of Eastern Agricultural Complex plants like goosefoot, marsh elder, erect knotweed, maygrass, and squash existed.[68] Cumberland Plateau sites, including the Cloudsplitter and Deep Shelter sites, became occupied in a more long-term manner during the Archaic period. Three phases of this occupation are classified: the Skidmore Phase, the Slone Phase, and the Cogswell Phase.

The Skidmore Phase was centered on Rowan, Menifee, and Powell Counties (aligning with Middle Archaic occupation) in the Pottsville Escarpment region and lasted from 2400 to 1650 BCE.[69] The Skidmore site in Powell County and Bluestone site in Rowan County were basecamps with evidence of earth ovens, sandstone hearths, and middens. Evidence at rockshelter sites like Cloudsplitter shows that people visited the site but did not use it for permanent occupation. At this point, the region was mainly mixed oak-chestnut-hickory forest, similar to what the region would have primarily been prior to extensive logging and blight during the nineteenth and twentieth centuries.

The Slone Phase is centered on Pike County, which sits at the sharp eastern corner of the state, where Kentucky, West Virginia, and Virginia meet. The Levisa Fork tributary of the Big Sandy River bisects this large county.[70] The Slone Phase is dated to

[68] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[69] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[70] Andrews, William, 2009, Eastern Coal Field Region.

about 1900 BCE and contains archaeological evidence for seasonally occupied floodplain settlements.[71] Unlike the Skidmore Phase, the Slone Phase does not contain Archaic Period evidence for plant cultivation. Two Woodland Period phases follow the Skidmore phase in the region, the Thacker and Sim's Creek phases.

The Cogswell Phase lasted from 1500 to 800 BCE, spanning the Late Archaic and Early Woodland periods.[72] The Cogswell Phase covered settlements in major drainage sites throughout Eastern Kentucky. Alongside hunting, foraged hickory nuts, acorns, and chestnuts served as significant food sources, as well as cultivated sunflower, goosefoot, marsh elder, and erect knotweed. The Cold Oak Shelter in Lee County is a primary archaeological site for the Cogswell Phase. Other major settlement sites outside the Cumberland Plateau and Mountain regions include the Green River Valley in Western Kentucky, the lower Tennessee-Cumberland River Valleys in Southern Kentucky, and the Bluegrass region in Central Kentucky. Throughout the state, tools of the Late Archaic period were highly specialized, and some tools were stylistic and decorated. Evidence of non-local materials revealed the presence of long-distance trade networks beginning around 3000 BCE.

Woodland Period (1000 BCE-900 CE)

The Woodland Period contains several overlapping cultures, including two notable Woodland cultures, the Hopewell and Adena.[73] People of the Woodland Period shared similarities with the Late Archaic Period in subsistence strategies of hunting, gathering, and cultivating Eastern Agricultural Complex plants. Woodland people also

[71] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[72] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[73] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, edited by R. Barry Lewis, 79-126. Lexington, Kentucky: University of Kentucky Press, 1996.

developed two distinctive cultural facets: pottery and mound building. As with the Paleoindian and Archaic periods, the Woodland Period can be divided into Early, Middle, and Late periods.

The Early Woodland period lasted from around 1000 BCE, when pottery became widespread, to about 200 BCE, when the Hopewell culture began.[74] Archaeological evidence suggests that the first pottery in Kentucky was made in the eastern part of the state and spread westward over about 500 years. The first pottery of Eastern Kentucky is part of what is known as the Fayette Thick tradition. The first archaeological evidence of woven textiles also comes from this period, and some early pottery has cord and fabric impressions on the exterior and interior walls. Subsistence during this period was similar to the Archaic Period, and cultivation of Eastern Agricultural Complex plants continued.

Analysis of the desiccated remains of a young boy dated to be from the Woodland Period has provided precise evidence of what kinds of foods Woodland people ate. "Little Al," who was originally found in Salts Cave near Mammoth Cave National Park, had eaten marsh elder, hickory nuts, goosefoot, and grubs before he passed.[75] Archaeological evidence in the sandstone rockshelters of the Cumberland Plateau region suggests that Early Woodland people had more sustained occupation in rockshelters than previous groups. In the escarpment region, Archaic Period valley camps were abandoned in favor of rockshelters. Horticulture could be the reason for this. As Cecil Ison suggests in “The Cold Oak Shelter: Providing a Better Understanding of the Terminal Archaic” (1988), hillside gardens would have been the most viable method of

[74] Railey, Jimmy A. “Woodland Cultivators.” In *Kentucky Archaeology*, 1996.
[75] Robbins, Louise M. "A Woodland "Mummy" from Salts Cave, Kentucky." *American Antiquity* 36, no. 2 (1971): 200-206.

plant cultivation in the rugged plateau region, and rockshelters would have given close access to these sites.[76]

As Little Al's diet demonstrates, Woodland people likely relied more on plants than hunting, so gardening would have been more intensified.[77] Alongside the Cloudsplitter site, Newt Kash Hollow became an important rockshelter site for archaeologists studying the Woodland period. Further east, near the Big Sandy River, which today forms the border between Kentucky and West Virginia, settlements favored longer valley sites.

The beginning of the Hopewell culture marked the start of the next part of the Woodland Period, the Middle Woodland, which lasted until about 500 CE, when the Hopewell overlapped with two later groups: the Mississippian and Fort Ancient people.[78] By the Middle Woodland Period, pottery throughout the state was quite diverse. A type of archaeological evidence called sherds, which are pottery fragments, show evidence of several diverse types of pottery present during this period. Some pottery had little decoration or the cord or fabric-impressed decoration that was common to Early Woodland pottery. Other sherds have evidence of check-stamped decoration associated with the American South and decorative elements associated with Hopewellian decoration. By the end of the Middle Woodland period, the check-stamped and Hopewellian pottery was no longer made, but the cord-marked pottery tradition continued.

---

[76] Ison, Cecil R., Charles D. Hockensmith, David Pollack, and Thomas N. Sanders. "The Cold Oak Shelter: Providing a Better Understanding of the Terminal Archaic." *Paleoindian and Archaic Research in Kentucky*, (1988): 205-219.
[77] Railey, Jimmy A. “Woodland Cultivators.” In *Kentucky Archaeology*, 1996.
[78] Railey, Jimmy A. “Woodland Cultivators.” In *Kentucky Archaeology*, 1996.

It is accepted that the Hopewell culture emerged first and the Adena culture later. However, they overlap temporally in Kentucky.[79] During their period of overlap, Hopewell people were centered more around the western and southern counties of Kentucky, while Adena people were centered around the northern and eastern counties. During the Middle Woodland Period, Central Kentucky became home to hundreds of Adena burial mounds and other earthworks. As the Woodland Period progressed, Adena mounds became larger and more complex, and their associated artifacts became more finely crafted. Valleys associated with the Big Sandy drainage area were also used by Adena people, like the C & O mound site in Johnson County.

The Late Woodland Period saw a decline in the trading of Adena goods and earthwork construction.[80] The Woodland Period is considered to have ended later in Eastern Kentucky (around 1000 CE), than it did in Western and Southern Kentucky (around 900 CE). There was a great deal of cultural change during the Late Woodland Period, including the introduction of the bow and arrow to Kentucky. While hunting was still necessary, horticulture was intensifying. During the last couple hundred years of the Woodland period, maize was introduced into the region. It would be the harbinger of significant cultural changes in Kentucky during the subsequent Mississippian Period. The end of the Woodland Period would mark a transition from Hopewell to Mississippian and Fort Ancient cultures.

[79] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.
[80] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.

Late Prehistoric Period (900-1650 CE)

The Late Prehistoric Period began with the decline of Hopewell and Adena cultures and the emergence of the Mississippian and Fort Ancient traditions.[81] As with the Hopewell and Adena cultures, Mississippian and Fort Ancient traditions were associated with Western and Southern Kentucky and Northern and Eastern Kentucky, respectively. Because Mississippian culture was largely absent from the Cumberland Plateau regions, the Fort Ancient culture will be the focus of this section. Like the Mississippian tradition, people classified as "Fort Ancient" are associated with different groups of people that shared cultural commonalities with each other and with the prior culture of the Adena people. Fort Ancient people had less presence in the plateau region than groups during previous periods, and were mainly limited to the Kentucky River and Big Sandy River drainage areas. The Woodside Phase refers to this period in the plateau region.

By this time, the maize-based Three Sisters agricultural complex had been introduced to the Eastern and Northern United States for some time and had become widespread throughout the country.[82] This crop complex utilizes companion planting of maize, corn, and squash. The maize stalk acts as a trellis for the beans, which fixes nitrogen for the squash and maize, and the squash shades the soil, preventing the growth of weeds.[83] Variations to the complex existed, like adding Rocky Mountain beeplant, which has edible greens and attracts pollinators. Other "fourth sisters" include

[81] Lewis, R. Barry "Mississippian Farmers." In *Kentucky Archaeology*, edited by R. Barry Lewis, 127-160. Lexington, Kentucky: University of Kentucky Press, 1996; Sharp, William E. "Fort Ancient Farmers." *Kentucky Archaeology*, edited by R. Barry Lewis, 161-182. Lexington, Kentucky: University of Kentucky Press, 1996.
[82] Smith, Bruce D. "The Cultural Context of Plant Domestication in Eastern North America." 2011.
[83] Landon, Amanda J. "The 'How' of the Three Sisters: The Origins of Agriculture in Mesoamerica and the Human Niche." *Nebraska Anthropologist* 23 (2008): 40.

bee balm and sunflower.[84] Sunflower and squash were the only Eastern Agricultural Complex plants that retained widespread agricultural use into this period and present day, likely in part due to their incorporation into the Three Sisters crop complex. An agricultural economy based on maize connected many groups of the southeastern United States.[85]

Like the Adena people, Fort Ancient groups created large-scale earthworks. Their most famous earthworks are Serpent Mound, near Peebles, Ohio, and the Alligator Effigy Mound, near Granville, Ohio (Figure 2.13). As their names suggest, these mounds represent serpent-like and alligator-like animals. There are different hypotheses regarding the meaning and purpose behind these mounds. Despite its name, some historians think that Alligator Effigy Mound depicts the Underwater Panther.[86] This mythical creature has ties to Eastern Woodland traditions and is still an aspect of indigenous cultures in the Great Lakes region, like the Anishinaabe. The Underwater Panther is thought to align with the constellation Scorpio, and the shape of the Alligator Effigy Mound seems to reflect this alignment. It is possible that Serpent Mound also has mythological and astrological connections. Large serpent creatures are present in other indigenous cultures, like the feathered serpent of Mesoamerican tradition and the tie-snake and horned serpent of Muscogee tradition.[87] Analysis of Serpent Mound has

[84] Pace, Katie. “The Three Sisters.” Sustainable Food Center, July 29, 2015.
[85] Lewis, R. Barry “Mississippian Farmers.” In *Kentucky Archaeology*, 1996.
[86] Gill, Jeff. "The Archaeoastronomy of Alligator Mound." Ohio History Connection. Ohio History Connection, January 20, 2014.
[87] Lenik, Edward J. “Mythic Creatures: Serpents, Dragons, and Sea Monsters in Northeastern Rock Art.” *Archaeology of Eastern North America* 38, (2010): 17-37.

revealed that its head aligns with the Summer Solstice sunset, and it is speculated that its distinctive curves also have similar astronomical alignments.[88]

Several mound sites thought to also possibly represent serpents are present in Eastern Kentucky, including ones in Boyd County, Lawrence County, and Menifee County. The site in Menifee County, located in the Pottsville Escarpment region, is called the Spratt Stoneworks.[89] While much of the information in the National Register of Historic Places nomination for the Spratt Stoneworks is restricted, as it is a restricted archaeological site, the period of significance is listed as 1499-1000 BCE and 1000-999 BCE. This would align with the Archaic and Woodland periods. According to Sarah L. Sanders, in her 1991 *Midcontinental Journal of Archaeology* paper titled "The Stone Serpent Mound of Boyd County, Kentucky: An Investigation of a Stone Effigy Structure:" "The Spratt Stoneworks (15Mf355) consist of a series of stone walls, oriented east-west, and an associated group of 23 small stone piles."[90]

Figure 2.13. Serpent Mound. Adams County, Ohio.

[88] Napoleon, Craig. "Astronomical Alignments at Serpent Mound." HMdb. The Historical Marker Database, February 4, 2021.
[89] "Spratt's Petroglyphs (15MF353)," National Register of Historic Places Nomination Form (Washington, DC: U.S. Department of the Interior, National Park Service, 1989).
[90] Sanders, Sara L. "The Stone Serpent Mound of Boyd County, Kentucky: An Investigation of a Stone Effigy Structure." *Midcontinental Journal of Archaeology* 16, no. 2 (1991), 277.

Historians have not entirely deduced the relationship between Mississippian and Fort Ancient cultures and contemporary Native American tribes. Contemporary tribes that likely had traditional lands in Eastern Kentucky include the Cherokee, Shawnee, Yuchi, and Osage.[91] Cherokee people are believed to be descendants of the Pisgah Phase of the Mississippian tradition and Shawnee people are thought to be descended from Fort Ancient people.[92] In 2021, Shawnee Tribe Chief Ben Barnes and Eastern Shawnee Tribe of Oklahoma Chief Glenna Wallace visited Serpent Mound on the summer solstice.[93] They educated visitors on the history of the site and the Shawnee peoples' connection with it. This was purportedly the first time the Shawnee people had officially returned to the site since the United States government removed Native American groups from the region. The traditional lands of Yuchi and Osage people overlap only slightly into Eastern Kentucky, on the southeastern edge and northeastern edge of the state, respectively.

European Contact to Today

Apart from the Eastern Band of Cherokee Indians in western North Carolina, federally-recognized tribes of Shawnee, Cherokee, Yuchi, and Osage people are located in Oklahoma, where they were removed to during the aftermath of President Andrew Jackson's Indian Removal Act of 1830.[94] Even before this, Native Americans in Kentucky were murdered, infected intentionally and unintentionally with diseases, and killed in battle by European colonizers. Some historical accounts, primarily by English

[91] Native Land Database. native-land.ca.
[92] Dickens, Roy S. 1976. *Cherokee Prehistory: The Pisgah Phase in the Appalachian Summit Region*. Knoxville: The University of Tennessee Press; Henderson, A. Gwynn and David Pollack, "A Native History of Kentucky," in Native America: A State-by-State Historical Encyclopedia, 2012.
[93] Pember, Mary A. "Shawnee Reclaim the Great Serpent Mound." ICT News. Indian Country Today, June 21, 2021.
[94] Henderson, A. Gwynn and David Pollack, "A Native History of Kentucky," 2012.

settlers, have attributed the diminished population of Native Americans in Kentucky during early European settlement to a series of attacks by the Five Nations of the Iroquois Confederacy on tribes in the Ohio River Valley between 1669 and 1672.[95] However, this is likely overstated, and diminished populations in Kentucky may instead be attributed to the development of larger and fewer towns, including European trading centers, in surrounding states that resulted in population shifts out of the state, and the introduction of diseases like smallpox that quickly swept through Native American populations and had high infection and mortality rates due to lack of natural immunity.

One town, known as Lower Shawneetown, Shannoah, and Sonnontio, was located on both sides of the Ohio River in present-day Scioto County, Ohio, Lewis County, Kentucky, and Greenup County, Kentucky.[96] Lower Shawneetown is thought to be one of the principle Shawnee villages of the mid-eighteenth century.[97] It was built around 1738 and was a significant fur-trading site during the 1740s and 1750s. The town was located at the mouth of the Scioto River along the Warrior's Path, also called Athiamiowee or Athawominee in Shawnee.[98] The Warrior's Path was a Cherokee and Shawnee game trail that extended from Shawnee territory around Lower Shawneetown through the Cumberland Gap to Cherokee territory in southeastern Tennessee. It ran through some of the counties that are within the Pottsville Escarpment. The Warrior's Path was part of a larger trail system that connected the Great Lakes region to the Gulf of Mexico. While it has a similar name, the Warrior's Path is distinct from the so-called

[95] Henderson, A. Gwynn and David Pollack, "A Native History of Kentucky," 2012.
[96] "Lower Shawneetown." Discover Kentucky Archaeology. Commonwealth of Kentucky, Accessed May 21, 2022.
[97] Feight, Andrew L. "Lower Shawnee Town and Céleron's Expedition of 1749." Scioto Historical. Center for Public History at Shawnee State University, June 1, 2023.
[98] Fugate, Ariel. "The Warrior's Path Project: Restoring an Ancient Trail Throughout Eastern Kentucky." Mountain Association. Mountain Association, November 9, 2021.

Great Indian War Path, or Seneca Trail, which is located further east. In 1753, the original site of Lower Shawneetown flooded and was moved to higher ground on the Ohio side, where Portsmouth is located today.

The post-colonization development of the plateau region was different from the rest of the state due to a lack of arable land and rugged topology.[99] This meant there were very few larger settlements or plantations, and most of the agriculture in the region was subsistence farming. Extractive industries like logging and mining dominated. During the Antebellum period, niter (or saltpeter) mining was common in Eastern and Western Kentucky. Archaeological excavation from Carter Caves in Carter County shows that over 50,000 pounds of niter were extracted from one cave using a wood-leaching vat system. Niter is a component of gunpowder, and Kentucky niter was primarily used for the War of 1812 and the Civil War. In the Appalachian region of the state, a large timber industry formed during the 1870s and was booming at the turn of the century. While commercial coal mining came to the Western Coal Fields several decades earlier, it reached the Eastern Coal Fields region around the turn of the century. By 1913, coal production in Eastern Kentucky surpassed that in Western Kentucky, a trend that has continued to this day. Several industrial towns developed along the Big Sandy River and were involved in the timber and coal industries.

In 1937, much of the Pottsville Escarpment region became part of the then Cumberland National Forest, now known as the Daniel Boone National Forest.[100] The Daniel Boone National Forest has a two-million-acre proclamation boundary and includes 700,000 acres of federally-owned land. The creation of the National Forest has

[99] McBride, Kim A. and W. Stephen McBride "From Colonization to the Twentieth Century." *Kentucky Archaeology*, edited by R. Barry Lewis, 183-212. Lexington, Kentucky: University of Kentucky Press, 1996.
[100] Jackson, Savannah. "The History of the Daniel Boone National Forest." Rowan County Kentucky.

minimized logging in the escarpment area, and coal mining has retreated to the southeastern part of the state, apart from one active mine in Estill County, the Bowie Refined Coal Company.

Tribal Status in Kentucky

Much of the documented post-colonization history of Kentucky is focused on the primarily white, settler history of the state. It is important to note that while Kentucky does not have any federally-recognized tribes, there are some people of indigenous descent in the state. According to the 2022 census, only 0.3% of Kentuckians identified as "American Indian and Alaska Native, alone."[101] There has been a history of people in the South claiming some indigenous heritage although the accuracy and origins of these claims have been disputed. Currently, the state of Kentucky does not have a formal system for recognizing tribal groups. There are, however, two tribes in Kentucky that have been recognized in the past by the Commonwealth of Kentucky: the Southern Cherokee Nation of Kentucky and the Ridgetop Shawnee Tribe of Indians. The Southern Cherokee Tribe of Kentucky was recognized by governor John Young Brown in an 1893 letter, and in 2006 was recognized by a proclamation by Governor Ernie Fletcher.[102] The Ridgetop Shawnee Tribe of Indians was "commended" by the Kentucky General Assembly in joint resolutions HJR-15and HJR-16 in 2009 and 2010, respectively.[103] The initial resolution both commended *and* recognized the Ridgetop Shawnee, but the

[101] "QuickFacts: Kentucky." United States Census Bureau. United States Census Bureau, July 1, 2022.
[102] Ernie Fletcher, Governor of the Commonwealth of Kentucky. Proclamation regarding the Southern Cherokee of Kentucky. November 20, 2006.
[103] Kentucky General Assembly, 2009 Regular Session. A joint resolution commending the Ridgetop Shawnee Tribe of Indians for their efforts on behalf of preserving Native American heritage. House Joint Resolution 15. February 26, 2009; Kentucky General Assembly, 2010 Regular Session. A joint resolution commending the Ridgetop Shawnee Tribe of Indians for their efforts on behalf of preserving Native American heritage. House Joint Resolution 16. February 2, 2010.

amended resolution, HJR-16, was rephrased to only commend the tribe. A series of bills brought to the Kentucky House between 2008 and 2014 aimed to formalize a process for recognizing tribal groups, but have not been adopted into the Kentucky Revised Statutes Chapter 171, which outlines the Kentucky Native American Heritage Commission's duties.[104] Despite what seems to be a history of recognizing at least those two tribes, or at least the Southern Cherokee Nation, the Commonwealth of Kentucky does not have a contemporary formal process for recognizing tribal groups.

While many states do have formal processes for state recognition of tribes, federally-recognized tribes are often critical of state recognition and have questioned the legitimacy of state-recognized and unrecognized tribes. In a November 2010 newsletter, the Absentee Shawnee Tribe of Oklahoma, a federally-recognized tribe, criticized the Ridgetop Shawnee as one of a number of groups that claim Shawnee ancestry who: "Constantly seek and receive opportunities that should justly be directed to federally-recognized bands of Shawnees. Considering the impacts on economics, sovereignty and culture, the antics of these individuals/groups can no longer be ignored."[105] A *Cherokee Phoenix* article from 2007 reflects similar sentiments that Cherokee tribal groups hold for unrecognized and state-recognized groups that claim Cherokee or other Indigenous ancestry, often nicknamed "wannabes."[106] A lack of a continual *tribal* presence in Eastern Kentucky does not mean that there are not people of Native American descent living in the region. There is, however, a political and cultural difference between

[104] KRS 171.822.
[105] Tribal Historic Preservation Office Cultural Preservation Department. The Absentee Shawnee News (Shawnee, Oklahoma), November 2010.
[106] Snell, Travis. "Non-recognized 'Cherokee Tribes' Flourish." Cherokee Phoenix. Cherokee Phoenix, January 19, 2007.

federally-recognized tribal groups and individual families or people who may have a small amount of Native American ancestry.

People of non-white descent who do not have tribal affiliations are also an important part of the history of Central Appalachia. An ethnic group called Melungeons historically claimed white, Black, Native American, and Portuguese ancestry (and sometimes Spanish, Italian, Moorish, and Roma ancestry). The term is thought to have originated along the Tennessee-Virginia border in the nineteenth century, likely as a slur to denote dark-skinned people in the area. While there is no state or federally-recognized "Melungeon" tribe, there is a Melungeon Heritage Association, a non-profit based in West Virginia.[107] The term typically refers to people in Central Appalachia; eastern Tennessee and Kentucky, and western Virginia and West Virginia. However, there are similar enclaves of mixed-race people who claim to have indigenous heritage throughout the eastern United States, like the Lumbee Tribe of North Carolina and Carmel Indians of Ohio, who are sometimes referred to as Melungeon. While some Melungeon people might have indigenous genetic heritage, genetic testing has revealed that people who self-identify as Melungeon are primarily of Western European and Sub-Saharan African descent.[108] It is probable that the claim of Portuguese ancestry came from mixed-race people who likely had Black ancestry identifying with darker-skinned European ethnic heritage rather than Black in order to avoid racial discrimination.

[107] "About the Melungeon Heritage Association." Melungeon Heritage Association.
[108] "Frequently Asked Questions." ." Melungeon Heritage Association.

CONCLUSION

This chapter has provided some context for the rich geological, geographical, ecological, and cultural history of Eastern Kentucky leading up to the development of the Eastern Agricultural Complex, the current state of the Pottsville Escarpment region, and the history of Native American's presence in the state. The following chapter will provide a more detailed history of the development of the Eastern Agricultural Complex in Kentucky.

CHAPTER 3: THE EASTERN AGRICULTURAL COMPLEX

INTRODUCTION

Since the discovery of Eastern Agricultural Complex seeds at archaeological sites in the 1930s and the broad acceptance of the Eastern Agricultural Complex as an independent center of plant domestication in the 1980s, our knowledge of the development of the Eastern Agricultural Complex has increased immensely.[109] With that being said, there are still many questions that have yet to be answered about the planting, harvesting, processing and use of Eastern Agricultural Complex crops, and about the people who farmed them. This chapter will detail some of what is currently known about the seven plant species associated with the crop complex, the features of the Pottsville Escarpment landscape that influenced the cultivation of those species, and some of the important archaeological sites in Eastern Kentucky that have revealed information about cultural development in the region, including the development of the Eastern Agricultural Complex.

Eastern Agricultural Complex crops are frequently divided into “oily” and “starchy” plants, and many have comparable characteristics to cereal and pseudocereal crops widely used today. Apart from squash, which has edible flowers, fleshy fruit and seeds, most of the species were likely cultivated for their seeds. Goosefoot has edible seeds and leaves, and modern crops in the same genus have been cultivated for either

[109] Jones, Volney. "Vegetal Remains of Newt Kash Hollow Shelter in Rock Shelters in Menifee County, Kentucky." *Reports in Archaeology and Anthropology*, (1936).

feature, so it is possible goosefoot was cultivated for both seeds and leaves.[110] Some Eastern Agricultural Complex plants have clear evidence of domestication, such as marsh elder and goosefoot. The features of plant morphology and characteristics associated with domestication are collectively called "domestication syndrome."[111] While the term "syndrome" frequently has negative connotations, domestication syndrome does not refer to negative features or disease, but rather a state of plant characteristics that are distinct from wild-type specimens. Other plants in the Eastern Agricultural Complex do not show huge differences between cultivated and wild-type specimens. However, Late Archaic and Woodland people likely would have had plants with varying degrees of domestication syndrome growing in tandem. Some terminology differentiates those species that have a clear distinction between wild and domesticated specimens as "domesticates" rather than simply "cultivars" or "cultigens."

The Late Archaic-Early Woodland transition period saw a correlation between Eastern Agricultural Complex cultivation, hillside gardening, rockshelter occupation, anthropogenic fire use, petroglyphs and hominy holes.[112] The evidence for this correlation will be explored in this chapter. Nutritional information provided in this chapter regarding these species are representative of contemporary wild type specimens, rather than of archaeological samples of domesticate seeds. This is because such archaeological specimens are often desiccated, burnt, or otherwise broken down or

[110] Gremillion, Kristen J. "Goosefoot (*Chenopodium*)." In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 44-64. Tuscon, Arizona: University of Arizona Press, 2014.
[111] Smith, Bruce D. "The Cultural Context of Plant Domestication in Eastern North America." 2011.
[112] Gremillion, Kristen J. "Prehistoric Upland Farming, Fuelwood, and Forest Composition on the Cumberland Plateau, Kentucky, USA." *Journal of Ethnobiology* 31, no. 1 (2015): 60-84; Ison, Cecil R. "Farming, Gender, and Shifting Social Organization: A New Approach to Understanding Kentucky' Rock-Art." In *The Rock-Art of Eastern North America: Capturing Images and Insight*. Edited by Carol Diaz-Granados and James R. Duncan. 177-189. Tuscaloosa, Alabama: University of Alabama Press, 2004.

damaged, so the analysis of nutritional qualities would not yield accurate results. Several researchers utilize photographic comparisons of plant specimens, often seeds. Photographic comparisons can be made of different cultivars, wild-growing and intentionally planted specimens, domesticated and cultivated specimens, and archaeological and contemporary specimens.

Researchers estimate that the historic range of the Eastern Agricultural Complex is centered around a core area of Kentucky, Tennessee, and Missouri, along with segments of Arkansas, Iowa, Illinois, Indiana, and Ohio.[113] Some representations show the complex extending slightly into Virginia, West Virginia, Georgia, Alabama, Mississippi, Louisiana, Oklahoma, and Kansas.[114]

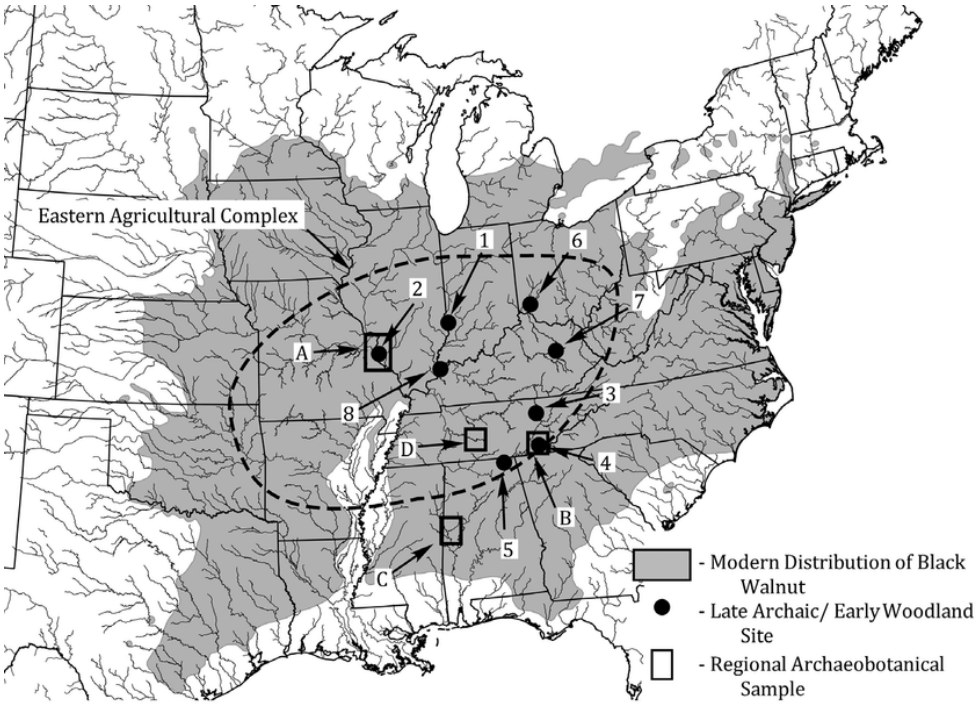


Figure 3.1. A map of the Eastern Agricultural Complex (dashed line) superimposed onto the modern range of Black Walnut (*Juglans nigra*) from "Foraging models, niche construction, and the Eastern Agricultural Complex" by David W. Zeanah

[113] Smith, Bruce D. and Richard A. Yarnell. "Initial Formation of an Indigenous Crop Complex in Eastern North America at 3800 B.P." *Proceedings of the National Academy of Sciences of the United States of America* 106, no. 16 (2009): 6561-6566.
[114] Zeneah, David W. "Foraging Models, Niche Construction, and the Eastern Agricultural Complex." *American Antiquity* 82, no. 2 (2017): 3-.24.

SPECIES OF THE EASTERN AGRICULTURAL COMPLEX

Little Barley (*Hordeum pusillum*)

Little barley is an annual grass in the *Poaceae* family (Figure 3.2).[115] As the name suggests, little barley resembles other cereal grains like wheat and barley. It is in the same genus as barley (*Hordeum vulgare*), which was domesticated from spontaneous or wild barley (*Hordeum spontaneum*). Barley was domesticated separately in the Fertile Crescent and Central Asia around 10,000 years ago, and is still an important crop. In fact, the etymology of the English word “barn” actually stems from barley. Little barley's native range includes the continental United States, Ontario, and Canada's far western provinces. Little barley seeds are starchy, and 100 grams of little barley seeds would provide 24.3 percent of daily carbohydrate, 22.4 percent of daily protein, 18 percent of daily calories, and 5-6 percent of daily fiber recommended for a 2,000 daily calorie diet.[116] These values are comparable to other common domesticated grains like barley, maize, and wheat. Archaeological evidence suggests that little barley grains were parched, or dry roasted, before being stored or consumed. In other crops, parching aids in killing insect larvae and fungal spores, and can keep the lipid content of the grain from going rancid, allowing for them to be stored longer. It can be assumed that parching little barley grains had similar benefits.

---

[115] "*Hordeum pusillum*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, May 6, 2014.

[116] Adams, Karen R. “Little Barley Grass (*Hordeum pusillum* Nutt.): A Prehispanic New World Domesticate Lost to History.” *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 139-179. Tuscon, Arizona: University of Arizona Press, 2014.

Figure 3.2. *Hordeum pusillum* or little barley plant (Image courtesy of Dr. Gail E. Wagner).

Maygrass (*Phalaris caroliniana*)

Maygrass, also called Carolina canarygrass, an annual grass in the family *Poaceae*, is a cereal grain (Figure 3.3).[117] Maygrass' native range includes most states in climate zones six, seven, and eight. Maygrass grows in loamy, alluvial soil and floodplains. It can also grow in disturbed areas like pastures. Maygrass seeds ripen in May or June, which is early compared to other crops.[118] This could have made them an especially important food crop as winter food stores were diminished by spring and early summer. Maygrass seed heads are easily harvested by hand or with a sharp tool, and informal experimentation with growing and harvesting maygrass by Gayle J. Fritz and Gail E. Wagner suggests that whole seed heads would have been removed, rather than beating individual seeds into a basket in the way that many other cereal and pseudocereal crops are harvested. Maygrass has a nutrient density value of 5.33 for protein, has a higher calorie density (370 kilocalories per 100 grams) than maize and

[117] "*Phalaris caroliniana* Walter." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, December 2, 2022.
[118] Fritz, Gayle J. "Maygrass (*Phalaris caroliniana* Walt.): Its Role and Significance in Native Eastern North American Agriculture." In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 12-43. Tuscon, Arizona: University of Arizona Press, 2014.

goosefoot, and has especially high thiamin and dietary iron nutrient density values (6.08 and 5.83, respectively). Paleofecal samples from Salts Cave and Mammoth Cave in the Green River drainage area of Kentucky show a correlation between consumption of maygrass and consumption of strawberries and raspberries or blackberries. In 2001, James Schoenwetter speculated that this evidence, along with evidence that the samples with maygrass seed lacked grass pollen, suggested that people used a fermentation process involving chewing and spitting out maygrass seeds and adding fruit to create a beer that could have had ceremonial cave-related use.[119] While this is an intriguing idea and has not necessarily been *disproven*, it is highly speculative and a bit of a reach considering the evidence present.

Figure 3.3. *Phalaris caroliniana* or maygrass plants (Image courtesy of Dr. Gail E. Wagner).

Marsh Elder (*Iva annua* var. *macrocarpa*)

Marsh elder, also called sumpweed, is an herbaceous annual forb in the family

[119] Schoenwetter, James. Paleoethnobotanical Expressions of Prehistoric Ritual: An Early Woodland Example. In *Fleeting Identities: Perishable Material Culture in Archaeological Research*, edited by Penelope B. Drooker, 272-284, Center for Archaeological Investigations Occasional Papers no. 28. Carbondale: Southern Illinois University.

Asteraceae (Figure 3.4).[120] The variety associated with the Eastern Agricultural Complex is *Iva annua* var. *macrocarpa*. Marsh elder's native range is centered around Kentucky, Arkansas, and Missouri. Marsh elder seems to have had special significance to the Kansas City Hopewell culture.[121] However, its pollen has the potential to be a severe allergen, like its *Asteraceae* relative ragweed.[122] This is thought to be one of the reasons why it may have been abandoned for maize, which has less of an allergen potential. Marsh elder seeds are similar to sunflower seeds, and are high in protein, fat, calcium, iron, phosphorous, potassium, riboflavin, thiamin, and niacin. This nutritional content is comparable to sunflower. Paleofecal analysis indicates that marsh elder was often eaten with sunflower, goosefoot, and hickory nut. Marsh elder seeds can be harvested by uprooting whole plants or by stripping individual branches or groups of branches from plants. The seeds can then be removed from branches by stripping or beating.

Figure 3.4. *Iva annua* or marsh elder plants (Image courtesy Dr. Gail E. Wagner).

[120] "*Iva annua* var. *macrocarpa*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, March 29, 2023.
[121] O'Brien, Patricia J., and Frances B. King. "The Yeo Site (23CL199): A Kansas City Hopewell Limited Activity Site in Northwestern Missouri: And Some Theories." *Plains Anthropologist* 27, no. 95 (1982): 37-56.
[122] Wagner, Gail E. and Peter H. Carrington “Sumpweed or Marshelder (*Iva annua*).” In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 65-101. Tuscon, Arizona: University of Arizona Press, 2014.

Goosefoot (*Chenopodium berlandieri* ssp. *jonesianum*)

Goosefoot is a forb in the family *Amaranthaceae* (Figures 3.5 and 3.6).[123] Also called pitseed goosefoot and lamb's quarters, goosefoot has edible leaves and seeds. In literature associated with the Eastern Agricultural Complex, goosefoot is often referred to as "chenopod." Goosefoot's native range includes northern Mexico, the continental United States and Alaska, and New Brunswick, Nova Scotia, and Prince Edward Island, Canada. Goosefoot seeds are similar to its close relatives and important Mesoamerican domesticates quinoa (*Chenopodium quinoa*) and kañawa (*Chenopodium pallidicaule*), which are considered pseudocereal crops.[124] *Chenopodium berlandieri* spp. *jonesianum* is the domesticate associated with the Eastern Agricultural Complex. The subspecies *C. berlandieri* spp. *jonesianum* is now considered extinct, but cultivars likely hybridized with wild populations after the plant went out of use. Another subspecies, *Chenopodium berlandieri* ssp. *nuttalliae*, was domesticated in Mexico and is still used today. There are three cultivars of *C. berlandieri* ssp. *nuttalliae*—chia, huazontle, and quelite—each with their own distinct culinary use. Chia (which is different than the other plant commonly known as chia, *Salvia Hispanica*) is used as a grain, huazontle is used for its fruit clusters, which are similar to broccoli, and quelite is used for its greens, which are similar to spinach. It is speculated that the Eastern Agricultural Complex cultivar was used for its mature seeds, like quinoa, and for its greens, like quelite. Nutritional analysis of goosefoot shows that it is comparable to most cereal grains, like maize, with protein high in the essential amino acids lysine, methionine, and cysteine, and has a high linoleic acid content, which is an essential fatty acid.

[123] "*Chenopodium berlandieri*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, January 5, 2023.
[124] Gremillion, Kristen J. (2014). Goosefoot (*Chenopodium*).


Figure 3.5. *Chenopodium berlandieri* or goosefoot plant (Image credit: Jim Pisarowicz).
Figure 3.6. *Chenopodium berlandieri* or goosefoot seeds (Image credit: Matt Lavin).

Erect knotweed (*Polygonum erectum* ssp. *watsoniae*)

Erect knotweed is an herbaceous annual in the *Polygonaceae* (buckwheat) family (Figure 3.7).[125] Erect knotweed is also a pseudocereal plant. Erect knotweed's native range is centered in the northeastern United States into southern Canada, but is scattered west and south. Erect knotweed seeds were likely used similarly to buckwheat today, to make a flour. The subspecies *Polygonum erectum* ssp. *watsoniae* exhibits markers of domestication.[126] Analysis of erect knotweed seeds has revealed two distinct achene (fruit) morphologies: a smooth morph and a tubercled morph. Figure 3.8 contains photographic examples of the smooth morph (right) and tubercled morph (left). The smooth morphs germinate immediately in the spring, while tubercled morphs

[125] "*Polygonum erectum*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, May 2, 2023.
[126] Mueller, Natalie G. "Documenting Domestication in a Lost Crop (*Polygonum erectum* L.): Evolutionary Bet-hedgers Under Cultivation." *Vegetation History and Archaeobotany* 26, (2016): 313-327.

remain in the seed bank for one or two growing seasons, allowing for erect knotweed populations to recover if affected by adverse events. Domestication of erect knotweed relaxed this evolutionary pressure for seed dimorphism because people save seeds and manage the environment that plants are grown in. A number of Eastern Agricultural Complex-related archaeological sites have seed assemblages that exclusively contain smooth morphs, and the smooth morph achenes in these assemblages are larger than wild-type achenes.

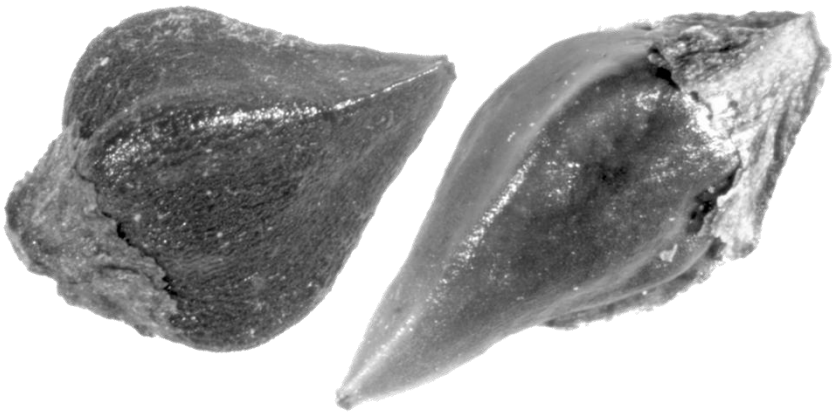


Figure 3.7. *Polygonum erectum or* erect knotweed plant (left) (Image credit: Cbaile19).
Figure 3.8 *Polygonum erectum* or erect knotweed seeds (right) (Image credit: Natalie Mueller).

Sunflower (*Helianthus annuus* var. *macrocarpus*)

Sunflower is a large flowering forb in the family *Asteraceae* (Figure 3.9). *Helianthus annuus* is one of a few cultivated sunflower species, called common sunflower or annual sunflower.[127] Sunflower is still widely cultivated globally and there are a few varieties of *H. annuus*, including *jaegeri*, *lenticularis*, *texanus*, and *macrocarpus*. *H. annuus* var. *macrocarpus* is the variety of sunflower associated with the Eastern Agricultural Complex. Because sunflower and squash continued to be

[127] "*Helianthus annuus*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, December 28, 2022.

cultivated long after other plants of the Eastern Agricultural Complex had fallen out of use, historians know much more about Native American peoples' use of those plants than other crops. Sunflower seeds were ground to make flour and were used to make cooking oil, which is the primary culinary use of sunflower seeds today. However, sunflower flour seems to have made a recent resurgence with the rise in gluten-free flour alternatives. Sunflower was also used as a dye: the petals were used to make yellow dye, and the seeds were used to make dyes that ranged from blue to maroon to black, depending on the mordant used. These dyes were primarily used for basketry and weaving. The Hopi people of the Four Corners region are most associated with using sunflowers to produce dye (Figure 3.10). A genetic study of domesticated sunflower revealed that all extant domesticated sunflower of the *Helianthus annuus* species stem from a single domestication event.[128]

Early European explorers took sunflowers back to Europe, where they became a popular ornamental plant.[129] During the nineteenth century a Russian cultivar of *Helianthus annuus* called 'Russian Mammoth' was developed. These giant sunflowers became the world's primary source of sunflower oil, made especially popular in the 1990s, when the adverse health effects of trans-fats were discovered. The potato chip industry began using stable, trans-fat-free sunflower oil from Russian Mammoth sunflowers. Russian Mammoths are popular among commercial growers in the United States, but Russia and Ukraine still export 70-80% of the world's sunflower oil. In Ukraine, the sunflower has been an important national symbol of peace. Some growers

[128] Smith, Bruce D. "Eastern North America as an Independent Center of Plant Domestication." *Proceedings of the National Academy of Sciences of the United States of America* 103, no. 33 (2006): 12223-12228.
[129] Waxman, Olivia B. "What to Know About the Meaning of Sunflowers in Ukraine." Time. TIME USA, March 4, 2022.

in the U.S. are concerned that large monocultures of Russian Mammoth and other sunflower cultivars bred for oil production threaten native and heirloom varieties, both ornamental and edible.

Figure 3.9. *Helianthus annuus* or sunflower plant (Image credit: James St. John).
Figure 3.10. Display of Hopi basket and jewelry (Image credit: Milton Snow courtesy of the Cline Library's Colorado Plateau Digital Collections).

Squash (*Cucurbita pepo* var. *ovifera*)

Squash is an herbaceous plant in the gourd family, *Cucurbitaceae* (Figures 3.11 and 3.12).[130] Squash has edible fruit, seeds, and flowers and includes a set of diverse varieties of *C. pepo*. These include *pepo* (pumpkin), *turbinata* (acorn squash), *longa* (cocozelle squash), *torticollia* (crookneck squash), *clypeata* (scallop squash), *recticollis* (straightneck squash), *fastigata* (vegetable marrow squash including spaghetti squash), *cylindrica* (zucchini), and *ovifera* (non-edible ornamental gourds). Two species of squash were early cultivars in the Americas: *Cucurbita pepo* and *Cucurbita argyrosperma*. *Cucurbita argyroperma*, or cushaw squash, was first domesticated in

[130] "*Cucurbita pepo* var. *ozarkana*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, September 30, 2019.

Mexico and introduced to the Eastern Woodlands around 1500 BCE, so it will not be included in the Eastern Agricultural Complex for the purposes of this paper. Bottle gourd, *Lagenaria siceraria*, was also used but is not a food plant, and it is unknown if it was truly domesticated at this time. The phylogenetics of squash are complicated, but it is thought that the first squash domesticated in the *Cucurbita pepo* species are classified in the subspecies *Cucurbita pepo* ssp. *ovifera*.[131] These were progenitors of modern acorn squash.

Figure 3.11. Acorn squash plant (Image credit: Amy Gaertner).
Figure 3.12. A diverse selection of *Cucurbita pepo* varieties at a market in the Bay Area, California (Image credit: jencu).

DOMESTICATION PROCESS

The process of domesticating plants in any region of the world usually begins as an unintentional process. Individual plants of a given species with features that make them easier or more desirable to forage are preferentially harvested over individual

[131] Castellanos-Morales, et al. "Tracing Back to Origin of Pumpkins (*Cucurbita pepo* ssp. *pepo* L.) in Mexico." *Proceedings of the Royal Society B* 286, no. 1908 (2019).

plants that do not have these features. The harvested plants are then spread to areas where humans live and forage and, over generations, the genes that make those specimens easier to harvest or more desirable to eat are selected for. Shattering is one trait that is often unintentionally selected for during this process. Shattering refers to the shedding of seeds when ripe. Seeds that shatter more readily are harvested more easily using foraging techniques akin to threshing. As foraging transitions to gardening, the process of selecting for specific characteristics might become more intentional.[132]

The crops of the Eastern Agricultural Complex show mixed evidence of domestication. Maygrass and little barley do not have known apparent differences between wild and cultivated specimens. They were, however, grown in conjunction with clear domesticates such as marsh elder, goosefoot, and erect knotweed. Because most archaeological evidence of these crops comes from charred and uncharred remains of seeds from storage pits and seed specimens from paleofecal samples, maygrass and little barley could have been domesticated with little evidence left in the archaeological record.

Two features of domesticated Eastern Agricultural Complex seeds are increased seed size and decreased testa thickness compared to wild specimens.[133] Marsh elder seed specimens from Illinois during the Late Archaic Period show an increased mean size compared to specimens from the same area from the Middle Archaic Period and compared to modern wild marsh elder seeds.[134] The testa is the outer covering of a seed. Testa thickness has been an indicator of domestication in goosefoot especially. Goosefoot seeds dated to the early part of the Late Archaic Period from sites in Illinois

[132] Smith, Bruce D. "The Cultural Context of Plant Domestication." 2023.
[133] Gremillion, Kristen J. (2014). Goosefoot (*Chenopodium*).
[134] Fritz, Gayle J. "Multiple Pathways to Farming," 1990.

have thick testa. Beginning in the latter part of the Late Archaic, from about 2000-1000 BCE, seed specimens from sites like Newt Kash Hollow and Cloudsplitter in the Pottsville Escarpment region have thin testa, indicating that they are domesticates. Thin testa are associated with a reduced dormancy period. Wild goosefoot seeds are also described as "lenticular," while domesticates have "truncate margins," making them more cylindrical.[135]

In a 2019 study, researchers Natalie Mueller, Andrea White, and Peter Szilagyi showed preliminary evidence that the plants associated with the Eastern Agricultural Complex, when grown in a polyculture, had higher yields than those cultivated in separate monocultures.[136] This study was constrained by time, and not all of the species were successfully germinated. Further research in this vein could elucidate which traits people selected for during domestication, how they grew these crops in conjunction with each other, and how they shaped their physical landscape to meet agricultural demands. In a 2017 *Nature Plants* article titled “Growing the lost crops of eastern North America’s original agricultural system,” researchers Natalie Mueller, Gayle J. Fritz, Paul Patton, Stephen Carmody, and Elizabeth T. Horton detailed their experience with cultivating the “lost crops” of the Eastern Agricultural Complex.[137] They outlined three impediments to research in re-cultivating these plants, and three initiatives aimed at addressing these issues:

---

[135] Crites, Gary D. "People and Plants in the Prehistoric Southeast: New Information from South Carolina." McClung Museum of Natural History & Culture. The University of Tennessee Knoxville, Accessed May 21, 2023.
[136] Mueller, Natalie G., Andrea White, and Peter Szilagyi. “Experimental Cultivation of Eastern North America’s Lost Crops.” 2019
[137] Mueller, Natalie G., Gayle J. Fritz, Paul Patton, Stephen Carmody, and Elizabeth T. Horton. "Growing the Lost Crops of Eastern North America’s Original Agricultural System." *Nature Plants* 3, (2017). Accessed May 21, 2023.

> (1) at least three of these species are now rare plants, due to competition from their invasive cousins, shrinking field margins and increased herbicide use; (2) we lack data on yields and market potential; and (3) researchers have difficulty accessing seed stock. Ongoing research into these challenges is currently being undertaken by the authors as part of the Survey for Lost Crops, Lost Crops Garden Network, and Native Cultigen Project initiatives. (4).[138]

These initiatives may be particularly helpful in making information about the Eastern Agricultural Complex available to the general public, and may help revive interest in growing these crops. Re-cultivation initiatives will be further explored in Chapter Five.

NATURAL AND ANTHROPOGENIC LANDSCAPE PROCESSES

Landscape Management

The agricultural process of any place begins with landscape management. Humans have long been manipulating our environment to suit our land use needs. Many early and modern farming techniques involved prescribed burning and terracing to prepare land for farming and increase yield. Archaeological evidence beyond the Eastern Agricultural Complex shows that the native people of North America have been using prescribed burns for thousands of years. Anthropogenic use of fire is commonly associated with agriculture, like swidden agriculture and fire-stick farming, but can have other purposes. Clearings in vegetation created by anthropogenic or natural processes create the potential for a new set of plant species that may differ from the surrounding land. Furthermore, planting certain food plants could set up a patch of land for a different succession of plant species to grow naturally in the long term. Over hundreds

[138] Mueller, Natalie G., et al. "Growing the Lost Crops of Eastern North America's Original Agricultural System." 2017.

or thousands of years, anthropogenic fires and other agricultural practices could change the forest composition of large land areas.

Researchers use pollen and charcoal analysis to determine changes in forest composition and correlation with human use of fire. In a 1998 study that was based on evidence gathered in a 1966 study, Delcourt et al. found that the forest composition of the Eastern Woodlands changed to predominantly mixed oak-chestnut and pine forests because Late Archaic and Woodland peoples used fire to clear sections of forests for the cultivation of Eastern Agricultural Complex plants.[139] This use of fire increased populations of fire-tolerant trees like oaks, chestnuts, and pines.[140]

While oak and pine trees are still relatively prevalent in the same forests, the near-extinction of the American chestnut and extensive logging have altered contemporary forest composition in many places. Patches of forest that have been spared from clearcutting and habitat fragmentation could hold evidence of the changes made by Archaic and Woodland people as a direct result of Eastern Agricultural Complex farming. Luckily, regions like the Pottsville Escarpment in Kentucky that are home to several Eastern Agricultural Complex-related archaeological sites are protected within the bounds of the Daniel Boone National Forest and other such conservation areas. "Reading" these landscapes within the context of the Eastern Agricultural Complex could reveal more details on landscape manipulation for agricultural purposes.

[139] Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and Kristen J. Gremillion. "Prehistoric Human Use of Fire, the Eastern Agricultural Complex, and Appalachian Oak-Chestnut Forests: Paleoecology of Cliff Palace Pond, Kentucky." *American Antiquity* 63, no. 2 (1998): 263-278.
[140] Gremillion, Kristen J. "Prehistoric Upland Farming, Fuelwood, and Forest Composition," 2015.

Natural Processes

Natural processes, like landslides and wildfires, also create gaps in the forest canopy that can open an area up for gardening. Climatic shifts during the mid-Holocene period increased the frequency of severe storms, making landslides more common.[141] Between 7,300 and 4,800 years ago, annual rainfall in central and southern Appalachian increased, then increased again and evened out annually between 3,000 and 200 years ago.[142] Pollen analysis of the Cliff Palace Pond site revealed a near extinction of hemlock trees 4,800 years ago due to the hemlock looper moth.[143] This trend occurred throughout eastern North America around the same time. The hemlock looper moth's larvae eat hemlock needles, eventually killing the tree. Large swaths of dead hemlocks are extremely fire-prone, and the charcoal record of the Cliff Palace Pond site confirms that a large forest fire swept through the area between 4,800 and 3,000 years ago. This preceded the Late Archaic period, when Eastern Agricultural Complex plant domestication began, and fires like these may have played a role in clearing patches of forest for agricultural use.

[141] Widingstad, Jason D., Sarah C. Sherwood, Kristen J. Gremillion, and Neal S. Eash. "Soil Fertility and Slope Processes in the Western Cumberland Escarpment of Kentucky" (2008).
[142] Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and A. Gwynn Henderson. 1999. *Forests, Forest Fires, & Their Makers*. Lexington, Kentucky: Kentucky Archaeological Survey.
[143] Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and A. Gwynn Henderson. 1999. *Forests, Forest Fires, & Their Makers*.

Figure 3.13. A sandstone rockshelter. Red River Gorge, Kentucky.

Soil Fertility

Analysis of Pottsville Escarpment soil fertility reveals why hillsides may have been favored sites for garden plots associated with the Eastern Agricultural Complex. The hillside areas in the Escarpment region have geological diversity because dissection by erosion has revealed both calcium-based Mississippian and silica-based Pennsylvanian rock layers. This geologic diversity, combined with a continual supply of organic material from slope wash, makes these hillsides similar in fertility to alluvial floodplain soils that have been historically favored for agriculture.[144]

[144] Widingstad, Jason D., Sarah C. Sherwood, Kristen J. Gremillion, and Neal S. Eash. "Soil Fertility and Slope Processes in the Western Cumberland Escarpment of Kentucky" (2008).

Rockshelters

While hunting may have only supplemented agriculture by the start of the Woodland period, having diverse rock materials at rockshelter sites also may have aided in creating the incredibly diverse array of stone tools associated with the Archaic Period and onward. Within the Eastern Woodlands region, the Eastern Agricultural Complex seems to be associated with sandstone rockshelters (Figure 3.13). Several rockshelter sites in Eastern Tennessee, also along the Cumberland Escarpment, have been associated with the Eastern Agricultural Complex, as well as rockshelter sites in Missouri and the Ozarks region of Arkansas that also sit on the margin between Pennsylvanian and Mississippian rock layers.[145] Rockshelters, or "bluff shelters" as they are often called in Arkansas, of the Arkansas Ozarks are typically limestone, rather than sandstone.[146] Rockshelters can sit adjacent to, above, or below hillsides that may have the soil fertility potential to support relatively intensive garden plots. The geologic diversity that contributes to soil fertility also made rockshelter sites in the Pottsville Escarpment desirable for other reasons.

One phenomenon found at rockshelter sites in Kentucky are "hominy holes" (Figure 3.15).[147] Hominy holes are holes made in the sandstone rockshelters themselves or in boulders at the mouth of rockshelter sites that are thought to have been used for grinding seeds. Hominy holes found at rockshelter sites in the Pottsville Escarpment

[145] Missouri Department of Natural Resources Division of Geology and Land Survey, Generalized Geologic Map of Missouri. 2014. Rolla, Missouri. dnr.mo.gov/geology; Rees, Lydia I., and Jamie C. Brandon. "Beyond the "Bluff Dweller": Excavating the History of an Ozark Myth." *The Arkansas Historical Quarterly* 76, no. 2 (2017): 125-143.
[146] "Bluff Shelter Basics." Bluff Shelters of the Arkansas Ozarks. University of Arkansas System: Arkansas Archaeological Survey.
[147] Ison, Cecil R. "Farming, Gender, and Shifting Social Organization" In *The Rock-Art of Eastern North America*, 2004.

region are now known to predate the introduction of corn (hominy is produced by treating maize with a process called nixtamalization), but the name arose in the 1930s before this was known. Archaeological evidence has revealed that the bell-shaped pestles used for grinding seeds in the hominy holes were often made of limestone. Hominy holes are sometimes associated with petroglyphs. In *Rock-Art of Eastern North America*, Cecil Ison notes a correlation between Eastern Agricultural Complex cultivars, hominy holes, and petroglyphs (Figure 3.14).[148] Along with the Green River drainage area in Western Kentucky, the Red River drainage area seems to be a locus of these three facets of Late Archaic and Early Woodland peoples' culture. The Green River drainage basin also includes limestone and sandstone formations along the Dripping Springs Escarpment, and is home to the Mammoth Cave complex, which is the longest known cave system in the world.

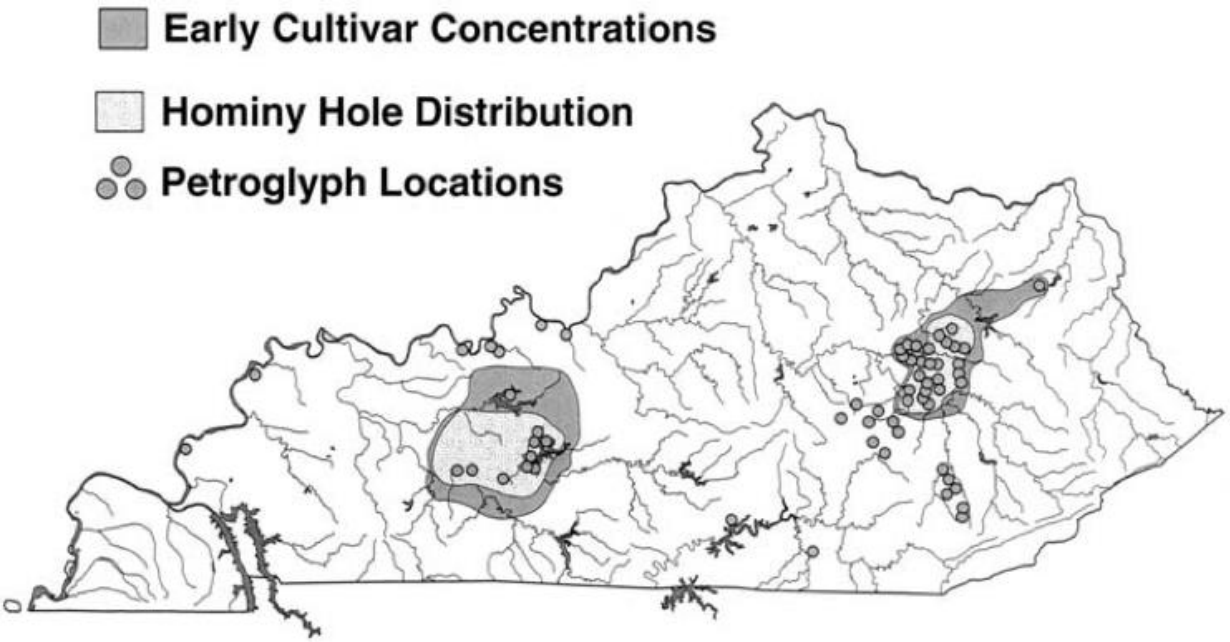


Figure 3.14. Map of the correlation between Eastern Agricultural Complex cultivars, Hominy Holes, and Petroglyphs in Kentucky from *Rock-Art of Eastern North America*.

[148] Ison, Cecil R. "Farming, Gender, and Shifting Social Organization" In *The Rock-Art of Eastern North America*, 2004.

Figure 3.15. A rock face with a hominy hole and petroglyphs depicting human footprints (left). Image source: *Rock-Art of Eastern North America*.

ARCHAEOLOGY

Because of the Eastern Agricultural Complex's association with sandstone rockshelters, several archaeological sites in the Pottsville Escarpment region hold evidence of this early center of plant domestication. Some of these sites include Cloudsplitter and Newt Kash Hollow Rockshelter in Menifee County and Cold Oak Shelter in Lee County.[149] Other sites, like Gladie Creek in Menifee County, Deep Shelter in Rowan County, and Cliff Palace Pond in Jackson County, reveal insights into the region's occupation and land use patterns.[150] All five sites sit within or very near the Daniel Boone National Forest, and at least two of them, Cloudsplitter and Gladie Creek,

[149] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996; Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.
[150] Mickelson, Andrew M., and Katherine R. Mickelson. "Gladie Creek: A Multicomponent Deposit Located Within the Red River Gorge, Eastern Kentucky;" Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996; Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and Kristen J. Gremillion. "Prehistoric Human Use of Fire, the Eastern Agricultural Complex, and Appalachian Oak-Chestnut Forests: Paleoecology of Cliff Palace Pond, Kentucky," 1998.

sit within the Red River Gorge Geological Area. Red River Gorge is located at the corner of Powell, Menifee, and Wolfe Counties.

Cloudsplitter, Menifee County

The Cloudsplitter shelter site (15Mf36) in Menifee County, on the North Fork of the Red River, is a sandstone rockshelter with evidence of human use as early as the Early Archaic Period (8000-6000 BCE).[151] During this period, Cloudsplitter was used by hunter-gatherers to shelter in during seasonal hunting of deer and collecting nuts. Bones of whitetail deer, elk, beaver, birds, and turtles at the site show what Early Archaic hunter-gatherers' diet looked like.

During the Late Archaic Period (3000-1000 BCE), Cloudsplitter was within the Skidmore Phase, which was centered on Rowan, Menifee, and Powell Counties.[152] The Skidmore Phase lasted from around 2400-1650 BCE. Sites associated with the Skidmore Phase have large middens, earth ovens, and roasting pits, indicating relatively long-term occupation. However, these sites are located in more open areas, like the Red River and Licking River floodplains. Rockshelters like Cloudsplitter had limited use in the Middle Archaic period but came back into use in the Skidmore Phase and are especially associated with hickory and chestnut foraging. One rockshelter site in the Skidmore Phase contained a squash rind dated to around 1800 BCE.

A period of archaeological evidence from the Late Archaic Period (3000-1000 BCE) in Cloudsplitter reveals a sequence of domestication.[153] Specimens of squash from 3000-2000 BCE show no signs of domestication, while specimens from 2000-1000 BCE are “presumed domesticates.” Specimens of goosefoot seeds from 2000-1000 BCE

[151] Jeffries, Richard W. “Hunters and Gatherers After the Ice Age.” In *Kentucky Archaeology*, 1996.
[152] Jeffries, Richard W. “Hunters and Gatherers After the Ice Age.” In *Kentucky Archaeology*, 1996.
[153] Fritz, Gayle J. "Multiple Pathways to Farming," 1990.

have thin testa, an indicator of domestication in that species. Specimens of marsh elder and sunflower from 1000-900 BCE show evidence of domestication, while maygrass and erect knotweed specimens of the same period do not have clear evidence of domestication.

There was an even more increased use of rockshelters in this region, including Cloudsplitter, during the Early Woodland Period (1000-200 BCE).[154] Archaeological evidence from this period reveals a shift from Late Archaic reliance on nuts to that of Eastern Agricultural Complex crops like sunflower, marsh elder, maygrass, and erect knotweed. Most seed specimens at Cloudsplitter come from storage pits.

Newt Kash Hollow Rockshelter, Menifee County

Newt Kash Hollow (15Mf1) is a sandstone rockshelter site in Menifee County.[155] Unlike Cloudsplitter, which sits in the Red River drainage area, Newt Kash sits in the Licking River drainage area. Paleofecal remains dated to around 1500-1000 BCE (the latter portion of the Late Archaic Period) show that human occupants of Newt Kash ate wild and domesticated goosefoot, domesticated sunflower, and domesticated marsh elder. This site shows that while food crops were important, they may have been equal or supplemental to foraged plants, unlike the Woodland Period when foraging supplemented agriculture.

In 2001, Cheryl Claassen postulated that rockshelters were primarily used by women, using Newt Kash Shelter as an example, in her publication *Rock Shelters as Women's Retreats: Understanding Newt Kash*.[156] Claassen outlines the work done by

[154] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.
[155] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.
[156] Claassen, Cheryl. "Rock Shelters as Women's Retreats: Understanding Newt Kash." *American Antiquity* 76, no. 4 (2011): 628-641.

an archaeological team lead by William Webb and William Funkhouser who, in 1936, found evidence of goosefoot, sunflower, squash, gourd, corn, tobacco, giant ragweed, and maygrass seeds, evidence of nuts like acorn, hickory, walnut, and chestnut, pieces of fabric, string, and cordage made from plant material, and beds of woven pawpaw leaf and matted big blue stem grass and leaves in Newt Kash. This evidence, along with non-plant material evidence such as antler, wood, and leather items, was dated to the Late Archaic, Terminal Archaic, and Early Woodland periods when the Eastern Agricultural Complex was developed and utilized, and evidently extending into the period when plants like corn and tobacco were introduced into the eastern United States.

Based on the strong presence of textiles, cordage, and nuts, Claassen interprets the Newt Kash site as a "women's place."[157] This is based on the assumption that weaving, braiding, and processing nut oils were tasks associated with women in the culture of the Late Archaic to Early Woodland periods, as they often are in other Indigenous cultures, both historic and contemporary. She also gives examples of other Indigenous cultures who have designated spaces for women who are menstruating, pregnant, or raising very young children. While we may not know enough about the people that lived in the Pottsville Escarpment region during the Late Archaic to Early Woodland periods to know if they too had designated spaces for women, it does raise an interesting question about gender roles during this transitional period from a reliance on hunting and gathering to a reliance on agriculture.

Many archaeological and anthropological researchers have focused their research on understanding historic and contemporary hunter-gatherer societies' gender roles,

[157] Claassen, Cheryl. "Rock Shelters as Women's Retreats." *American Antiquity*, 628-641.

and historic and contemporary agricultural societies' gender roles. Archaeological analysis could elucidate how gender roles changed, or did not change, during the transitional period of the Late Archaic to Early Woodland period. Further analysis of Newt Kash, and other Eastern Agricultural Complex sites, could also reveal how men and women interacted with rockshelters and garden sites, and may confirm Claassen's hypothesis that rockshelters were to some degree "women's retreats."

Cold Oak Shelter, Lee County

Cold Oak Shelter (15Le50) is a sandstone rockshelter site in Lee County.[158] Two primary occupation periods exist at Cold Oak: the Cogswell Phase of the Late Archaic Period and the Early Woodland Period. Archaeological findings in Cold Oak storage pits dated to the Late Archaic Period show evidence of some maygrass and charred and uncharred seeds of domesticated squash, marsh elder, goosefoot, and sunflower.[159] Data sets from the Woodland Period show larger assemblages of these seeds.

Gladie Creek, Menifee County

Gladie creek is a tributary of the Red River that runs from near Pomeroyton, an unincorporated community just outside of the Red River Gorge Geological Area to the northeast, to meet the Red River near the Gladie Visitor Center in Red River Gorge.[160] The Gladie Creek archaeological site (15Mf410) is located along Gladie Creek within the Red River Gorge Geological Area. While in a rockshelter-rich area, the Gladie Creek site is a sloping colluvial landform. Colluvial deposits sit near the base of hillsides, often above the alluvial deposits in the floodplain. Excavation of the Gladie Creek site has

[158] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[159] Gremillion, Kristen J. "Plant Husbandry at the Archaic/Woodland Transition: Evidence from the Cold Oak Shelter, Kentucky." *Midcontinental Journal of Archaeology* 18, no. 2 (1993): 161-189.
[160] Mickelson, Andrew M., and Katherine R. Mickelson. "Gladie Creek: A Multicomponent Deposit Located Within the Red River Gorge, Eastern Kentucky."

revealed information about human occupation in the areas outside of rockshelter sites. The site revealed an array of food seeds and nuts, including hickory and chestnut. However, no "cultigens" were identified at the site, perhaps further confirming the close association of Eastern Agricultural Complex cultivation with rockshelters.

Deep Shelter, Rowan County

The Deep Shelter site (15R034) is in the Cave Run Lake area on the Licking River. The U.S. Army Corps of Engineers dammed the Licking River to create Cave Run Lake between 1965 and 1974.[161] Evidence from the Early Archaic Period (6000-7000 BCE) showed that the area's high plant and animal diversity attracted hunter-gatherers.[162] Surrounding open areas did not show evidence of occupation, so it seems rockshelters were preferred. Like Cloudsplitter, Deep Shelter was in the Skidmore Phase during the Late Archaic period.

Cliff Palace Pond, Jackson County

Cliff Palace Pond, located near Keener Point Knob in Jackson County, was investigated by Dr. Paul A. Delcourt and Dr. Hazel R. Delcourt, paleoecologists from the University of Tennessee, Knoxville in 1966 (Figure 4.16).[163] Their investigation looked at pond sediment to determine a pollen and charcoal record going back almost 10,000 years. Cliff Palace Pond is located just above a rockshelter site with evidence of human occupation from the Early Archaic to Fort Ancient periods. This investigation supported Wes Cowan's determination that the correlation of rockshelter occupation, plant domestication, and increase in anthropogenic fire during the Late Archaic-to-Early

[161] Moody, Sean. "Spotlight on Morehead: Cave Run Lake." LEX18 Lexington. Scripps Local Media, August 11, 2022.
[162] Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, 1996.
[163] Delcourt, Paul A., et al, "Prehistoric Human Use of Fire," 1998.

Woodland transition was not coincidental: people who were occupying rockshelter sites used fire to clear gaps in the forest to plant Eastern Agricultural Complex crops using broadcast planting in garden plots (1985).[164] It also showed that this increased use of prescribed burning affected forest composition: there was an increase in fire-tolerant trees like pitch pine, oak, black walnut, and chestnut in areas where prescribed burning occurred.

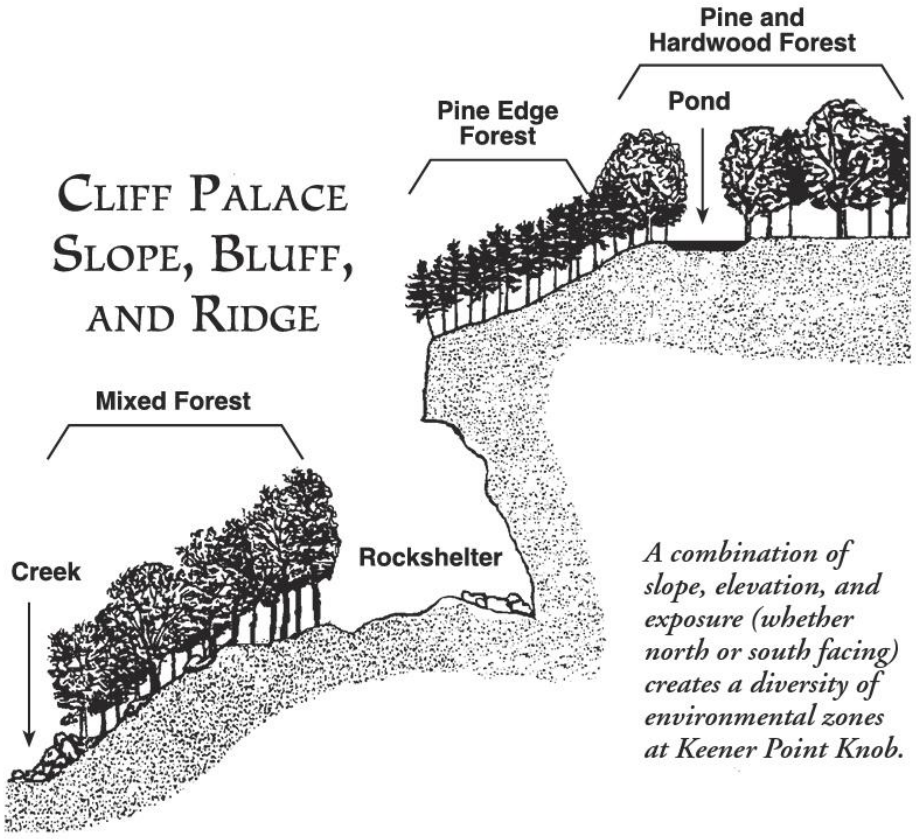


Figure 3.16. An illustration of Cliff Palace Pond, adapted from *Forests, Forest Fires, & Their Makers* by Paul A. Delcourt, Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and A. Gwynn Henderson.

[164] Cowan, Wesley C. "From Foraging to Incipient Food Production." 1985.

CONCLUSION

During the Woodland Period, the Three Sisters crop complex of maize, beans, and squash was introduced to the eastern United States from Mesoamerica.[165] This crop complex was adopted by a number of cultures throughout the United States and eventually most plants of the Eastern Agricultural Complex were abandoned. There were likely multiple factors involved in this transition to the Three Sisters, including the allergen potential of some of the Eastern Agricultural Complex plants, especially those in the *Asteraceae* family, the emergence of well-established and lucrative maize-based trade networks, and the high-yielding, synergist qualities of growing the Three Sisters crops together.

While it may have fell out of use thousands of years ago, the Eastern Agricultural Complex is still an important part of the rich human history of Kentucky. Despite the ample evidence of Late Archaic and Woodland period domestication, cultivation, and heavy reliance on Eastern Agricultural Complex crops in the Pottsville Escarpment region, little is being done to interpret this important period of history in Eastern Kentucky. The following chapter will discuss recommendations for interpreting the Eastern Agricultural Complex in Red River Gorge.

[165] Railey, Jimmy A. "Woodland Cultivators." In *Kentucky Archaeology*, 1996.

CHAPTER 4: INTERPRETATION

INTRODUCTION

This chapter will address opportunities and challenges in interpreting the Eastern Agricultural Complex at sites in Eastern Kentucky like Red River Gorge. The Eastern Agricultural Complex is not only a significant part of Kentucky's history, but it is an important aspect of Native American history, especially for cultures who developed out of Woodland Period groups, and whose traditional lands extended into Kentucky prior to European colonization and subsequent Native American removal from much of the eastern United States. For this reason, care must be taken to interpret the development and implementation of the Eastern Agricultural Complex.

The following sections will discuss how to respectively interpret aspects of indigenous history in a region that no longer has a tribal presence, and will reinforce the importance of involving federally-recognized tribes in the interpretation process. This chapter will also outline the current interpretation efforts at Red River Gorge, including at the Gladie Visitor Center, and will make recommendations for updating those interpretation efforts to further include the Eastern Agricultural Complex. These interpretation recommendations include updated interpretive signage, creating a demonstration garden, and developing a contemporary foodways program. Proposed interpretive signage designs are included in Appendix B at the end of this thesis.

RED RIVER GORGE AND THE GLADIE VISITOR CENTER

The Daniel Boone National Forest and the Red River Gorge Geological Area

The Red River Gorge Geological Area sits within the Cumberland District of the Daniel Boone National Forest. Red River Gorge, or "the Gorge" as it is known locally, is adjacent to Clifty Wilderness to the east and Natural Bridge State Park and Nature Preserve to the southwest, both of which also sit within the Cumberland District of the Daniel Boone National Forest. Red River Gorge is around 30,000 acres, the Clifty Wilderness is around 13,000 acres, and Natural Bridge State Park is around 2,000.[166] The Daniel Boone National Forest was established in 1937, while the Clifty Wilderness was designated in 1985.[167] Natural Bridge State Park was one of Kentucky's four original state resort parks dedicated in 1926, alongside Pine Mountain, Old Fort Harrod, and the Blue and Gray (which was closed in 1933).[168] In 1981, it was dedicated as a nature preserve to protect the rare Virginia big-eared bat (*Corynorhinus townsendii virginianicus*) and the Hood Branch watershed.[169] The Red River Gorge Geological Area has been designated as a National Natural Landmark (1976), a National Archaeological District, and is listed on the National Register of Historic Places (2003).[170] Like Red River Gorge, Clifty Wilderness and Natural Bridge State Park are popular recreational areas, and hiking and camping are common in both. The Daniel Boone National Forest has three contiguous districts, the Cumberland, London, and Stearns districts, and one

---

[166] "History." Red River Gorge. Red River Gorge; "Clifty Wilderness." Daniel Boone National Forest. United States Forest Service; "Natural Bridge State Park and Nature Preserve." Kentucky Energy and Environment Cabinet. Commonwealth of Kentucky.
[167] Jackson, Savannah. "The History of the Daniel Boone National Forest;" "Clifty Wilderness." Daniel Boone National Forest. United States Forest Service.
[168] Kentucky General Assembly, House Standing Committee on Tourism and Outdoor Recreation. Kentucky State Parks Overview. March 3, 2022; "Facebook Post: TBT Blue and Gray State Park!" Facebook. Kentucky State Parks, March 31, 2016.
[169] "Natural Bridge State Park and Nature Preserve." Kentucky Energy and Environment Cabinet.
[170] "History." Red River Gorge. Red River Gorge.

discontiguous district to the east, the Redbird district. The Cumberland, London, and Stearns districts largely overlap with the Pottsville Escarpment region as identified by the Kentucky Geological Survey. However, the northernmost margin of the Daniel Boone National Forest is the northern boundary of Rowan County, while the Pottsville Escarpment region extends northeast to include parts of Carter and Greenup counties.[171]

The Daniel Boone National Forest has a 2.1-million-acre proclamation boundary, which includes private land interspersed with over 700,000 acres of Forest Service-managed land.[172] Other designated areas within the Daniel Boone National Forest include Cumberland Falls State Resort Park and Buckhorn Lake State Park, as well as the Big South Fork National River and Recreation Area, which extends into Tennessee, the Beaver Creek Wilderness, Laurel River Lake, Cave Run Lake, and the Sheltowee Trace National Recreation Trail. Nearby state parks include Carter Caves State Resort Park, General Burnside Island State Park, and Lake Cumberland State Resort Park.

The Red River Gorge Geological Area is home to the Red River Gorge Scenic Byway, which goes through a landmark called Nada Tunnel, a 900-foot-long logging tunnel cut through a mountain in 1910.[173] Red River Gorge also houses mountain biking and hiking trails, including several sections of the Sheltowee Trace trail, campsites, and canoe launches. One of the most internationally-popular attractions of Red River Gorge is mountain climbing. In a 57 Hours article, Aaron Gerry called Red River Gorge the "Sport Climbing Mecca of the East."[174] A 2020 study conducted by Eastern Kentucky University's Division of Regional Economic Assessment and Modeling (DREAM)

[171] Andrews, William, 2009, Eastern Coal Field Region.
[172] Jackson, Savannah. "The History of the Daniel Boone National Forest."
[173] "History." Red River Gorge. Red River Gorge.
[174] Gerry, Aaron. "Red River Gorge: The Sport Climbing Mecca of the East." 57 Hours.

estimated that Red River Gorge has over 100,000 climber visits every year, which draws in $8.7 million annually, and found that park closures due to the COVID-19 pandemic did not impact annual visitation.[175] They also determined that climbers were highly aware of the "Leave No Trace" initiative, which aims to minimize the environmental impact of climbing. The ideals of the Leave No Trace initiative began in the 1960s and 1970s when visitation to outdoor recreation sites like hiking trails and national parks became extremely popular.[176]

The impacts of increased recreation, and a proposal to dam the Red River in the 1960s, threatened Red River Gorge. In 1971, the University of Kentucky commissioned renowned Kentucky author and poet Wendell Berry to author an essay advocating for the preservation of Red River Gorge. In his essay, *The Unforeseen Wilderness*, Berry recounts his Memorial Day trip to Red River Gorge.[177] He describes his awe at the beauty of Red River Gorge and his disappointment in humanity's negative impact on the landscape in the form of litter and waste. The following excerpt from *The Unforeseen Wilderness* reveals Berry's careful observation of an ever-changing landscape (Figure 4.1). This passage, the source of the title of this thesis, speaks to the connection that many generations of humans have had with the Red River and its associated landscape, and will continue to have:

> The lessons are everywhere. He can't avoid them. They are innate in the experience. The weather and the mood of the woods have changed since his last trip. The stepping stones on which he crossed the creek a month ago are now washed away. The pebbles and small stones of the stream bed have moved and changed, and in their changing he feels the changing of the boulders and the cliffs. If the weather on his last trip was so pleasant as to have stayed in his mind,

[175] Maples, James N., and Michael Bradley. 2020. *Economic Impact of Rock Climbing in Kentucky's Red River Gorge*. Eastern Kentucky University's Division of Regional Economic Assessment and Modeling.
[176] Jeffrey L. Marion and Reid, Scott E. "Development of the Leave No Trace Program: A Historical Perspective"
[177] Berry, Wendell. "The Unforeseen Wilderness." *The Hudson Review* 23, no. 4 (1971): 633-647.

an enticement to come back, he may be discouraged this trip to have to contend with sweltering heat, or with a cold rain. But the elusive ovenbird, that he sort of expected never to see, suddenly appears on a low limb beside the path. Or a pair of grouse erupt into flight almost under his feet, causing his heart to jump out of place—and for the next hundred yards he walks unconsciously on tiptoe, scarcely breathing, alert to what is around him as he has rarely been. Or a turn in the path shows him suddenly a rare flame azalea in bloom. What he planned is not happening, as if by some natural law. He is finding the *life* of the time, the challenges and delights, in what he did not foresee.

No place is to be learned like a textbook or a course in school, and then turned away from forever on the assumption that one's knowledge of it is complete. What is to be known about it is without limit, and it is endlessly changing. Knowing it is therefore like breathing: it can happen, it stays real, only on the condition that it *continue* to happen. As soon as it is recognized that a river—or, for that matter, a home—is not a place but a process, not a fact but an event, there ought to come an immense relief: one can step into the same river twice, one can go home again.[178]

Figure 4.1. A photograph from Wendell Berry's trip to Red River Gorge, from *The Unforeseen Wilderness*.

[178] Berry, Wendell. "The Unforeseen Wilderness." *The Hudson Review*, 635.

The Gladie Visitor Center

The Gladie Cultural-Environmental Learning Center, or Gladie Visitor Center as it will be referred to in this chapter, is the primary information center associated with Red River Gorge. The visitor center is located close to where Gladie Creek connects to the Red River, and most interpretive signage at Red River Gorge is located in or around it. A site plan of the Gladie Visitor Center property is included in Appendix A. The Daniel Boone National Forest operates the Gladie Visitor Center in partnership with FIND Outdoors, a 501(c)(3) nonprofit organization focused on interpretation and conservation of natural recreational areas on public lands in North Carolina, Georgia, Kentucky, and Indiana. FIND Outdoors partners with the U.S. Forest Service, including USFS National Symbol's Program icons Smokey Bear and Woodsy Owl, the National Park Service, *Natural Inquirer*, and Leave No Trace.[179] Living Archaeology Weekend, an annual event aimed at K-12 students, educators, and members of the public, is also hosted on the Gladie Visitor Center's grounds.

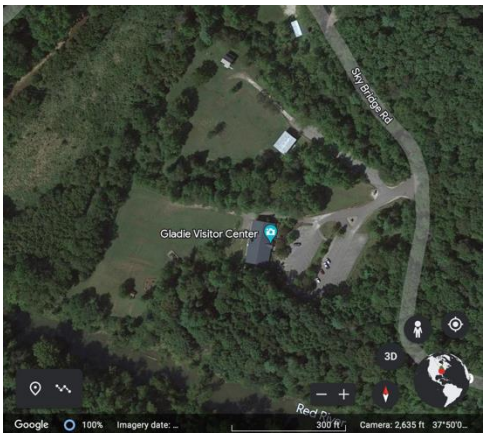


Figure 4.2. The Gladie Visitor Center Site (Image Credit: Google Earth).

[179] "About." FIND Outdoors.

The grounds also include the Historic Gladie Cabin, a barn, historic farm equipment, and a copper moonshine still (Figures 4.3 and 4.4). The Ledford family built the now-reconstructed Gladie Cabin after moving from Harlan County to Menifee County in the 1870s.[180] The Ledfords built the cabin from hand-hewn chestnut logs with mud and grass chinking and sheathed the roof in hand-split oak shingles. The Gladie Cabin and barn were once part of a small logging community situated at the mouth of Gladie Creek, where the visitor center sits today. At one time, this community also included a church, post office, community store, and school. Because the Gladie Visitor Center is the primary locus of interpretation at Red River Gorge, it will be the main focus of interpretation recommendations outlined in this chapter.

[180] "Historic Gladie Cabin." Daniel Boone National Forest. U.S. Forest Service.

Figure 4.3. The Historic Gladie Cabin and some of the associated farm equipment.

Figure 4.4. The barn with sandstone outcrops in the background.

The current interpretive signage and exhibits at the Gladie Visitor Center focus on a mix of natural and cultural aspects of Red River Gorge. One interpretive sign located just outside the visitor center includes photographs and a map (Figure 4.5). The text of this sign reads:

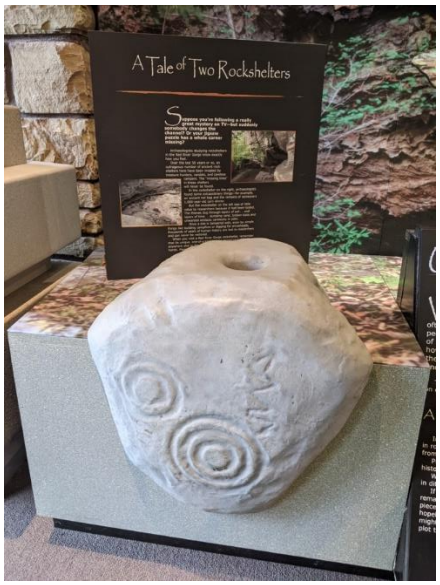
Welcome to the Red River Gorge
Older than the dinosaurs…a favorite campsite of ancient Native Americans…a National Geological Area and a National Natural Landmark site…
The Red River Gorge is one of the most unusual landscapes on earth. In this vast, mysterious land, you can find soaring cliffs, rushing waters, and rare plants and animals. You can stand, awe-struck, beneath magnificent rockshelters and 'sky bridges' created eons ago as the North American continent evolved.
As you hike, canoe, or picnic along the rushing Red River that flows through the Gorge, you may feel that you have entered a lost world of long, long ago. An in a sense, you have.
Welcome! But please—take care!

Figure 4.5. A welcome sign outside of the Gladie Visitor Center.

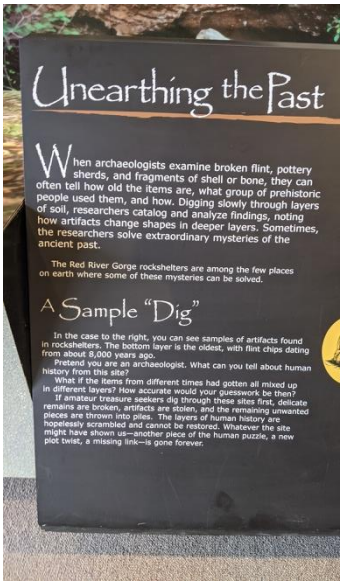
This signage shapes visitors' expectations of Red River Gorge, detailing an ancient and rare landscape with ancient human connections. Other signage outside the visitor center describes the Clifty Wilderness and the Red River.

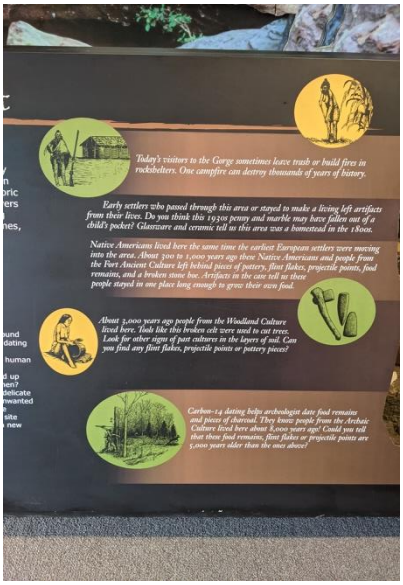
Signage inside the visitor center expands on the natural and cultural history of Red River Gorge. Signage related to natural resources focuses on rare and unique plants and animals, like ovenbirds and pink lady's slipper orchids, as well as natural processes, like the creation of rockshelters. The cultural history interpreted inside the center spans

pre-contact Native American history, Daniel Boone and the history of early white settlement, and the eighteenth and nineteenth-century history of subsistence farmers and bootleggers. Aspects of Native American history interpreted include petroglyphs, pottery, hominy holes, anthropogenic use of fire, atlatls, and other tools (Figures 4.6 and 4.7). The process of archeology at Red River Gorge is also interpreted (Figures 4.8-4.10).



Figures 4.6 and 4.7. An interpretive sign detailing human use of fire (left), and one detailing the effect of vandalism and looting on rockshelter sites alongside a re-creation of a petroglyph and hominy hole (right).





Figures 4.8-4.10. A sign detailing the archaeological process with a sample of what kind of artifacts would be found in different layers at a rockshelter site.

Only one sign addresses the Eastern Agricultural Complex (Figure 4.11). The text of this sign reads:

> Sunflower Seeds, Anyone?
> If you lived in a rockshelter in the Red River Gorge about 3,000 years ago, here's what you might have had for dinner: cooked turtle or rabbit, squash, and sunflower or goosefoot seeds.
> Your family might grind the seeds into coarse meal in a "hominy hole" in a nearby rock. The ancient seeds found in the Gorge rockshelters tell archaeologists a remarkable story: Human beings in North America apparently learned to grow crops much earlier than scientists once believed. These long-ago people are thought to have had small gardens near their rockshelter homes. Their cultivated seeds—preserved for centuries in rockshelter soils—may be one of the earliest indications of agriculture in eastern North America!

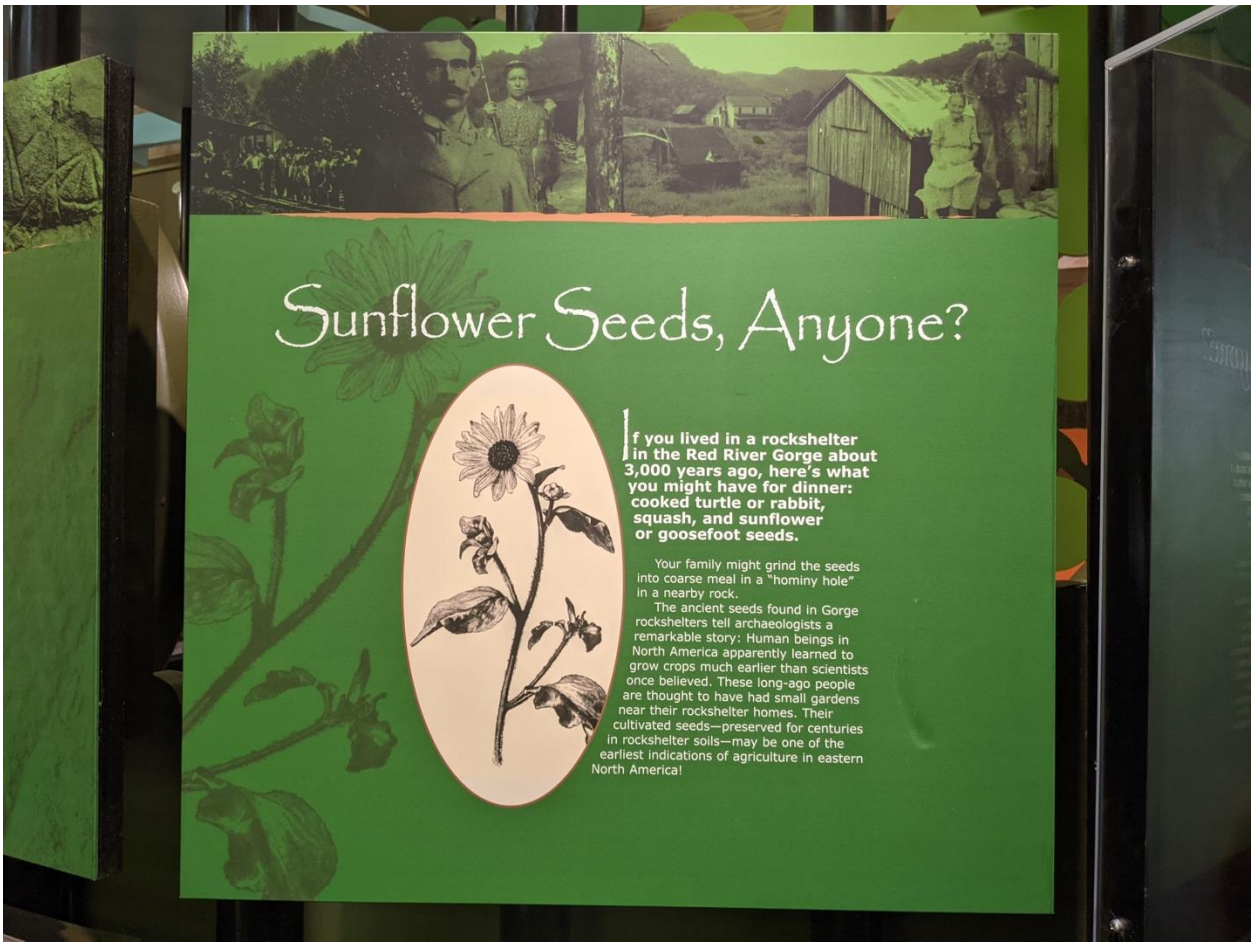


Figure 4.11. An interpretive sign about the Eastern Agricultural Complex.

This is a fantastic start to interpreting the history of the Eastern Agricultural Complex.

However, this one sign only addresses three plant species associated with the Eastern

Agricultural Complex, does not address the Eastern Agricultural Complex by name, and does not convey the significance of the Red River drainage area and Pottsville Escarpment region in archaeological research being done on the Eastern Agricultural Complex. Overall, a more comprehensive interpretation effort could be made to convey the details and significance of the Eastern Agricultural Complex in Red River Gorge, and that will be the primary focus of this chapter.

Living Archaeology Weekend

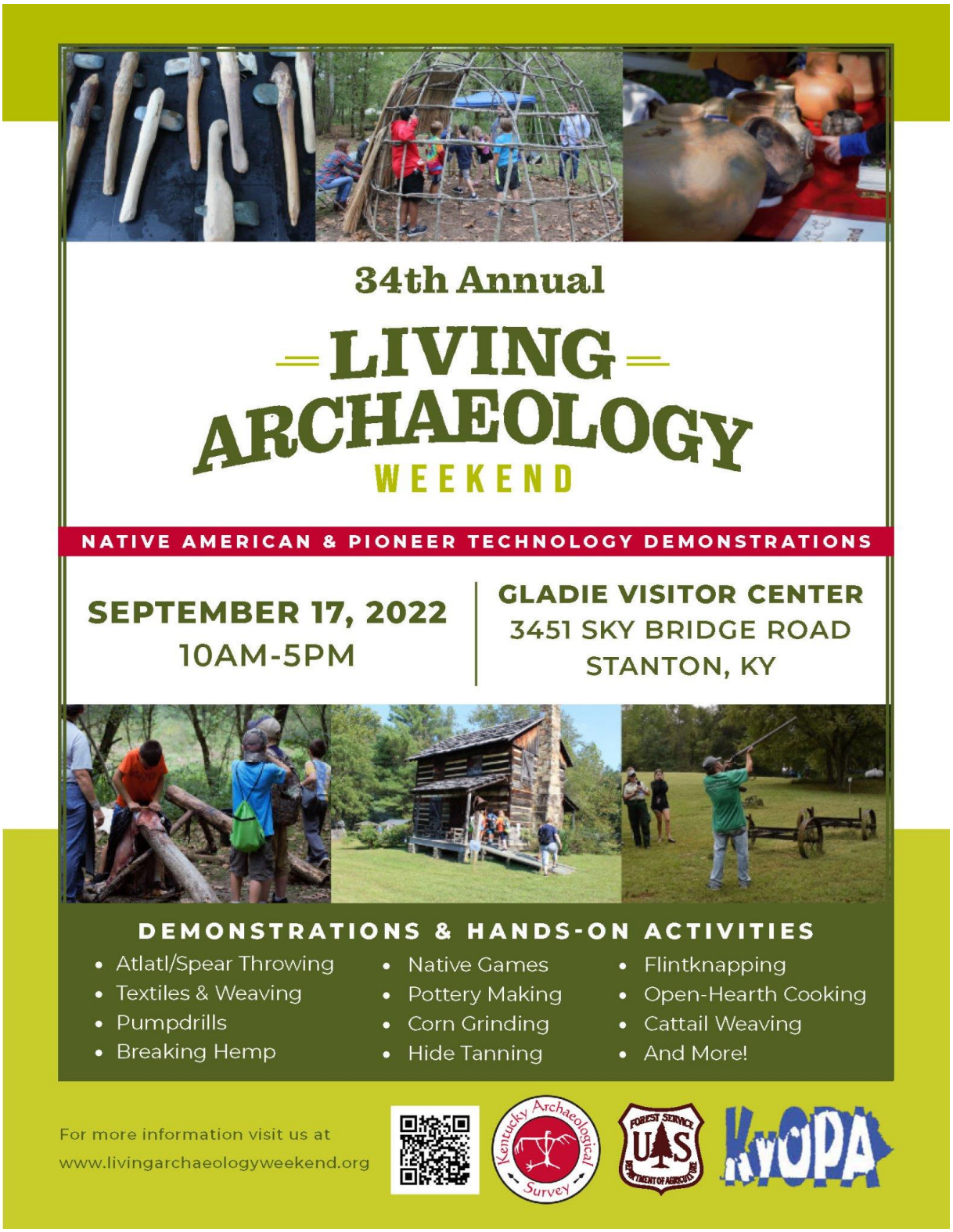


Figure 4.12. A poster advertising the 2022 Living Archaeology Weekend. (Poster source: Kentucky Organization for Professional Archaeologists).

Events are also an important aspect of interpretation. Interpretive events at Red River Gorge focus on history, ecology, and archaeology. Some of these events include tours of the Gladie Cabin and "Creeks, Critters, & Chemistry" weekends, both hosted by FIND Outdoors, and the annual Living Archaeology Weekend, hosted by the Kentucky Archaeology Survey, The U.S. Forest Service, and the Kentucky Organization for Professional Archaeologists (Figure 4.12).[181] The program goals of Living Archaeology Weekend are to "promote an appreciation for cultural diversity and cultural accomplishments, focusing on the rich American Indian heritage of Kentucky… as well as the lifeways of historic period settlers in Kentucky," to "inform about the past as it is known through archaeology," and to "foster respect for cultural resources and promote public stewardship of the archaeological record."[182]

Living Archaeology Weekend is aimed at school groups on the first day and the general public on the second. The 2022 poster lists some of the activities and demonstrations. Most of these events take place on the grounds surrounding Gladie Cabin and behind the Gladie Visitor Center. Living Archaeology Weekend demonstrations associated with food and food processing include open hearth cooking, medicinal plants, corn processing techniques, and the common bean. Dr. Renée Bonzani, a professor of anthropology at the University of Kentucky, leads demonstrations to "display Native plants and tools used to plant, harvest, and process domesticated crops since Archaic times." This would likely include both the Eastern Agricultural Complex and the Three Sisters crop complex, although neither are

[181] "Gladie Visitor Center." FIND Outdoors; *34th Annual Living Archaeology Weekend*. 2022. Poster. Kentucky Archaeological Survey, United States Forest Service, Kentucky Organization of Professional Archaeologists.
[182] "About." Living Archaeology Weekend.

currently addressed by name on the Living Archaeology Weekend website.[183] The next Living Archaeology Weekend will be held on September 15th and 16th, 2023.

FRAMEWORK FOR INTERPRETATION

Why Red River Gorge?

As outlined in this and previous chapters, Red River Gorge is both a critical archaeological location in relation to the Eastern Agricultural Complex and a popular recreational site with existing interpretation of the historic Native American culture of the region. Some of the existing marketing and interpretive signage at Red River Gorge paints it as an ancient landscape important to Native Americans thousands of years ago. The high degree of preservation of the natural environment at Red River Gorge also lends itself to being perceived as if visitors were "stepping back in time," as the sign in Figure 4.5 reads. The Gladie Visitor Center provides a location for interpretive signage, exhibits, and events like Living Archaeology Weekend to interpret the history and significance of the Eastern Agricultural Complex in the Red River Gorge area.

Design Guidelines

Because this interpretation will be happening in a site administered by the U.S. Forest Service, design guidelines for interpretive signage put in place by the USFS must be followed. In addition, facilities, funding, and personnel available to the Daniel Boone National Forest, FIND Outdoors, and the Gladie Visitor Center must be taken into account. The official *Sign and Poster Guidelines for the Forest Service* document is used for general signage requirements.[184] Mary O'Malley, the Public Affairs Specialist for the

[183] "Meet Our Demonstrators." Living Archaeology Weekend.
[184] "Sign and Poser Guidelines for the National Park Service." United States Department of Agriculture. October, 2013.

Daniel Boone National Forest, has been kind enough to provide this document and additional information about signage.

Best Practices Framework

In order to more significantly incorporate the Eastern Agricultural Complex into the interpretive efforts that already exist at Red River Gorge, a framework for best practices regarding interpreting Native American cultural landscapes must be formed. In the introductory chapter of this thesis, Freeman Tilden's six principles of heritage interpretation were outlined. In this chapter, Tilden's principles will be referenced, and more "best practices" regarding interpretation of Indigenous cultural heritage will be outlined and discussed. The history of interpreting sites that have significance to Indigenous cultures has not always been a respectful one, and creating interpretation recommendations in 2023 gives us an opportunity to utilize the most up-to-date "best practices" to ensure that the cultures who developed and used the Eastern Agricultural Complex, and their ancestors, are being treated with respect and that their history is being interpreted accurately.

As Western Carolina University history professor Andrew Denson notes in his 2017 book *Monuments to Absence*, the cultural history of Native Americans, particularly Cherokee people, in Appalachia has historically been used as entertainment for white tourists to places like Great Smoky Mountains National Park.[185] The narrative of Indigenous history in the eastern United States also often frames Native American groups as being entirely removed from the region and excludes Indigenous Americans from telling their own stories. While many of the descendants of Indigenous Eastern

[185] Denson, Andrew. 2017. *Monuments to Absence: Cherokee Removal and the Contest over Southern Memory*. Chapel Hill, North Carolina: The University of North Carolina Press.

Kentuckians today live in Oklahoma, involving tribal members from anywhere in the United States in contemporary interpretive efforts is entirely possible, and made especially easy with the broad increase in the use of telecommunication software since the start of the COVID-19 pandemic. Megan Krietsch, the Heritage Program Manager and Tribal Relations Program Manager for the Daniel Boone National Forest, is currently working to involve tribal groups in some upcoming interpretive efforts that will be covered in this chapter.

In any case of interpretation at a museum or historic site, "best practices" refers to the accepted framework for procedures, design guidelines, personnel training, and content related to interpretation that professionals in the field of museum studies and historic preservation widely accept. In this case, best practices regarding interpreting cultural landscapes, agricultural history, and Native American history would be of concern. One source for best practices is the National Park Service. The NPS is a large organization that oversees numerous historic sites and cultural landscapes. While Red River Gorge is not a National Park Service site, NPS bulletins and reports can be helpful guidelines for management and interpretation, and these bulletins and reports are frequently cited in the field of historic preservation. For example, the "Guide to Cultural Landscape Reports: Contents, Procedures and Techniques" (1998) is a report detailing the creation of cultural landscape reports, which are large reports documenting the history of a site, the current status of that site, and proposed treatment of the site.[186] The cultural landscape report framework can be advantageous even when dealing with sites the National Park Service does not manage. National Park Service bulletins, like

[186] Page, Robert R., Cathy A. Gilbert, and Susan A. Dolan. 1998. *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques*. Washington, D.C.: U.S. Department of the Interior.

"Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties," could also help survey and evaluate a landscape like Red River Gorge through the lens of cultural landscape documentation.[187] These sources are often useful when nominating a property to be listed on the National Register of Historic Places or when developing a new management plan for a site. Since Red River Gorge is already listed in the National Register of Historic Places, and a management plan is outside of the scope and focus of this thesis, the framework for best practices that will be covered will be limited to interpretive efforts, like exhibits, signage, and events.

In 1990 the National Park Service published a paper relating to interpretation of Indigenous history, "Interpreting Native American Cultures," with sections written by John E. Cook, G. Ray Bane, Michael Holm, Betty McSwain, Marie T. Myers, Robert Lake, M. Reid Miller, Valerie J. Naylor, Kenneth Arzarian, Robert Palmer, Costa Dillon, Don Neubacher, Ailema Benally, Don Wollenhaupt, Deb Liggett, and Andrea J. Sharon.[188] While the NPS published this paper over thirty years ago, it still retains some beneficial discussion on the subject of interpreting Indigenous history. In Michael Holm's section, titled "Cross Cultural Communication," Holms, who was, at the time of publication, the superintendent of Knife River Indian Villages National Historic Site, recounts efforts that Knife River undertook to involve tribal members of the Mandan, Hidatsa, and Arikara Nation (also known as the Three Affiliated Tribes):

> I believe we have achieved success in some endeavors, but the task is not complete. One children's book has come about through this cooperative effort. Involved in the review from first draft until the final printing were park staff, tribal representatives, regional office staff, Midwest Archeological Center staff, three authors, an illustrator, a university system, a cooperating association and a

[187] Interagency Resources Division, National Park Service, U.S. Department of the Interior. National Register Bulletin 38. 1992.
[188] Cook, John E., G. R. Bane, Michael Holm, Betty McSwain, Marie T. Myers, Robert Lake, M. R. Miller et al. "Interpreting Native American Cultures." *Interpretation* Fall, (1988).

> publisher. Tough to coordinate this? You bet it was. But the end product was worth the effort. Involving the Native American people created a sensitivity to the text as well as the artwork that could not have been achieved otherwise. (8)[189]

In 1990, this effort for inclusion was a step in the right direction. In 2020, Alisha Deegan, a member of the Mandan, Hidatsa, and Arikara Nation, was sworn in as superintendent of Knife River Indian Villages National Historic Site, demonstrating that those earlier efforts of "cross cultural communication" were not trivial.

Interpretation recommendations made in this chapter deal with a period in history that predates contemporary tribal affiliations like Shawnee and Cherokee. However, members of tribes who descended from Late Archaic and Woodland Period people, and who shared their ancestral lands for many years, can still be involved in interpreting the Eastern Agricultural Complex at Red River Gorge. Just as contemporary Europeans may be fascinated by ancient agriculture techniques like coppiced hazelnut forest gardens, contemporary Eastern Kentuckians and tribal groups whose traditional lands extended into Eastern Kentucky alike may be fascinated by the "first foods" of the Eastern Agricultural Complex. For example, Cherokee Nation tribal members and chefs Nico Albert and Taelor Barton have begun using traditional foods, including plants like goosefoot, in developing dishes.[190] Barton and Albert's work will be further explored later in this chapter.

[189] Cook, John E., G. R. Bane, Michael Holm, Betty McSwain, Marie T. Myers, Robert Lake, M. R. Miller et al. "Interpreting Native American Cultures." *Interpretation* Fall, (1988).
[190] Wallace, Eric J. "The Cherokee Chefs Bringing Back North America's Lost Cuisine." Gastro Obscura. Atlas Obscura, June 4, 2020.

OPTIONS FOR INTERPRETATION

This chapter aims to outline a set of interpretative elements that would be appropriate and engaging for interpreting the Eastern Agricultural Complex at Red River Gorge. As detailed earlier in the chapter, current interpretive efforts include some interpretive signage inside the Gladie Visitor Center relating to pre-historic life in rockshelters and hominy holes, and one sign referencing the cultivation of goosefoot, squash, and sunflower, as well as some focus on plant harvesting and processing related to the Three Sisters agricultural system and the Eastern Agricultural Complex at the annual Living Archaeology Weekend event. The audience for future interpretive efforts can be assumed to include school-age children to adults, Indigenous and non-Indigenous people, Kentuckians and people from outside of Kentucky and outside of the United States, and people who may know very little to no information about the Eastern Agricultural Complex to people who have extensive knowledge of it. For the reasons outlined above, interpretive efforts that the Forest Service carries out in the future should involve tribal groups' participation, be respectful to the cultures that are being interpreted, be respectful to the values and desires of the tribal groups that descend from those cultures, and be interesting, informative, and accessible to any and all visitors of Red River Gorge.

In the field of interpretation at historic sites, there are many possibilities for interpretive signage, permanent and temporary exhibits, and events. Many museums and some historic sites utilize re-creations of historic structures and life-size or scale dioramas to depict historical cultures or events. While this type of imagery-based interpretation can be very engaging, the Gladie Visitor Center is a relatively small facility that houses interpretive exhibits in about half of its square footage, while restroom

facilities, a help desk, and a gift shop are housed in the other half. Since so many aspects of history and ecology at Red River Gorge are interpreted at this site, a diorama dedicated entirely to the Eastern Agricultural Complex would likely be too large for the space available. There are two maintained outdoor areas outside of the Gladie Visitor Center. While only one is dedicated to the Gladie Cabin and barn site, both areas are used for events like Living Archaeology Weekend. The site is also in the Red River and Gladie Creek valley and does not contain the rugged terrain of rockshelter sites. For these reasons, this thesis will not explore the possibilities of creating a large-scale historic re-creation of an Eastern Agricultural Complex site.

Currently, artistic renderings of Eastern Agricultural Complex-related activities or life in rockshelters during the time in which the Eastern Agricultural Complex was developed do not exist or are not publicly available. Visual representation would benefit the broader interpretation of the Eastern Agricultural Complex and life at that time at sites like Red River Gorge, and in the Eastern Woodlands region in general. As we grow to better understand the people who developed the Eastern Agricultural Complex, such artistic renderings may be created and incorporated into interpretation efforts. At this time, many aspects of life during the Late Archaic and Woodland periods, including agricultural practices, are still being discovered. While interpretive signage can always be updated to include such artistic renderings, this thesis will not discuss details on commissioning any artistic renderings for the near future.

Several historic sites in the United States, like the Knife River Indian Villages National Historic Site, include "living history" in their interpretive efforts. Living history often involves reenactments by real people at the site. These reenactments typically include historical dress and demonstrations of historical practices. While living history

interpretation can be incredibly immersive and engaging, there are a few reasons why it might not work at Red River Gorge. The first reason is related to space and administration. As mentioned above, the Gladie Visitor Center has limited space, and living history interpretation is often done at larger sites. The visitor center is also administered by the National Forest Service and FIND Outdoors, neither of which use living history in their typical interpretive efforts.

Another reason is funding: sites administered by the National Parks Service, like Knife River, often have more funding available, including from visitor fees. While Red River Gorge has fees for camping, entrance to Red River Gorge and the Gladie Visitor Center, and activities like hiking, mountain climbing, and canoeing, are typically free.[191] Thus, a large-scale interpretation effort like a year-round or seasonal living history project with high costs, including hiring many new personnel, is likely out of the scope of the resources currently available to Red River Gorge. Living history is also better suited to sites with one significant period of history being interpreted. Red River Gorge has a rich history, and even the pre-colonial history of Red River Gorge includes significant cultural periods beyond the Eastern Agricultural Complex. Additionally, living history projects at Native American sites should be enthusiastically welcomed by—and organized and carried out by—tribal groups associated with the site. There are no tribal groups currently living in Kentucky or the areas surrounding Red River Gorge. While a full-on living history project may be outside of the USFS' scope at this time, the annual Living Archaeology Weekend includes several demonstrations of historical

[191] "Recreation Permits and Passes." Daniel Boone National Forest. United States Forest Service.

practices. It can serve to educate K-12 students and teachers, and members of the public about Eastern Agricultural Practices in an immersive way.

Another tool for interpreting the Eastern Agricultural Complex to K-12 students and teachers, and members of the public, would be to create public video programming. Kentucky Educational Television (KET), a PBS network, is the primary producer of public television programming in Kentucky. Such programming would likely also include the Green River drainage area in Western Kentucky, as it, too, is a significant site for the development of the Eastern Agricultural Complex in Kentucky. In addition to the Green River area, this kind of programming could be filmed in part at, and focus on, Red River Gorge. It would likely be beyond the administrative capacity and resources of the U.S. Forest Service to organize and carry out this kind of programming. However, the USFS could advocate for and partner with such programming in the future. This kind of programming could be especially beneficial in priming K-12 students for events like Living Archaeology Weekend.

Three potential facets of interpretation that *would* be viable for Red River Gorge and the Gladie Visitor Center to carry out in the near future are updated signage to include more information about Eastern Agricultural Complex plants and practices, a native plant demonstration garden that includes Eastern Agricultural Complex plants, and partnerships with local restaurants and indigenous-led organizations to create seasonal dishes using Eastern Agricultural Complex ingredients. This proposed interpretive array will be explored in the following sections.

INTERPRETIVE SIGNAGE

The first, and perhaps simplest, aspect of updated interpretation at Red River Gorge that will be covered is interpretive signage. Currently, interpretive signage exists within and just outside of the Gladie Visitor Center. Figure 4.11 depicts the only signage currently addressing the Eastern Agricultural Complex. Utilizing examples of best practices in interpretive signage at Native American historic sites and the current U.S. Forest Service guidelines on signage, four new sign designs are included in this thesis. The first and third are proposed to be housed in the Gladie Visitor Center and would replace the current sign (Figure 4.11). The second is an alternative design to the first and would be placed at the demonstration garden site. The third sign is proposed to sit along a hiking trail that bypasses several sandstone rockshelters. The signage will address the relationship between rockshelters and the Eastern Agricultural Complex, but will not disclose the locations of classified archaeological sites within Red River Gorge, like the Cloudsplitter rockshelter site. The sample designs are attached in Appendix B at the end of this thesis.

National Forest Service Signage Design Guidelines

The guidelines for creating signage on U.S. Forest Service-managed land, titled *Sign and Poster Guidance for the Forest Service*, was provided by Mary O'Malley, Public Affairs Specialist for the Daniel Boone National Forest. O'Malley also provided official branding information and documents. These guidelines date to 2013. While the Forest Service is in the process of updating their branding, the 2013 guidelines are still in use for now. Signage designs included with this thesis are flexible, and if guidelines change before the designs are implemented they can be updated in accordance with new branding.

The most pertinent section of this guide is *Chapter 10A: Visitor Information Signage—Interpretive*.[192] The introduction states: "Interpretive signs are the single most popular form of interpretation in the Forest Service, and are commonly used on self-guided trails, scenic byways, and other points of interest, such as overlooks and resource management areas," and that "Interpretation is purposeful, and at the same time enjoyable, relevant, organized, and thematic." General signage guidelines and specific parameters like font size and layouts will be followed for all signage designs included in Appendix B at the end of this thesis. Inspiration for the signage designs will come from existing interpretive signage within the Gladie Visitor Center to create a harmonious incorporation of the Eastern Agricultural Complex into existing interpretation, personal experience visiting Red River Gorge and the Gladie Visitor Center, and personal experience hiking on trails at Red River Gorge.

The Forest Service guidelines for signage offer a degree of artistic freedom and encourage using local materials, so the aesthetic inspiration for the signage within and outside of the visitor center will come from the unique natural and historic features of Red River Gorge. The use of signage and brochure information in a self-guided walking tour at the Poverty Point World Heritage site in Louisiana is used as a case study in the following section to determine appropriate use of signage along a walking path system outdoors.

[192] "Sign and Poser Guidelines for the National Park Service." 2013, 495-496.

Poverty Point, Louisiana

Figure 4.13. USGS aerial imagery of the Poverty Point earthworks, 1938.

Poverty Point is an earthworks site built by Native Americans over 3,000 years ago (Figure 4.13).[193] It is about 46 miles east of the Watson Brake mound site in northeastern Louisiana, which is thought to be the oldest earthwork in North America, at over 5,000 years old. The Poverty Point earthworks include a set of concentric half-circle ridges and six mounds, one of which, Mound A or Bird Mound, is one of the largest in North America. The site was abandoned around 1100 BCE and briefly re-inhabited around 700 CE, then abandoned again until it was rediscovered in the nineteenth century. Archaeological evidence has revealed that Poverty Point was likely an important location along a Mississippi River-based trade route. Artifacts from

[193] "The Story of Poverty Point." Poverty Point World Heritage Site. Louisiana Office of Tourism.

Poverty Point show that people at Poverty Point sourced materials, like stone, for making tools like projectile points from as far away as the Appalachian Mountains.[194] Poverty Point has a visitor center with an interpretive exhibit and a walking trail with twenty "stops" (Figure 4.14). These stops align with information in a self-guided walking tour pamphlet, and some have interpretive signage with information about the mounds and concentric ridges. The museum exhibit is primarily focused on archaeology and includes a large array of artifacts and interpretive signage describing life at Poverty Point.

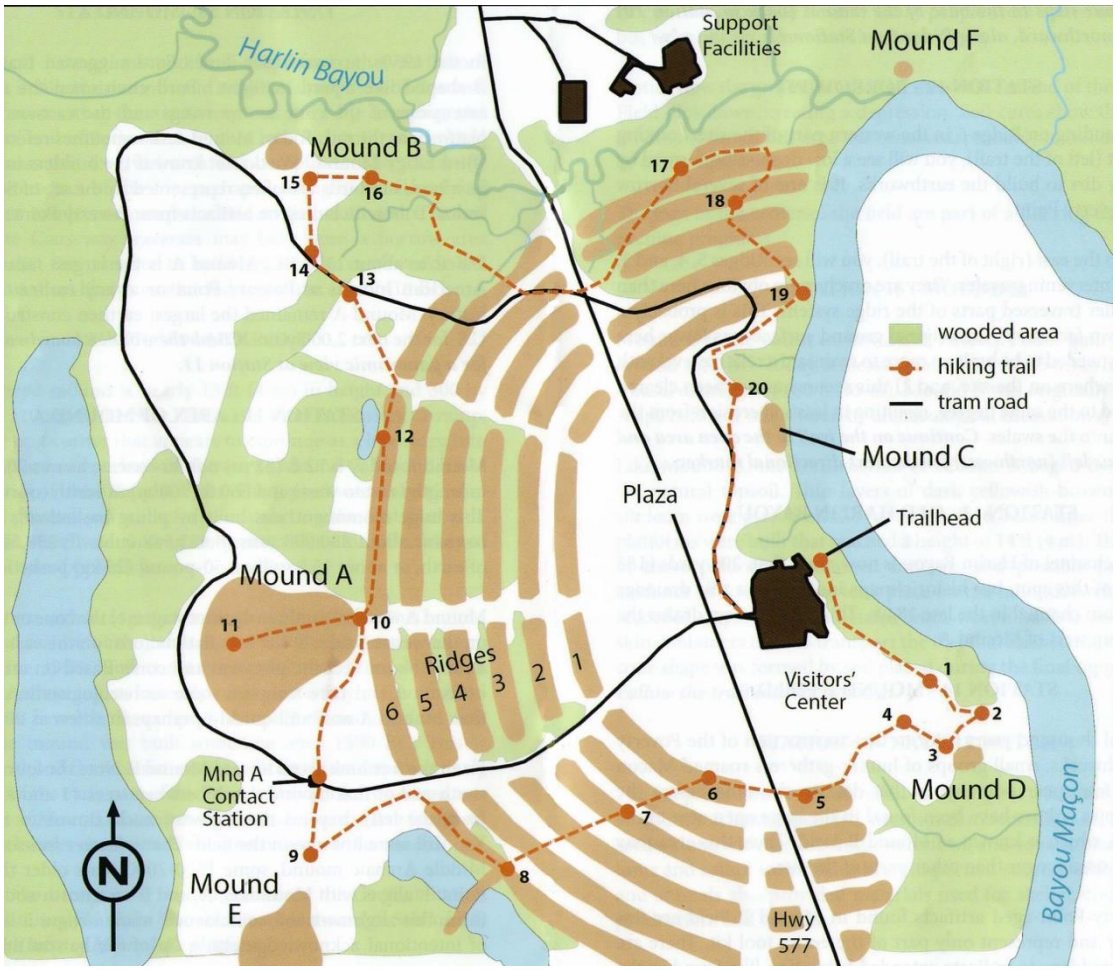


Figure 4.14. A portion of the Poverty Point brochure indicating the locations of stops signage (numbered) along a hiking trail.

[194] "History and Artifacts of Poverty Point." Poverty Point World Heritage Site. Louisiana Office of Tourism.

One visitor to the Poverty Point World Heritage Site stated, via a Google review, that the information included in the brochure made them notice details of the landscape that they would not have noticed otherwise.[195] Many other reviewers commended the information on the history of Poverty Point provided in the museum, signage, and self-guided walking tour brochure. A mix of brochure and signage information could be incorporated into the interpretive efforts at Red River Gorge and the Gladie Visitor Center.

This thesis includes one sign design that could be used along a self-guided walking tour. This sign addresses rockshelters and hillside gardening associated with the Eastern Agricultural Complex. A self-guided walking tour could be an opportunity to interpret multiple periods of history. This would require input from experts on other periods of history at Red River Gorge, like the Gladie settlement and older floodplain settlements like the Gladie Creek site. The tour could also include geological and ecological features unique to Red River Gorge. In order to include a rockshelter site, the trail would have to extend beyond the area immediately surrounding the Gladie Visitor Center. Several trailheads begin near the visitor center. If one of these trails contains suitable sites for interpreting various periods of history, it may be selected as a continuation of the self-guided trail starting on the visitor center grounds. If another trail within Red River Gorge contains a more appropriate array of natural and historic features, it could be used as a discontiguous continuation of the self-guided tour beginning at the Gladie Visitor Center. Ideally, the trail system selected to contain the interpretive signage would have a high degree of accessibility rather than be of an

[195] Probst, Tim. "Online Review of Poverty Point World Heritage Site." Google Maps. Google.

advanced difficulty level. Due to the region's rugged terrain, interpretive signage should be carefully placed to be as accessible as possible. A companion pamphlet would make the information provided along the walking trail accessible to people of all physical abilities. See Appendix B for proposed signage designs.

DEMONSTRATION GARDEN

According to the University of Florida, “Demonstration gardens, sometimes referred to as learning landscapes or teaching gardens, are a collection of plants assembled and organized in a manner that allows garden visitors to access and study them.”[196] A demonstration garden at Red River Gorge could include a plethora of native plants with historical uses, including food plants, medicinal plants, and plants used for things like textiles and building materials. Visitors to Red River Gorge could then see, first-hand, the plants that are referenced in interpretive signage, exhibits, and events. Plants associated with the Eastern Agricultural Complex could be used for research and teaching purposes, as the interaction between the different plant species and exactly how they were harvested, processed, and used is still relatively unknown. During events like Living Archaeology Weekend, demonstrations on harvesting, processing, and cooking certain plants associated with the Eastern Agricultural Complex could create an even more immersive experience for participants. Plants associated with other historic agricultural systems, like the Three Sisters crop complex, and those used by families who lived in the Gladie settlement, could also be included in the demonstration garden. Megan Krietsch has been discussing the idea of a native plant garden with the Daniel

[196] "Demonstration Gardens." askifas. University of Florida IFIS Extension.

Boone National Forest botanist and several tribes. This discussion includes sourcing seeds from tribal-owned gardens and greenhouses. Some challenges in implementing a demonstration garden include allotting a plot of land for the garden, hiring personnel, and implementing a volunteer program for gardeners.

Demonstration gardens can range widely in size, but a modest garden could be placed on the already-maintained tracts of land immediately adjacent to the Gladie Visitor Center. If chosen, the process of using this tract of land would have to be carefully considered, since the same land is used for events like Living Archaeology Weekend. At the same time, incorporating a demonstration garden into Living Archaeology Weekend could mean having the garden near the visitor center would be a benefit. Existing facilities would have to be utilized or new facilities built to house gardening equipment and store seeds. Squash and sunflower seeds would likely be easier to source than some of the more obscure species of the Eastern Agricultural Complex. Still, care must be taken to source seed varieties that are closely related to Eastern Agricultural Complex cultivars, especially because the contemporary selection of sunflower and squash varieties is immense. Some specialty seed stores have begun carrying seeds like little barley and maygrass, and other varieties of goosefoot are still cultivated and would likely be relatively available.

The Three Sisters Garden, Madera County, California

Three Sisters Garden in Madera County, California is one example of a demonstration garden that is used for interpreting Native American agricultural practices.[197]

[197] "“Three Sisters’ Demonstration Garden.” Madera County Master Gardener Program. University of California.

Figure 4.15. California poppies with a mural of “Three Sisters” agriculture in the background (Image source: The UCCE Master Gardeners of Madera County Facebook page).

This garden was developed by the University of California Cooperative Extension (UCCE) Madera County Master Gardner’s program and the Madera Community College Center. In addition to maize, squash, and beans, the Three Sisters Garden grows many other food plants and ornamentals (Figure 4.15). They also hold gardening and landscape design workshops presented by Master Gardeners affiliated with the garden.

The Three Sisters Garden is made possible by their affiliation with a Master Gardeners program, which is part of a state university extension service, and their affiliation with a community college. While the Gladie Visitor Center and Red River Gorge landscape sit on National Forest Service land, university affiliations can still exist, making a demonstration garden possible. In Lexington, about a 65-mile drive from the

Gladie Visitor Center, the University of Kentucky College of Agriculture, Food, and Environment's cooperative extension service administers the Kentucky Extension Master Gardener program. According to their Master Gardener guidelines, a county extension agent (CEA) must oversee volunteer activities and maintain the certification status of Master Gardeners in the program.[198] In this case, the Menifee County CEA would likely oversee the program. Trainees must complete forty hours of volunteer service before getting certified and twenty hours per year to maintain their certification. A Master Gardener program affiliated with the proposed demonstration garden at the Gladie Visitor Center would provide skilled volunteer labor from people passionate about gardening.

The demonstration garden could also be affiliated with archaeology and anthropology programs in Eastern Kentucky's higher education institutions like the University of Kentucky, Eastern Kentucky University, and Morehead State University. This would extend the reach of education opportunities to the college level and may get students and professors interested in becoming Master Gardeners, or otherwise becoming affiliated with the demonstration garden.

Even with a volunteer program like the Master Gardener program involved, the Gladie Visitor Center would likely need to hire dedicated personnel to administer the garden full-time and to coordinate volunteer activities and events. Dr. Renée Bonzani from the University of Kentucky and Dr. Jon Endonino from Eastern Kentucky University have research focused on the Eastern Agricultural Complex already and may be able to serve as professional consultants to the garden, in addition to the Daniel

[198] Durham, Richard. Guidelines for the Kentucky Master Gardener Program. University of Kentucky College of Agriculture, Food, and Environment Cooperative Extension Service.

Boone National Forest botanist and archaeologists, and tribal groups affiliated with Red River Gorge. Such a garden could also benefit student research projects like this one, that are focused on native plant species and ancient agricultural systems.

A demonstration garden would be a long-term project that would require a great deal of input and careful planning. However, it would likely be incredibly meaningful and engaging for visitors to the Gladie Visitor Center and participants in the Living Archaeology Weekend to experience the ancient crops of the Eastern Agricultural Complex first-hand. Spreading the knowledge of Eastern Agricultural crop cultivation using a demonstration garden also has the potential to allow researchers and the public, alike, to develop and carry out ideas, and perhaps discoveries, regarding the domestication process, planting, harvesting, and processing techniques, and developing culinary dishes using the crops. Newly developed culinary dishes using Eastern Agricultural Complex crops could also connect traditional and contemporary Native American foodways with traditional and contemporary Kentucky foodways.

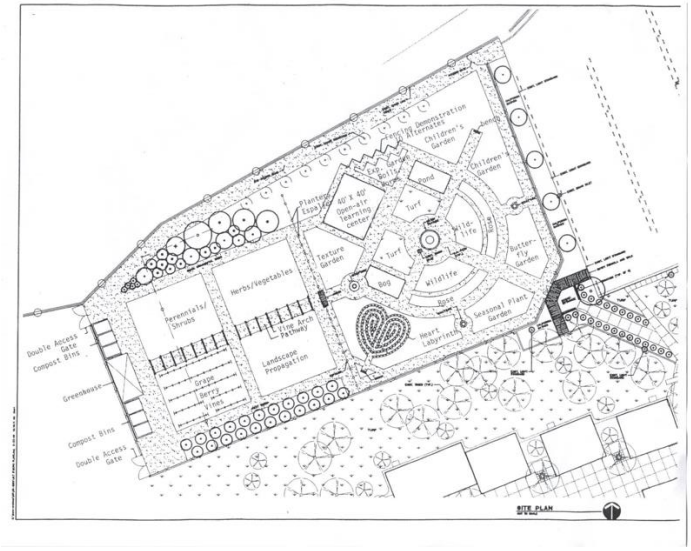


Figure 4.16. Three Sisters Demonstration Garden Plan (Image source: cemadera.ucanr.edu).

Figure 4.17. The Appalachian Proud logo (Image source: kyproud.com).

Another first-hand experience aspect of interpretation that could be implemented in relation to the Eastern Agricultural Complex would be to utilize Eastern Agricultural Complex crops in contemporary foodways. Developing seasonal dishes in partnership with chefs like Nico Albert and Taelor Barton, whose work with traditional foodways will be discussed further in this chapter, that incorporate Eastern Agricultural Complex crops could be a meaningful way of bridging ancient and modern Kentucky culture. While there is no restaurant affiliated with Red River Gorge, there are numerous restaurants in the surrounding area and the Pottsville Escarpment region in general, and restaurants affiliated with state resort parks in the region, like the adjacent Natural Bridge State Park, that could incorporate these seasonal dishes into their menus. Several

non-state park-affiliated restaurants participate in Kentucky Proud, a farm-to-table style program that connects Kentucky farms with Kentucky restaurants and vendors.[199] To create an even more local brand to Eastern Kentucky, Kentucky Proud launched the Appalachian Proud brand in 2014, and every county within the Pottsville Escarpment region is eligible for participation in this brand (Figure 4.17).[200] Utilizing locally grown ingredients that were among Kentucky's first cultivated foods seems very much in line with the Kentucky Proud and Appalachian Proud brands, and it could be an opportunity to bring education on the Eastern Agricultural Complex directly to peoples' tables. Restaurants that partner with the program could place Kentucky Proud or Appalachia Proud branded "tent cards" with a short message about the Eastern Agricultural Complex and its connection to Kentucky and the Red River Gorge on tables. With the rise in popularity of heritage crops and sustainable farming systems like permaculture and agroforestry, perhaps more farmers and gardeners in Kentucky will see potential in cultivating the ancient crops of the Eastern Agricultural Complex.

The Museum of the American Indian

Creating dishes with historically-used food crops as a form of "interpretation" may fall outside of traditional ideas of interpretation at museums and historic sites. However, this case study, the Smithsonian's National Museum of the American Indian, has been serving traditional Native North and South American dishes at their museum

[199] "Proud to be Kentucky Proud: Local Agricultural Marketing Program." Kentucky Proud. The Kentucky Department of Agriculture.
[200] "Appalachia Proud: Mountains of Potential." Kentucky Proud. The Kentucky Department of Agriculture; "17 Kentucky Counties Added to Appalachia Proud Region." The Lane Report. The Lane Report, September 6, 2019.

café, the Mitsitam Native Foods Café, since the museum opened in 2004.[201] Mitsitam's current menu features traditional foods like manoomin (wild rice) from the Great Lakes region, tamales from the American Southwest and Central America, and chuño phuti, a freeze-dried potato dish from Bolivia and Peru.[202] The café focuses on regional foods from the Northern Woodlands, Mesoamerica, South America, the Northwest Coast, and the Great Plains.[203] Notably missing from this list is the Eastern Woodlands region, once home to the Eastern Agricultural Complex. By opening up opportunities to collaborate with Cherokee or Shawnee chefs like Nico Albert and Taelor Barton, the success of the Mitsitam Café may be repeated in the heart of the Eastern United States.

Nico Albert and Taelor Barton

Figure 4.18. Taelor Barton (second from the left) and Nico Albert (far right) in front of a spread of food cooked for a BBC program (Image source: Atlas Obscura).

[201] "About Mitsitam Café & Chefs." Mitsitam Native Foods Café. National Museum of the American Indian; Dillon, Katie. "Mitsitam Cafe Is the Best Place to Eat in the National Mall." La Jolla Mom. La Jolla Living, June 10, 2020.
[202] "Mitsitam Native Foods Café Menu & Hours." Mitsitam Native Foods Café. National Museum of the American Indian.
[203] Dillon, Katie. "Mitsitam Cafe Is the Best Place to Eat in the National Mall."

A 2020 Atlas Obscura article by Eric J. Wallace, titled "The Cherokee Chefs Bringing Back North America's Lost Cuisine: Researching traditional foods led them to the revelations of an archaeological dig in Kentucky," detailed the journey that Cherokee Chefs Nico Albert and Taelor Barton took to reconnect with the ancient agricultural system that developed in their traditional lands (Figure 4.18).[204] When the article was written, Albert and Barton were developing a menu for Duet, a restaurant in Tulsa, Oklahoma. Albert is the executive chef at Duet, and every November, which is Native American Heritage Month, the chefs convert the entire menu to contemporary takes on traditional Native American foods. Barton and Albert became interested in reviving the use of Eastern Agricultural Complex plants after researching traditional early crops like the Three Sisters led them to learning about the Eastern Agricultural Complex at sites like Red River Gorge. In order to source seeds for these dishes, the chefs have partnered with the Cherokee Nation Seed Bank, Pawnee Seed Preservation Project, and Sean Sherman's North American Traditional Indigenous Food Systems program.

Albert is the founder and executive director of Burning Cedar Sovereign Wellness.[205] According to the Burning Cedar website, their mission is to address "socioeconomic disparities, health crises, and cultural disconnection affecting Indigenous communities by re-establishing ancestral foodways, wellness practices, and traditional medicine, educating future generations of Indigenous cooks, supporting Indigenous food producers, teaching sustainable and environmentally restorative practices, and providing resources for our people to improve their spiritual, mental, emotional and physical health through ancestral ways of knowing."[206] Barton is a

[204] Wallace, Eric J. "The Cherokee Chefs Bringing Back North America's Lost Cuisine." June 4, 2020.
[205] "Board of Directors." Burning Cedar Sovereign Wellness. Burning Cedar Sovereign Kitchen.
[206] "Our Mission." Burning Cedar Sovereign Wellness. Burning Cedar Sovereign Kitchen.

member of the I-Collective, an “autonomous group of Indigenous chefs, activists, herbalists, seed, and knowledge keepers” who strive “to open a dialogue and create a new narrative that highlights not only Indigenous historical contributions, but also promotes our community's resilience and innovations in gastronomy, agriculture, the arts, and society at large.”[207]

Organizations like the I-Collective and Burning Cedar, and seed suppliers like those listed above, would be incredibly beneficial partners in creating and implementing a contemporary Eastern Agricultural Complex foodways program in Kentucky. Partnering with such organizations, as well as with tribal groups and state-wide and regional agriculture brands, can also help reconnect the Pottsville Escarpment region with people whose ancestors once lived there and can show contemporary Kentuckians that Kentucky's connection to Indigenous Americans is not just a thing of the past. Furthermore, partnering with locally-focused agricultural brands like Kentucky Proud and Appalachia Proud would also further connect contemporary Kentuckians with the history of the land they live on.

CONCLUSION

Connecting Kentuckians with their land and history aligns with the conservation concept of bioregionalism. The theory of bioregionalism posits that the more people are familiar with the details of the bioregion they are from, the more they will be interested *and* able to steward the landscape of their home. Incorporating interpretation of the Eastern Agricultural Complex, the original domesticated crop system in eastern North

[207] "Who We Are." I-Collective; "About Us." I-Collective.

America, into the current interpretive efforts at Red River Gorge, will be a small step in educating Kentuckians, young and old, about the intricate ties between features of the land, like ecology and geology, and features of their own culture and the historic and ancient cultures Kentucky. It can also serve to help reconnect tribal groups with the lands their ancestors once lived in. This new phase of interpretation will hopefully be one step in an ongoing process of preserving the cultural heritage and conserving the ecological and geographical beauty of the Commonwealth of Kentucky.

Regarding Tilden's principles, new interpretive signage, a demonstration garden, and a contemporary foodways program would each be one aspect of telling the larger story, the whole, of the Eastern Agricultural Complex at Red River Gorge. It has the potential to be engaging and relatable to visitor's and volunteer's personal experience with gardening and agriculture. Interpretive signage related to the garden could be designed to engage adults and children separately, and perhaps most importantly, could incorporate all of the questions that we still have about the Eastern Agricultural Complex: How were these foods planted and harvested? How were they processed and cooked? How intensive or extensive was the gardening? Did garden plots move around season-to-season or stay in one place?

Directly incorporating what we *do not know* about the Eastern Agricultural Complex in the form of such questions into the interpretation would engage the audience beyond simply stating what we *do* know. For this reason, two different versions of one of the proposed signage designs are included in Appendix B at the end of this thesis. One version of the design, which is intended to be used within the Gladie Visitor Center, includes images of the plant species and simple textual information about each species and how they were used. The other version, which is intended to be

displayed at the demonstration garden site, includes the plants as well as expression of some of the questions associated with the Eastern Agricultural Complex that have been detailed in this chapter and the previous chapter. The simpler alternative could be used in the case that the demonstration garden does not come to fruition, and could be adapted to include the questions.

All of the interpretive efforts proposed in this chapter are adaptable, and Daniel Boone National Forest personnel, experts on the Eastern Agricultural Complex, and tribal groups and organizations will be closely consulted as the process of implementing the proposed interpretation efforts begins.

CHAPTER 5: CONCLUSION

The previous chapters represent a compilation of the relevant geological, geographical, ecological, and human history of the Pottsville Escarpment region and larger Cumberland Plateau region of Eastern Kentucky, and the development and implementation of the Eastern Agricultural Complex. From this existing knowledge stems a set of recommendations for updated and novel interpretation efforts to incorporate our knowledge of the Eastern Agricultural Complex in relation to Kentucky and the Red River Gorge Geological Area into the current interpretive efforts of the Gladie Visitor Center. This work relies on an immense amount of archaeological and historical research done over the last ninety years, as well as intensive surveys of the geology, geography, and ecology of Eastern Kentucky, and contemporary efforts to include tribal groups in the interpretation of their own traditional lands in a meaningful and respectful way.

The Red River Gorge Geological Area is one of several significant old-growth landscapes in Kentucky, and is particularly representative of the Pottsville Escarpment region's unique geological and geographical characterizes. The physical beauty and rich cultural history of Red River Gorge makes it the perfect location to interpret the fascinating history of the Eastern Agricultural Complex.

FUTURE RESEARCH

While much has been accomplished over the last ninety years in understanding what the Eastern Agricultural Complex was, and who the people were who developed it,

there are still many intricacies to the crop complex and culture that are yet-to-be discovered. Taking what we currently understand about the Eastern Agricultural Complex and incorporating it into the interpretive efforts at a popular recreational and natural site in Eastern Kentucky may help to spread our current knowledge, so that opportunities for acquiring more knowledge about the crop complex may arise.

The demonstration garden, especially, has the potential to contribute to future research. Understandings of how Eastern Agricultural Complex crops were domesticated, planted, harvested, processed, and used in cooking are all areas that a demonstration garden could potentially contribute to our knowledge of the complex. There are several aspects of the demonstration garden that would need to be carefully researched and planned out prior to implementing the garden, and may need to be adapted once a garden is planted.

One of these aspects is the lack of domestication syndrome characteristics in wild-type plants of most of the crops. While sunflower and squash have extant domesticates, many of the traits that made Eastern Agricultural Complex domesticates distinct from wild-type plants have been lost to time. Some of the now "weedy" crops of the Eastern Agricultural Complex, like marsh elder, which has the potential to be an allergen, may not be appropriate for incorporating into the demonstration garden, at least in its early phases. However, little barley, goosefoot, maygrass, and erect knotweed have been experimentally cultivated by researchers like Natalie Mueller and Gail Wagner, and their expertise and experimentation could allow for cultivation of plants that we may think of as weeds. The demonstration garden could also utilize experimentation on germination techniques, like cold stratification, and growing

seedlings prior to plantation in the garden, based on the research of people like Mueller and Wagner, and experimentation within the garden itself.

Experiments in driving re-domestication also could be carried out. The domestication of the Eastern Agricultural Complex crops happened over the course of hundreds of years, beginning with the foraging of wild-type plants and culminating in heavy Woodland Period reliance on agriculture. However, a concerted effort to re-domesticate these crops could be much faster, given everything we know about domesticate syndrome traits and advanced modern cultivation and experimentation techniques. It is also important to note that because these crops were foraged for many years before they were cultivated, and certain plants like maygrass and little barley do not have clear evidence of domestication, cultivating wild-type specimens may still lead to valuable knowledge building and interpretation. Two other plants, giant ragweed (*Ambrosia trifida*) and amaranth (*Amaranthus hypochondriacus*), have been shown to have some association with the Eastern Agricultural Complex.[208] If these plants were not domesticated or intentionally cultivated, they were likely tolerated weeds and are similar to goosefoot and marsh elder, respectively. There would be value in growing these species in the demonstration garden for educational and research purposes, although ragweed is a severe allergen and may not be appropriate in this setting. These crops do not show up in archaeological seed assemblages as frequently as the crops covered in Chapter Three, but future research could justify their inclusion into the complex. Other crops in the demonstration garden could include those in the Three Sisters crop complex and those used during the Gladie Settlement period. The Three

[208] Fritz, Gayle J. "Multiple Pathways to Farming," 1990; Fritz, Gayle J. “Identification of Cultigen Amaranth and Chenopod from Rockshelter Sites in Northwest Arkansas.” *American Antiquity* 49, no. 3 (2017): 558-572.

Sisters have regional variations, and the appropriate assemblage of plants (other than the core group of maize, squash, and beans) should be determined for Eastern Kentucky.

The use of wild-type plants for culinary dishes as part of the foodways program is another subject for further research. While foraged plants are seeing a resurgence in popularity and the species that were part of the Eastern Agricultural Complex were foraged prior to their domestication, using and sourcing wild-type seeds may pose a challenge. Barton and Albert have used goosefoot in their dishes, and several goosefoot varieties are used in Mesoamerica, and sunflower and squash are widely available.[209] The more niche crops may be especially difficult to source, at least in the early phases of the foodways project. Dishes that utilize goosefoot, sunflower, and squash could likely be developed soon. Other seeds might be seasonally available, and as demand increases, supply might increase.

Partnering with organizations both within and outside of Eastern Kentucky, whether as part of a contemporary foodways initiative or a proposed trail system, can also help spread this knowledge beyond the Gladie Visitor Center. The Warrior's Path Project, an organization based in Olive Hill, Kentucky, is working with the National Park Service's Rivers, Trails, and Conservation Assistance Program to designate the historic Warrior's Path trail as a National Heritage Trail and a National Scenic Trail.[210] The Warrior's Path project aims to "spur local recreation, conservation, and economic development opportunities."[211] This trail, which overlaps with much of the Pottsville

[209] Wallace, Eric J. "The Cherokee Chefs Bringing Back North America's Lost Cuisine." June 4, 2020.
[210] Fugate, Ariel. "The Warrior's Path Project." 2021.
[211] "The Warrior's Path." Warrior's Path Project, January 2022.

Escarpment region, could also be an opportunity to further encourage and spread research, knowledge-building, and interpretation efforts beyond Red River Gorge.

In conclusion, proposed interpretive efforts outlined in this thesis are adaptable, and should always be drawing upon current knowledge and research associated with the Eastern Agricultural Complex and the Indigenous history of Eastern Kentucky. At the same time, these interpretive efforts have the potential to contribute to that knowledge and research.

REFERENCES

"17 Kentucky Counties Added to Appalachia Proud Region." The Lane Report. The Lane Report, September 6, 2019. https://www.lanereport.com/116828/2019/09/17-kentucky-counties-added-to-appalachia-proud-region/.

34th Annual Living Archaeology Weekend. 2022. Poster. Kentucky Archaeological Survey, United States Forest Service, Kentucky Organization of Professional Archaeologists, August 25, 2022.

"About." FIND Outdoors. FIND Outdoors, Accessed May 30, 2023. https://gofindoutdoors.org/about/.

"About." Living Archaeology Weekend. Living Archaeology Weekend, Accessed May 30, 2023. https://www.livingarchaeologyweekend.org/about.

"About Mitsitam Café & Chefs." Mitsitam Native Foods Café. National Museum of the American Indian, Accessed May 30, 2023. http://www.mitsitamcafe.com/content/about.asp.

"About the Melungeon Heritage Association." Melungeon Heritage Association. Melungeon Heritage Association, Accessed May 16, 2023. http://melungeon.org/information-about-mha/.

"About Us." I-Collective. Accessed May 30, 2023. https://www.icollectiveinc.org/about.

Adams, Karen R. “Little Barley Grass (*Hordeum pusillum* Nutt.): A Prehispanic New World Domesticate Lost to History.” *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 139-179. Tuscon, Arizona: University of Arizona Press, 2014.

Andrews, William, 2009, Eastern Coal Field Region; Lexington: University of Kentucky, Kentucky Geological Survey.

“Anthropocene.” National Geographic, May 20, 2022. https://education.nationalgeographic.org/resource/anthropocene/.

"Appalachia Proud: Mountains of Potential." Kentucky Proud. The Kentucky Department of Agriculture, Accessed May 30, 2023. https://www.kyproud.com/programs/appalachia-proud/.

Barnes, Thomas G. and S. Wilson Francis. *Wildflowers and Ferns of Kentucky*. Lexington, Kentucky: University Press of Kentucky, 2004.

Berry, Wendell. "The Unforeseen Wilderness." *The Hudson Review* 23, no. 4 (1971): 633-647. https://doi.org/10.2307/3849627.

"Black Mountain Conservation Easement." Kentucky Energy and Environment Cabinet. Commonwealth of Kentucky, Accessed May 30, 2023. https://eec.ky.gov/Nature-Preserves/Locations/Pages/Black-Mountain-Conservation-Easement.aspx.

"Bluff Shelter Basics." Bluff Shelters of the Arkansas Ozarks. University of Arkansas System: Arkansas Archaeological Survey, Accessed May 21, 2023. https://archeology.uark.edu/ozarkbluffshelters/28-2/arkansas-ozark-bluff-shelters/.

"Board of Directors." Burning Cedar Sovereign Wellness. Burning Cedar Sovereign Kitchen, Accessed May 30, 2023. https://www.burningcedar.org/board.

Carey, Daniel I. Kentucky Landscapes Through Geologic Time, Map and Chart 200, Series XII, 2011. Kentucky Geological Survey.

Castellanos-Morales, Gabriela, Karen Y. Ruiz-Mondragón, Helena S. Hernández-Rosales, Guillermo Sánchez-de la Vega, Niza Gámez, Erika Aguirre-Planter, Salvador Montes-Hernández, Rafael Lira-Saade, and Luis E. Eguiarte. "Tracing Back to Origin of Pumpkins (*Cucurbita pepo* ssp. *pepo* L.) in Mexico." *Proceedings of the Royal Society B* 286, no. 1908 (2019). https://doi.org/10.1098/rspb.2019.1440.

"*Chenopodium berlandieri*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, January 5, 2023. https://www.wildflower.org/plants/result.php?id_plant=CHBE4.

Claassen, Cheryl. “Rock Shelters as Women’s Retreats: Understanding Newt Kash.” *American Antiquity* 76, no. 4 (2011): 628-641. https://www.jstor.org/stable/41331915.

"Clifty Wilderness." Daniel Boone National Forest. United States Forest Service, Accessed May 30, 2023. https://www.fs.usda.gov/recarea/dbnf/recarea/?recid=39460.

Cook, John E., G. R. Bane, Michael Holm, Betty McSwain, Marie T. Myers, Robert Lake, M. R. Miller et al. "Interpreting Native American Cultures." *Interpretation* Fall, (1988). http://npshistory.com/newsletters/interpretation/education-fall-1990.pdf.

Cowan, Wesley C. "From Foraging to Incipient Food Production: Subsistence Change and Continuity on the Cumberland Plateau of Eastern Kentucky. (Volumes I and II)." Doctoral Dissertation, University of Michigan, 1985.

Crites, Gary D. "People and Plants in the Prehistoric Southeast: New Information from South Carolina." McClung Museum of Natural History & Culture. The University of Tennessee Knoxville, Accessed May 21, 2023. https://mcclungmuseum.utk.edu/2002/02/01/people-and-plants-in-the-prehistoric-southeast/.

"*Cucurbita pepo* var. *ozarkana*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, September 30, 2019. https://www.wildflower.org/plants/result.php?id_plant=CUPEO2.

Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and A. Gwynn Henderson. 1999. *Forests, Forest Fires, & Their Makers*. Lexington, Kentucky: Kentucky Archaeological Survey. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5276203.pdf.

Delcourt, Paul A., Hazel R. Delcourt, Cecil R. Ison, William E. Sharp, and Kristen J. Gremillion. "Prehistoric Human Use of Fire, the Eastern Agricultural Complex, and Appalachian Oak-Chestnut Forests: Paleoecology of Cliff Palace Pond, Kentucky." *American Antiquity* 63, no. 2 (1998): 263-278. https://doi.org/10.2307/2694697.

"Demonstration Gardens." askifas. University of Florida IFIS Extension, Accessed May 30, 2023. https://edis.ifas.ufl.edu/entity/topic/demonstration_gardens.

Denson, Andrew. 2017. *Monuments to Absence: Cherokee Removal and the Contest over Southern Memory*. Chapel Hill, North Carolina: The University of North Carolina Press.

Dickens, Roy S. 1976. *Cherokee Prehistory: The Pisgah Phase in the Appalachian Summit Region*. Knoxville: The University of Tennessee Press.

Dillon, Katie. "Mitsitam Cafe Is the Best Place to Eat in the National Mall." La Jolla Mom. La Jolla Living, June 10, 2020. https://lajollamom.com/mitsitam-cafe-national-mall/.

Durham, Richard. Guidelines for the Kentucky Master Gardener Program. University of Kentucky College of Agriculture, Food, and Environment Cooperative Extension Service. https://anr.ca.uky.edu/files/mastergardnerguidelines.pdf.

Ernie Fletcher, Governor of the Commonwealth of Kentucky. Proclamation regarding the Southern Cherokee of Kentucky. November 20, 2006.

"Facebook Post: TBT Blue and Gray State Park!" Facebook. Kentucky State Parks, March 31, 2016. https://www.facebook.com/kystateparks/photos/a.154324586577/10153920014901578/.

Feight, Andrew L. "Lower Shawnee Town and Céleron's Expedition of 1749." Scioto Historical. Center for Public History at Shawnee State University, June 1, 2023. https://sciotohistorical.org/items/show/35.

"Fossil of the month: Stigmaria." Kentucky Geological Survey. University of Kentucky, Accessed May 16, 2023. http://www.uky.edu/KGS/fossils/fossil-month-Stigmaria.php.

Fritz, Gayle J. “Identification of Cultigen Amaranth and Chenopod from Rockshelter Sites in Northwest Arkansas.” *American Antiquity* 49, no. 3 (2017): 558-572. https://doi.org/10.2307/280360.

Fritz, Gayle J. "Multiple Pathways to Farming in Precontact Eastern North America." *Journal of World Prehistory* 4, no. 4 (1990): 387-435. Accessed May 21, 2023. https://www.jstor.org/stable/25800587.

Fritz, Gayle J. “Maygrass (*Phalaris caroliniana* Walt.): Its Role and Significance in Native Eastern North American Agriculture.” In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 12-43. Tuscon, Arizona: University of Arizona Press, 2014.

Fugate, Ariel. "The Warrior's Path Project: Restoring an Ancient Trail Throughout Eastern Kentucky." Mountain Association. Mountain Association, November 9, 2021. https://mtassociation.org/training-ideas/the-warriors-path-project-restoring-an-ancient-trail-throughout-eastern-kentucky/.

"Geologic Formations." Arches National Park Utah. National Park Service, November 19, 2021. https://www.nps.gov/arch/learn/nature/geologicformations.htm.

"Geologic Map of Kentucky." Kentucky Geological Survey. University of Kentucky, August 16, 2019. https://www.uky.edu/KGS/geoky/geologymap.htm.

Gerry, Aaron. "Red River Gorge: The Sport Climbing Mecca of the East." 57 Hours. 57 Hours, Accessed May 30, 2023. https://57hours.com/review/red-river-gorge-climbing/.

Gill, Jeff. "The Archaeoastronomy of Alligator Mound." Ohio History Connection. Ohio History Connection, January 20, 2014. https://www.ohiohistory.org/the-archaeoastronomy-of-alligator-mound/.

“Gladie Visitor Center.” FIND Outdoors. FIND Outdoors, Accessed May 30, 2023. https://gofindoutdoors.org/sites/gladie/.

Gremillion, Kristen J. “Plant Husbandry at the Archaic/Woodland Transition: Evidence from the Cold Oak Shelter, Kentucky.” *Midcontinental Journal of Archaeology* 18, no. 2 (1993): 161-189. http://www.jstor.org/stable/20708348.

Gremillion, Kristen J. “Goosefoot (*Chenopodium*).” In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 44-64. Tuscon, Arizona: University of Arizona Press, 2014.

Gremillion, Kristen J. “Prehistoric Upland Farming, Fuelwood, and Forest Composition on the Cumberland Plateau, Kentucky, USA.” *Journal of Ethnobiology* 31, no. 1 (2015): 60-84. http://dx.doi.org/10.2993/0278-0771-35.1.60.

Haynes, Gary. "The Catastrophic Extinction of North American Mammoths and Mastodonts." *World Archaeology* 33, no. 3 (2002): 391-416. https://www.jstor.org/stable/827876.

"*Helianthus annuus*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, December 28, 2022. https://www.wildflower.org/plants/result.php?id_plant=HEAN3.

Henderson, A. Gwynn and David Pollack, “A Native History of Kentucky,” in *Native America: A State-by-State Historical Encyclopedia*, 2012, https://heritage.ky.gov/Documents/Native_History_KyTeachers.pdf.

"Historic Gladie Cabin." Daniel Boone National Forest. U.S. Forest Service, Accessed May 30, 2023. https://danielboone.oncell.com/en/historic-gladie-cabin-304932.html.

“History and Artifacts of Poverty Point.” Poverty Point World Heritage Site. Louisiana Office of Tourism, Accessed May 29. 2023. https://www.povertypoint.us/history-artifacts-poverty-point.

"History." Red River Gorge. Red River Gorge, Accessed May 30, 2023. https://www.redrivergorge.com/history-education/history/.

Hodgins, Jane. “What it Takes to Bring Back the Near Mythical American Chesnut Trees.” U.S. Department of Agriculture, April 29, 2019. https://www.usda.gov/media/blog/2019/04/29/what-it-takes-bring-back-near-mythical-american-chestnut-trees.

"*Hordeum pusillum*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, May 6, 2014. https://www.wildflower.org/plants/result.php?id_plant=HOPU.

Interagency Resources Division, National Park Service, U.S. Department of the Interior. National Register Bulletin 38. 1992. https://www.nps.gov/subjects/nationalregister/upload/NRB38-Completeweb.pdf.

Ison, Cecil R., Charles D. Hockensmith, David Pollack, and Thomas N. Sanders. "The Cold Oak Shelter: Providing a Better Understanding of the Terminal Archaic." *Paleoindian and Archaic Research in Kentucky*, (1988): 205-219. Accessed May 21, 2023.

Ison, Cecil R. "Farming, Gender, and Shifting Social Organization: A New Approach to Understanding Kentucky' Rock-Art." In *The Rock-Art of Eastern North America: Capturing Images and Insight*. Edited by Carol Diaz-Granados and James R. Duncan. 177-189. Tuscaloosa, Alabama: University of Alabama Press, 2004.

"*Iva annua* var. *macrocarpa*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, March 29, 2023. https://www.wildflower.org/plants/result.php?id_plant=IVANM.

Jabr, Ferris, "A New Generation of American Chestnut Trees May Redefine America's Forests." Scientific American. March 1, 2014. https://www.scientificamerican.com/article/chestnut-forest-a-new-generation-of-american-chestnut-trees-may-redefine-americas-forests/.

Jackson, Savannah. "The History of the Daniel Boone National Forest." Rowan County Kentucky Accessed May 30, 2023. https://www.rcky.us/history-of-daniel-boone-national-forest.

Jeffries, Richard W. "Hunters and Gatherers After the Ice Age." In *Kentucky Archaeology*, edited by R. Barry Lewis, 39-78. Lexington, Kentucky: University of Kentucky Press, 1996.

Jones, Volney. "Vegetal Remains of Newt Kash Hollow Shelter in Rock Shelters in Menifee County, Kentucky." *Reports in Archaeology and Anthropology*, (1936). Accessed May 21, 2023.

Kentucky General Assembly, 2009 Regular Session. A joint resolution commending the Ridgetop Shawnee Tribe of Indians for their efforts on behalf of preserving Native American heritage. House Joint Resolution 15. February 26, 2009.

Kentucky General Assembly, 2010 Regular Session. A joint resolution commending the Ridgetop Shawnee Tribe of Indians for their efforts on behalf of preserving Native American heritage. House Joint Resolution 16. February 2, 2010.

Kentucky General Assembly, House Standing Committee on Tourism and Outdoor Recreation. Kentucky State Parks Overview. March 3, 2022.

KRS 171.822.

Landon, Amanda J. "The 'How' of the Three Sisters: The Origins of Agriculture in Mesoamerica and the Human Niche." *Nebraska Anthropologist* 23 (2008): 40. https://digitalcommons.unl.edu/nebanthro/40.

"LAW Educational Resources." Living Archaeology Weekend. Living Archaeology Weekend, Accessed May 30, 2023. https://www.livingarchaeologyweekend.org/learnold.

Lenik, Edward J. “Mythic Creatures: Serpents, Dragons, and Sea Monsters in Northeastern Rock Art.” *Archaeology of Eastern North America* 38, (2010): 17-37. https://www.jstor.org/stable/40914539.

Lewis, R. Barry “Mississippian Farmers.” In *Kentucky Archaeology*, edited by R. Barry Lewis, 127-160. Lexington, Kentucky: University of Kentucky Press, 1996.

Lopez, Barry and Debra Gwartney. *Home Ground: Language for an American Landscape*. San Antonio, Texas: Trinidad University Press, 2006.

Lovett, Richard A. "Sandstone arches form under their own stress." *Nature*, (2014). https://doi.org/10.1038/nature.2014.15590.

Lovgren, Stefan. "Clovis People Not First Americans, Study Shows." National Geographic. National Geographic Society, February 23, 2007. https://www.nationalgeographic.com/science/article/native-people-americans-clovis-news?loggedin=true&rnd=1683825664930.

"Lower Shawneetown." Discover Kentucky Archaeology. Commonwealth of Kentucky, Accessed May 21, 2022. https://archaeology.ky.gov/Find-a-Site/Pages/Lower-Shawneetown.aspx.

Maples, James N., and Michael Bradley. 2020. *Economic Impact of Rock Climbing in Kentucky's Red River Gorge*. Eastern Kentucky University's Division of Regional Economic Assessment and Modeling. https://rrgcc.org/wp-content/uploads/2021/06/RRG-EIS-2020-final-report-62121.pdf.

McBride, Kim A. and W. Stephen McBride “From Colonization to the Twentieth Century.” *Kentucky Archaeology*, edited by R. Barry Lewis, 183-212. Lexington, Kentucky: University of Kentucky Press, 1996.

McFadden, Thomas S. "The Vascular Flora of the Red River Gorge in Powell, Menifee, and Wolfe Counties Kentucky." Master’s Thesis, Eastern Kentucky University, 2018

"Meet Our Demonstrators." Living Archaeology Weekend. Living Archaeology Weekend, Accessed May 30, 2023. https://www.livingarchaeologyweekend.org/meet-our-demonstrators.

Mickelson, Andrew M., and Katherine R. Mickelson. “Gladie Creek: A Multicomponent Deposit Located Within the Red River Gorge, Eastern Kentucky.”

"Mississippian Period—358.9 to 323.2 MYA." Geologic Time Periods in the Paleozoic Era. National Park Service, April 28, 2023. https://www.nps.gov/articles/000/mississippian-period.htm.

"Mississippian Period." Kentucky Geological Survey. University of Kentucky, January 05, 2023. https://www.uky.edu/KGS/geoky/geologymap.htm.

Missouri Department of Natural Resources Division of Geology and Land Survey, Generalized Geologic Map of Missouri. 2014. Rolla, Missouri. dnr.mo.gov/geology.

"Mitsitam Native Foods Café Menu & Hours." Mitsitam Native Foods Café. National Museum of the American Indian, Accessed May 30, 2023. http://www.mitsitamcafe.com/content/menus.asp.

Moody, Sean. "Spotlight on Morehead: Cave Run Lake." LEX18 Lexington. Scripps Local Media, August 11, 2022. https://www.lex18.com/spotlight-series/spotlight-on-morehead-cave-run-lake#:~:text=The%20U.S.%20Army%20Corps%20of,a%20little%20low%2Dkey%20fun.

Mueller, Natalie G., Andrea White, and Peter Szilagyi. “Experimental Cultivation of Eastern North America’s Lost Crops: Insights into Agricultural Practice and Yield Potential.” *Society of Ethnobiology* 39, no. 4 (2019): 549-566. https://doi.org/10.2993/0278-0771-39.4.549.

Mueller, Natalie G. "Documenting Domestication in a Lost Crop (*Polygonum erectum* L.): Evolutionary Bet-hedgers Under Cultivation." *Vegetation History and Archaeobotany* 26, (2016): 313-327. Accessed May 26, 2023. https://doi.org/10.1007/s00334-016-0592-9.

Mueller, Natalie G., Gayle J. Fritz, Paul Patton, Stephen Carmody, and Elizabeth T. Horton. "Growing the Lost Crops of Eastern North America’s Original Agricultural System." *Nature Plants* 3, (2017). https://doi.org/http://dx.doi.org/10.1038/nplants.2017.92.

Napoleon, Craig. "Astronomical Alignments at Serpent Mound." HMdb. The Historical Marker Database, February 4, 2021. https://www.hmdb.org/m.asp?m=214409.

Native Land Database. native-land.ca, Accessed May 15, 2023. https://native-land.ca/.

"Natural Bridge State Park and Nature Preserve." Kentucky Energy and Environment Cabinet. Commonwealth of Kentucky, Accessed May 30, 2023. https://eec.ky.gov/Nature-Preserves/Locations/Pages/Natural-Bridge.aspx.

Niquette, Chuck M., Gwynn Henderson, and Ellen A. Dugan. 1984. *Background to the Historic and Prehistoric Resources of Eastern Kentucky*. Alexandria, Virginia: Bureau of Land Management, Eastern States Office. https://archive.org/details/backgroundtohist00niqu/page/52/mode/2up.

O'Brien, Patricia J., and Frances B. King. "The Yeo Site (23CL199): A Kansas City Hopewell Limited Activity Site in Northwestern Missouri: And Some Theories." *Plains Anthropologist* 27, no. 95 (1982): 37-56. https://www.jstor.org/stable/25667747.

"Our Mission." Burning Cedar Sovereign Wellness. Burning Cedar Sovereign Kitchen, Accessed May 20, 2023. https://www.burningcedar.org/mission.

Pace, Katie. “The Three Sisters.” Sustainable Food Center, July 29, 2015. https://sustainablefoodcenter.org/latest/gardening/the-three-sisters.

Page, Robert R., Cathy A. Gilbert, and Susan A. Dolan. 1998. *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques*. Washington, D.C.: U.S. Department of the Interior. https://irma.nps.gov/DataStore/DownloadFile/501621.

Pember, Mary A. "Shawnee Reclaim the Great Serpent Mound." ICT News. Indian Country Today, June 21, 2021. https://ictnews.org/news/shawnee-relcaim-great-serpent-mound.

"Pennsylvanian Period—323.2 to 298.9 MYA." Geologic Time Periods in the Paleozoic Era. National Park Service, April 28, 2023. https://www.nps.gov/articles/000/pennsylvanian-period.htm.

"Pennsylvanian Period." Kentucky Geological Survey. University of Kentucky, January 5, 2023. https://www.uky.edu/KGS/fossils/fossil-region-pennsylvanian-period.php.

“*Phalaris caroliniana* Walter.” Lady Bird Johnson Wildflower Center. The University of Texas at Austin, December 2, 2022. https://www.wildflower.org/plants/result.php?id_plant=PHCA6.

"*Polygonum erectum*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, May 2, 2023. https://www.wildflower.org/plants/result.php?id_plant=POER2.

Probst, Tim. "Online Review of Poverty Point World Heritage Site." Google Maps. Google, Accessed May 30, 2023. https://g.co/kgs/Cpcnkn.

"Proud to be Kentucky Proud: Local Agricultural Marketing Program." Kentucky Proud. The Kentucky Department of Agriculture, Accessed May 30, 2023. https://www.kyproud.com/programs/who-we-are.

"Quaternary Period—2.58 MYA to Today." Geologic Time Periods in the Cenozoic Era. National Park Service, April 27, 2023. https://www.nps.gov/articles/000/quaternary-period.htm.

"QuickFacts: Kentucky." United States Census Bureau. United States Census Bureau, July 1, 2022. https://www.census.gov/quickfacts/KY.

Railey, Jimmy A. “Woodland Cultivators.” In *Kentucky Archaeology*, edited by R. Barry Lewis, 79-126. Lexington, Kentucky: University of Kentucky Press, 1996.

"Recreation Permits and Passes." Daniel Boone National Forest. United States Forest Service, Accessed May 21, 2023. https://www.fs.usda.gov/detail/dbnf/passes-permits/?cid=stelprdb5292939.

Rees, Lydia I., and Jamie C. Brandon. "Beyond the "Bluff Dweller": Excavating the History of an Ozark Myth." *The Arkansas Historical Quarterly* 76, no. 2 (2017): 125-143. Accessed May 21, 2023. https://www.jstor.org/stable/26201258.

Rice, Charles L. "Pennsylvanian System." Contributions to the Geology of Kentucky. United States Geological Survey, January 9, 2001. https://pubs.usgs.gov/pp/p1151h/penn.html.

Robbins, Louise M. "A Woodland "Mummy" from Salts Cave, Kentucky." *American Antiquity* 36, no. 2 (1971): 200-206. Accessed May 16, 2023. https://doi.org/10.2307/278674.

Sanders, Sara L. "The Stone Serpent Mound of Boyd County, Kentucky: An Investigation of a Stone Effigy Structure." *Midcontinental Journal of Archaeology* 16, no. 2 (1991): 272-284. https://www.jstor.org/stable/20708318.

Sharp, William E. “Fort Ancient Farmers.” *Kentucky Archaeology*, edited by R. Barry Lewis, 161-182. Lexington, Kentucky: University of Kentucky Press, 1996.

Schoenwetter, James (2001). Paleoethnobotanical Expressions of Prehistoric Ritual: An Early Woodland Example. In *Fleeting Identities: Perishable Material Culture in Archaeological Research*, edited by Penelope B. Drooker, 272-284.

“Sign and Poser Guidelines for the National Park Service.” United States Department of Agriculture. October, 2013.

Smith, Bruce D. and Richard A. Yarnell. “Initial Formation of an Indigenous Crop Complex in Eastern North America at 3800 B.P.” *Proceedings of the National Academy of Sciences of the United States of America* 106, no. 16 (2009): 6561-6566. https://doi.org/10.1073/pnas.0901846106.

Smith, Bruce D. “Eastern North America as an Independent Center of Plant Domestication.” *Proceedings of the National Academy of Sciences of the United States of America* 103, no. 33 (2006): 12223-12228. https://doi.org/10.1073/pnas.0604335103.

Smith, Bruce D. "The Cultural Context of Plant Domestication in Eastern North America." *Current Anthropology* 52, no. S4 (2011): S471-S484. https://doi.org/10.1086/659645.

Smith, Dave. "The Carboniferous Period." UC Museum of Paleontology. University of California, Berkeley, June 30, 2011. https://ucmp.berkeley.edu/carboniferous/carboniferous.php.

Smith, Dave. "The Pleistocene Epoch." UC Museum of Paleontology. University of California, Berkeley, June 10, 2011. https://ucmp.berkeley.edu/quaternary/pleistocene.php.

Snell, Travis. "Non-recognized 'Cherokee Tribes' Flourish." Cherokee Phoenix. Cherokee Phoenix, January 19, 2007. https://www.cherokeephoenix.org/news/non-recognized-cherokee-tribes-flourish/article_ac02834f-35d3-5bc3-bd2c-ad2b69101baf.html.

Snider, Jerry A., Susan Moyle Studlar, and Max Medley. “A List of Bryophytes in Kentucky.” *The Bryologist* 91, no. 2 (1988): 98-105. https://doi.org/10.2307/3242623.

Spencer, Victoria, Zoe N. Venza, and Cecily J. Harrison. "What Can Lycophytes Teach Us about Plant Evolution and Development? Modern Perspectives on an Ancient Lineage." *Evolution & Development* 23, no. 3 (2021): 174-196. https://doi.org/10.1111/ede.12350.

"Spratt’s Petroglyphs (15MF353)," National Register of Historic Places Nomination Form (Washington, DC: U.S. Department of the Interior, National Park Service, 1989).

Tankersley, Kenneth B. “Ice Age Hunters and Gatherers.” In *Kentucky Archaeology*, edited by R. Barry Lewis, 21-38. Lexington, Kentucky: University of Kentucky Press, 1996.

"*Taxus canadensis*." Lady Bird Johnson Wildflower Center. The University of Texas at Austin, October 21, 2022. https://www.wildflower.org/plants/result.php?id_plant=taca7.

“The Story of Poverty Point.” Poverty Point World Heritage Site. Louisiana Office of Tourism, Accessed May 29, 2023. https://www.povertypoint.us/.

"“Three Sisters’ Demonstration Garden.” Madera County Master Gardener Program. University of California, https://cemadera.ucanr.edu/Madera_County_Master_Gardener_Program/_Three_Sisters__Demonstration_Garden554/.

Tilden, Freeman. *Interpreting our Heritage*, Chapel Hill: University of North Carolina Press, 1977.

Tribal Historic Preservation Office Cultural Preservation Department. The Absentee Shawnee News (Shawnee, Oklahoma), November 2010. https://www.astribe.com/sites/default/files/newsletter/november20101.pdf.

"Types of Trees Preserved as Fossil Tree Stumps." Kentucky Geological Survey. University of Kentucky, Accessed May 16, 2023. https://www.uky.edu/KGS/fossils/fossil-tree-stumps-types.php.

Ullman, David. "The Retreat Chronology of the Laurentide Ice Sheet during the Last 10,000 Years and Implications for Deglacial Sea-level Rise." in *Vignettes: Key Concepts in Geomorphology*. Carleton College, December 16, 2022. https://serc.carleton.edu/59463.

Wagner, Gail E. and Peter H. Carrington “Sumpweed or Marshelder (*Iva annua*).” In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Lewis, 65-101. Tuscon, Arizona: University of Arizona Press, 2014.

Wallace, Eric J. "The Cherokee Chefs Bringing Back North America’s Lost Cuisine." Gastro Obscura. Atlas Obscura, June 4, 2020. https://www.atlasobscura.com/articles/what-was-native-american-food-like-before-europeans/.

“The Warrior’s Path.” Warrior’s Path Project, January 2022. https://sites.google.com/view/warriorspath/home?authuser=0.

Waxman, Olivia B. "What to Know About the Meaning of Sunflowers in Ukraine." Time. TIME USA, March 4, 2022. https://time.com/6154400/sunflowers-ukraine-history/.

"Who We Are." I-Collective. Accessed May 30, 2023. https://www.icollectiveinc.org/who-we-area.

Widingstad, Jason D., Sarah C. Sherwood, Kristen J. Gremillion, and Neal S. Eash. “Soil Fertility and Slope Processes in the Western Cumberland Escarpment of Kentucky: Influences on the Development of Horticulture in the Eastern Woodlands.” *Journal of Archaeological Science* 35, no. 6 (2008): 1717-1731. https://doi.org/10.1016/j.jas.2007.11.023.

Woods, A.J., J.M. Omernik, W.H. Martin, G.J. Pond, W.M. Andrews, S.M. Call, J.A. Comstock, and D.D Taylor, 2002*, Ecoregions of Kentucky*: Reston, VA., U.S. Geological Survey (map scale 1:1,000,000).

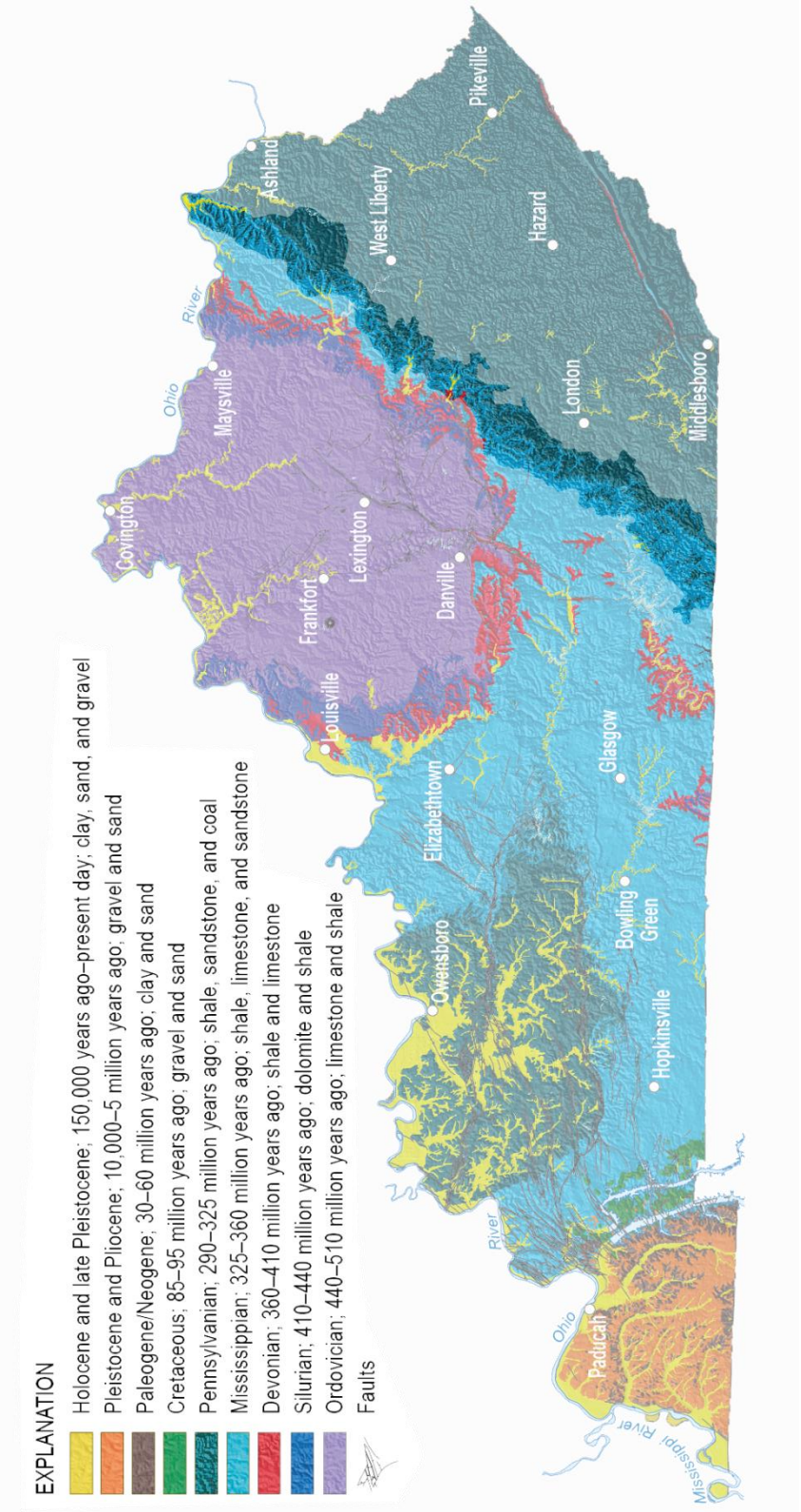
Zeneah, David W. "Foraging Models, Niche Construction, and the Eastern Agricultural Complex." *American Antiquity* 82, no. 2 (2017): 3-.24. https://www.jstor.org/stable/26337953.

APPENDIX A: MAPS AND SITE PLANS

LIST OF MAPS AND SITE PLANS

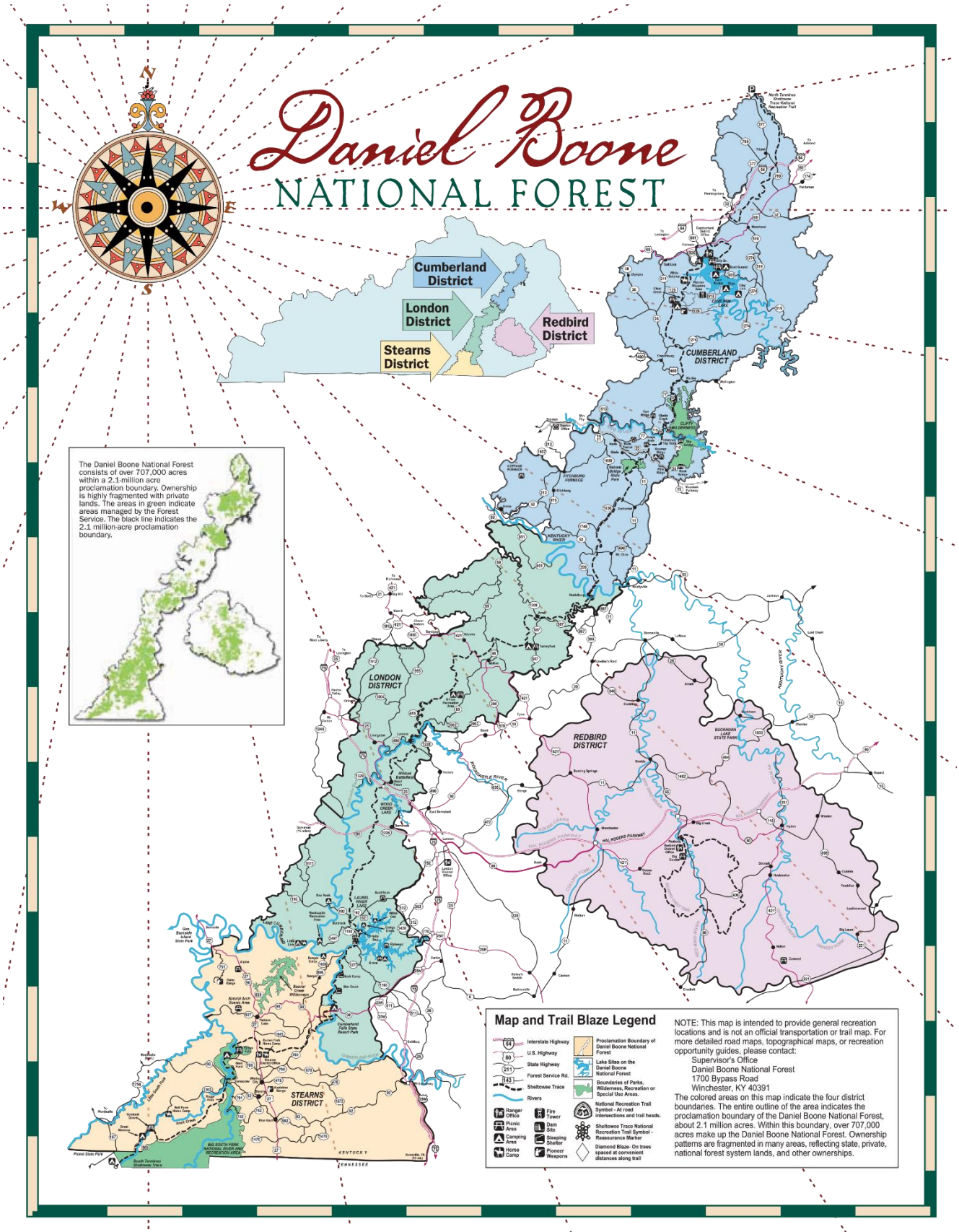
Site Plan A.1. A site plan of the Gladie Visitor Center, Google Earth.

Map A.2. Eastern Coal Field region map, adapted from *A Pictorial Tour of the Eastern Coal Field Region of Kentucky*, prepared by the Kentucky Geological Survey.



Map A.3. Geological map of Kentucky, modified to highlight the Pottsville Escarpment region, original map prepared by the Kentucky Geological Survey.

Map A.4. Ecoregions map of Kentucky, prepared by the United States Environmental Protection Agency.



Map A.5. District map of the Daniel Boone National Forest, prepared by the National Forest Service.

Appendix B: Interpretive Signage Designs

LIST OF SIGNS

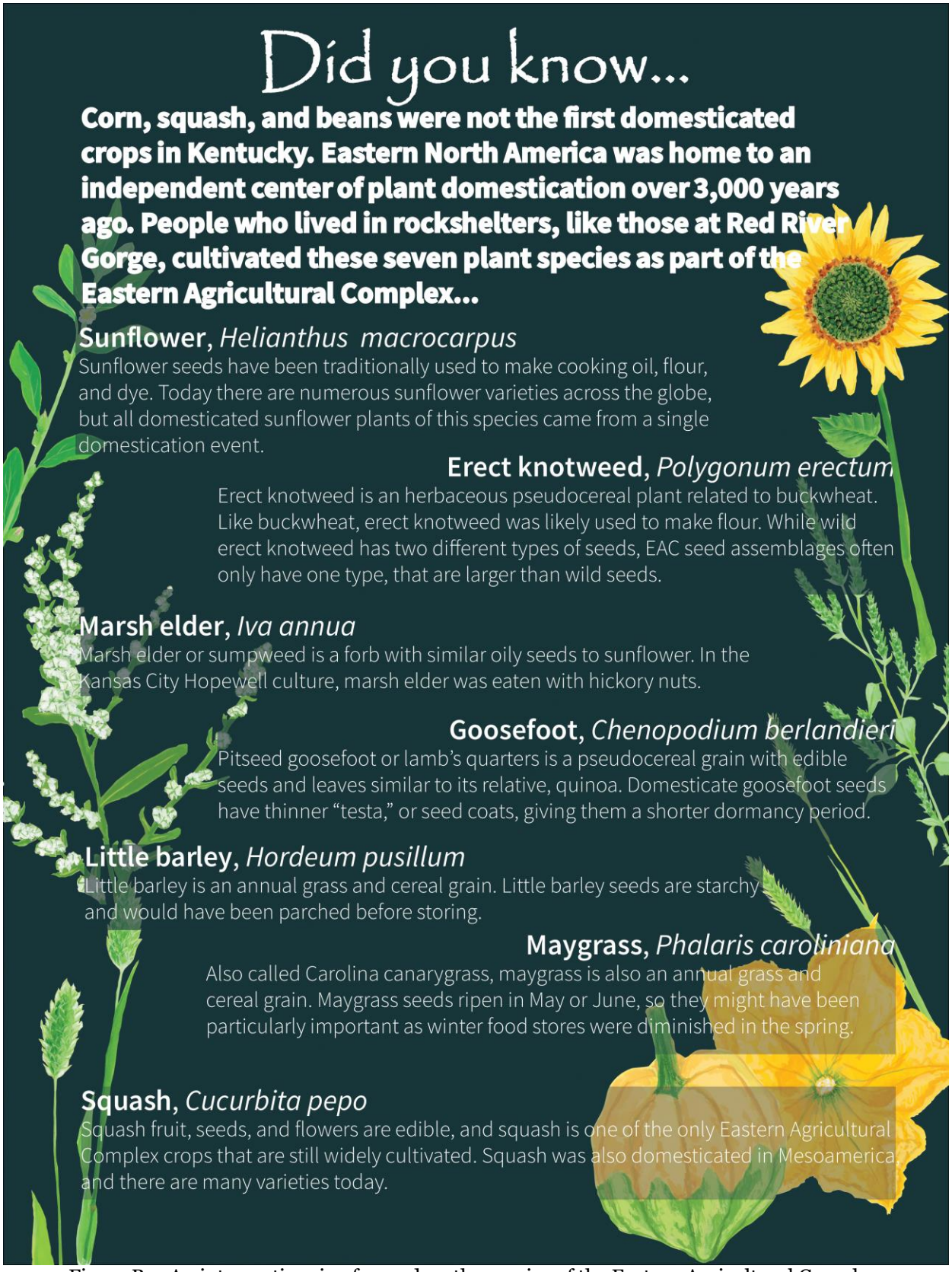


Figure B.1. An interpretive sign focused on the species of the Eastern Agricultural Complex.

Sign B.2b: An alternative sign to B.1 (right side).

B.2b: An alternative sign to B.1 (left side)

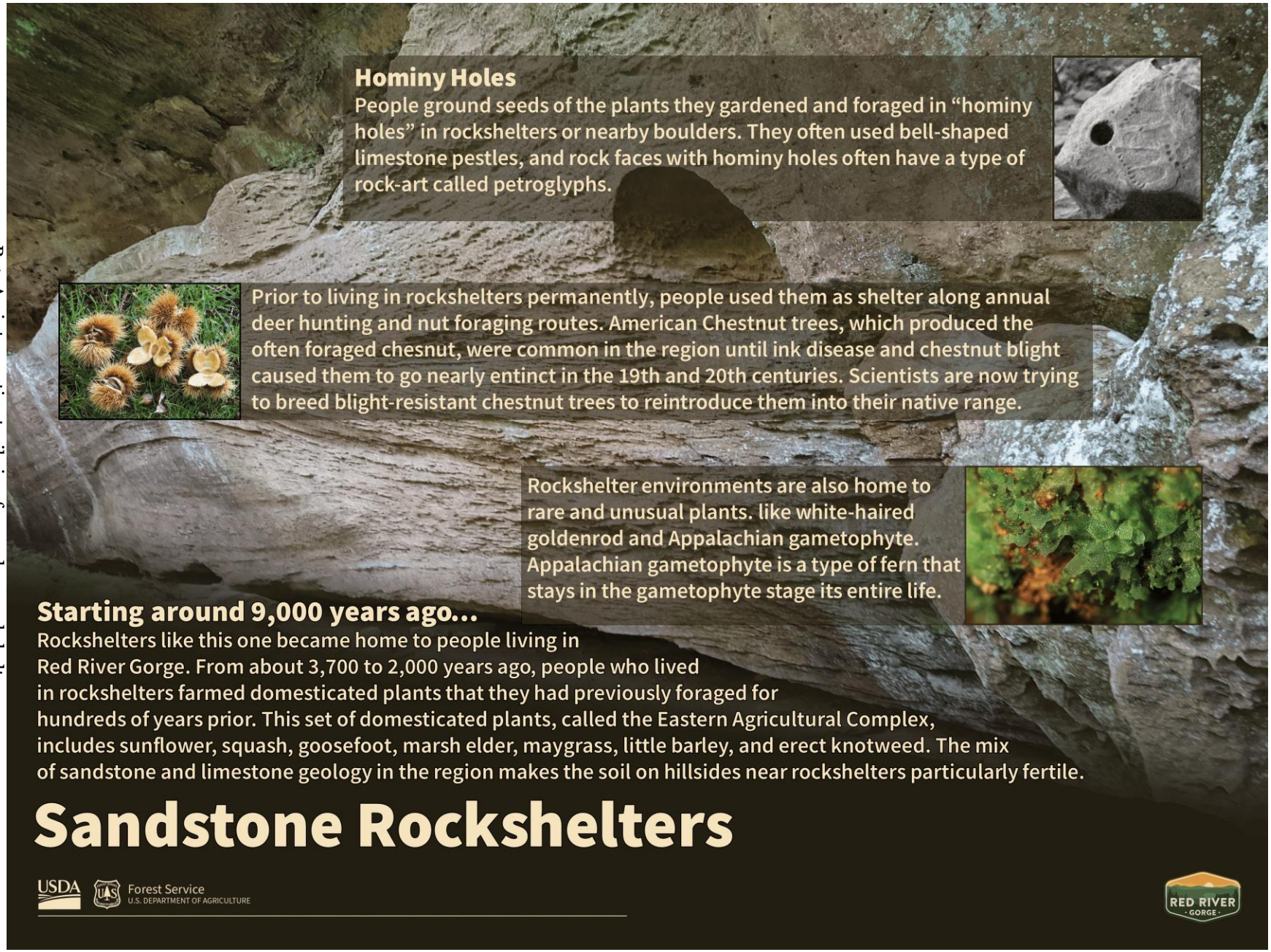
Sunflower Seeds, Anyone?

If you lived in a rockshelter in the Red River Gorge about 3,000 years ago, here's what you might have had for dinner:

Cooked turtle or rabbit, sunflower, goosefoot, marsh elder, little barley, maygrass, or erect knotweed seeds, squash, and foraged hickory and chestnut.
Your family might grind the seeds into a course meal or flour using a "hominy hole" in a nearby rock.

The ancient seeds found in the Gorge rockshelters tell archaeologists a remarkable story: Human beings in North America apparently learned to grow crops much earlier than scientists once believed. These long-ago people are thought to have had small gardens near their rockshelter homes. Their cultivated seeds—preserved for centuries in rockshelter soils—may be one of the earliest indications of agriculture in eastern North America!

B.3. An interpretive sign designed to replace the sign shown in Figure 4.11.



B.4. An interpretive trail sign focused on rockshelters.