An Archaeobotanical Analysis of Site 40DV7

By

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Abstract

This thesis examines archaeobotanical data collected from the Late Archaic and Middle Woodland Site 40DV7 in Nashville, Tennessee. Over the course of five chapters, it emphasizes the importance and relevance of this data to the archaeology of the American Southeast, analyzes the data using archaeobotanical methods as described by Pearsall (2000), and provides context for the data not only through research of Southeastern archaeobotany, but also through information regarding climate change and mobility patterns. *Carya* sp. is particularly prevalent throughout the data, as well as other genera of the Juglandaceae family. However, various other plant families are present in the data and, despite their underrepresentation, could suggest that intentional plant cultivation was taking place at or around Site 40DV7 during its Late Archaic and Middle Woodland use.

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CHAPTER 1: INTRODUCTION

This thesis explores Native American subsistence strategies during the Late Archaic and Middle Woodland, through an analysis of macrobotanical remains from site 40DV7 in Nashville, Tennessee. The shift from the Late Archaic to the Middle Woodland periods saw a significant transition in subsistence strategies from food-collecting to food-producing systems; this advent of plant domestication is a “poorly understood stage in prehistory” (Ogilvie 2005: 84), owing to a poor understanding of the geographic variability of foraging adaptations throughout the Southeast (Gremillion 1996a: 103). Gremillion (1996a) states that “considerable geographic variability in foraging patterns is evident across the Southeast during the mid-Holocene”, which only stresses the need for further research in the Middle Tennessee area. Through the analysis of the archaeobotanical assemblage of 40DV7 we can construct a clearer picture of this transition, allowing future researchers to develop a deeper understanding of the mechanisms of prehistoric food production systems, such as the degree of mobility necessary to procure sufficient food, as well as the degree of sedentism (Ogilvie 84; Whittaker et. al. 2007: 6-7). These mechanisms can also extend to how people perceived plants, as well as how they may have cultivated them.

By analyzing the archaeobotanical remains from Site 40DV7, this thesis contributes to a growing body of knowledge about the Late Archaic and Middle Woodland periods in the American Southeast. As noted by Yarnell and Black:

> Large gaps in the data, such as those of the Atlantic and lower Mississippi drainages, and smaller gaps, such as the Terminal Archaic and Late Woodland of Tennessee, need to be filled in. We should continue to increase the number of locales for which we have long sequences of subsistence data that incorporate substantial quantities of nutshell and seeds. All sections of the Southeast should be represented by long span data sequences. [Yarnell and Black 1985: 104]

Such data will allow present and future researchers to reevaluate models and hypotheses of prehistoric subsistence of the American Southeast. Furthermore, the study of archaeobotany in the American Southeast relies too much on hypothetical modeling, and not enough on actual data (104: 93). The quantitative data presented in this thesis is particularly useful to future researchers as a solid basis that provides direct evidence from which to “reconstruct…patterns and trends in aboriginal subsistence (104).”

CHAPTER 2: SITE AND CHRONOLOGY

Excavations

Site 40DV7 is a shell-bearing site located on the University College campus of Nashville along the right bank of the Cumberland River. It was first formally investigated in 1998, and it was most recently the subject of emergency testing provoked by inundations of the Cumberland River in May 2010 as well as looting activities from previous years (Peres et al. 2012: 40). Because human remains were present at the site, Peres et. al. forewent traditional excavation techniques (in which the excavators would dig in 2x2 meter squares, 10 centimeters at a time) to avoid both unnecessary disturbance to burials and infringement on Tennessee state laws concerning cemeteries as well as the Native American Grave Protection and Repatriation Act (41).

The portions of the site with naturally vertical profiles that had not been looted or undercut by erosion were chosen for sampling, and the first step to excavation was to clean along profiles of “at least 50 cm in width to remove contamination and identify both natural and cultural stratigraphy” (Peres et. al. 41). Peres et. al. used excavation techniques to prevent further erosion and ensure that the excavations were not obvious to potential looters (41). Nested geologic sieves were used to process all samples in order to recover the maximum possible data when only limited sampling is possible. During excavation, roughly 10 liters of soil per level were sampled for flotation, so in the table in Chapter 4, the specimens from Level 1 were all derived from the same soil sample (41).

The Late Archaic and Middle Woodland Periods

The Archaic period in the Southeast (8000-1000 BCE) is divided into the Early Archaic (8000-6000 BCE), Middle Archaic (6000-3000 BCE), and Late Archaic (3000-1000 BCE) (Anderson and Sassaman: 66, 71; Chapman and Watson 1993:36). The Late Archaic Period is characterized by a 40% increase in site frequencies from the Middle Archaic. This period is referred to as the "Shell Mound Period" due to the large frequency of shell mounds (typically referred to as "middens") present at riverine sites, which comprise a large proportion of Late Archaic sites in Tennessee and elsewhere (Dowd 1989: 4). Based on radiocarbon samples the earliest known use of 40DV7 occurred in the Late Archaic Period (Peres et al 2012: 40).

Explorations in shell middens are now a major focus of contemporary archaeological research in the southeast, "…because earthen mounds and late prehistoric cemeteries offered better opportunities for finding elaborate and intact stone or ceramic artifacts useful for exhibition or sale (Anderson and Sassaman 13). In other words, it was seen as more profitable for looters to exploit sites that were more obviously used by Native Americans, and shell middens were ignored due to their outwardly natural appearance. The first known scientific excavation of a shell midden was done in Florida by Jeffries Wyman from 1867 to 1874, (13-14). Though it was uncertain then whether the shell middens were man-made or natural, Wyman's *Fresh Water Shell Mounds of the St. John's River, Florida,* identified the middens he examined as definite cultural features formed through the gradual addition of materials over time (14).

Landscape change, in particular the gradual transition of streams to larger bodies of water like rivers and lakes, presented Middle and Late Archaic populations with a greater abundance of food resources like riverine mussels that were possibly more difficult to access before. According to Jefferies, et al. "…people were admirably positioned to take advantage of both aquatic and terrestrial resources when they occupied river-edge shell middens" (2005: 19).

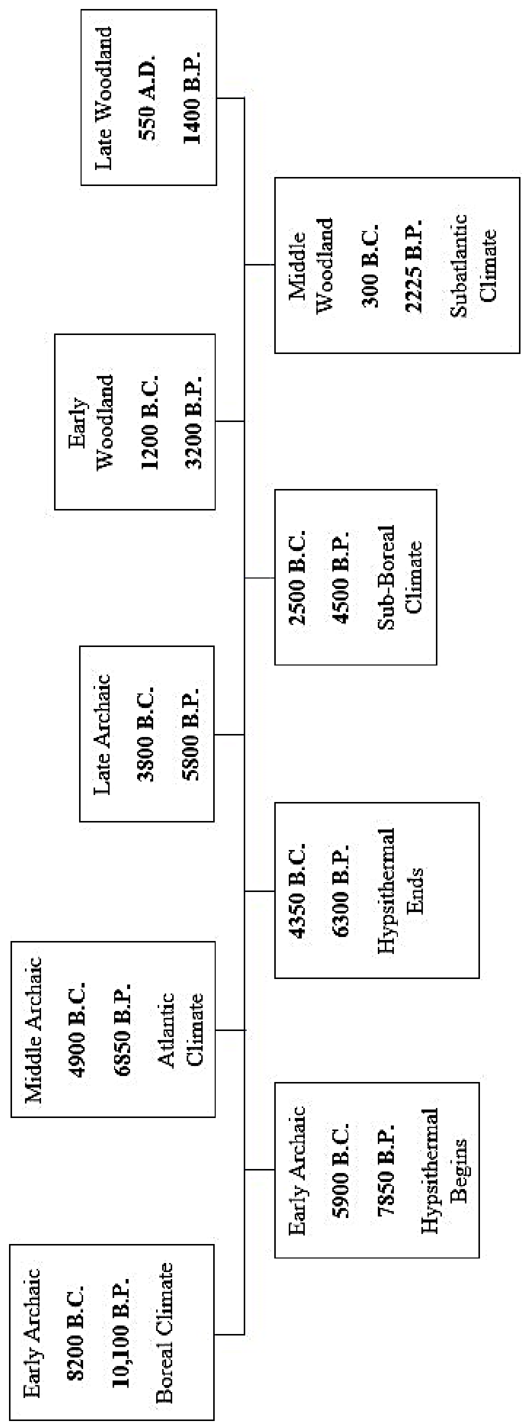
The Woodland period is also divided into Early, Middle, and Late periods, and lasts for approximately two millennia beginning circa 1200 BCE and ending circa CE. 1000. This period is characterized by "increased dietary importance of seeds…increased sedentism…more elaborate mortuary ceremonialism and burial mound complexes…and widespread adoption of pottery" (Anderson and Sassaman 112-114). Moore and Dekle argue that the key to understanding the changes in subsistence strategies that occurred throughout the Archaic and into the Woodland is that a paradigm shift in people's perception of the role of plants in subsistence occurred in the Middle and Late Archaic (Moore and Dekle 2010: 596). This idea of a paradigm shift can be tied into mobility patterns and the increasing sedentism that became more prevalent during and after the Late Archaic period. Though Early Archaic groups "were eating the same range of plant foods as Middle to Late Archaic hunter-gatherers, quantities of plant remains from early sites are limited (596). Furthermore, by the Late Archaic "some groups living in the riverine portions of the Midwest and Midsouth had adopted some form of low-level food production" (598). Thus, the increase in plant remains from the Early to the Late Archaic periods paired with plant cultivation and food production in the Late Archaic suggests that people's ideas about plants likely shifted from plants being an opportunistic resource to be exploited at will to plants being a profitable resource to intentionally cultivate and exploit over long periods of time.

The advent of horticulture in the American Southeast is linked to this paradigm shift and the adoption of bulk processing technologies(597), such as the use of nutting stones, mortars, and lapstones to facilitate the processing of nuts and shellfish (601), that followed. This paradigm shift is characterized partially by a lesser degree of dietary reliance on large animals and more exploitation of "lower-ranked resources concentrated in river valleys"—i.e., riverine resources like mussels (597). Middle Tennessee is of particular interest in pursuing more information about the advent of horticulture because the area between the Cumberland and Tennessee Rivers is home to "unusually large numbers of sites" (Anderson 1996: 175). Late Archaic sites are abundant throughout the Southeast, and compared with the numbers of known sites from the Early and Middle Archaic periods (7,081 and 10,423, respectively), the Late Archaic reflects steady population growth and territorial expansion (160-165).

In many regions of the Southeast there is insufficient data to allow us to identify the transition from the Early Woodland to the Late Archaic except through the appearance of widespread pottery use (Franklin et. al. 2013: 72-73). Furthermore, Late Archaic artifacts are often found in the same contexts as Early Woodland artifacts, and "there is no convenient division between [the] Early and Middle Woodland [periods]" (73); the Early Woodland is even sometimes "jokingly referred to as 'Archaic with pottery'" (Wright and Henry 2013: 8). Early Woodland terminology is therefore problematic and will be avoided in this thesis.

Figure 1.1, adapted from *Recent Developments in Southeastern Archaeology: From Colonization to Complexity* by David G. Anderson and Kenneth E. Sassaman, juxtapositions time periods and climatic events for a holistic perspective on time periods in southeastern archaeology (Anderson and Sassaman 13).

Figure 1.1 American Southeast Timeline



CHAPTER 3: THEORY

Most sources concerning Southeastern archaeology and archaeobotanical remains assert that hickory nuts and walnuts comprise the majority of archaeobotanical remains discovered at Late Archaic sites in the Southeast. This trend continues into the Middle Woodland period and is accompanied by an increasing number of incipient domesticates. In this chapter, I will briefly discuss the role of climate and mobility in Late Archaic and Middle Woodland subsistence strategies.

Climate

Though climate change can act as a major motivator for technological and subsistence adaptations, “changing patterns in subsistence…were not simply mechanistic responses to changing climates or non-discursive implementations of optimal foraging behaviors” (Moore and Dekle 604). The Late Archaic immediately followed extensive climatic and hydrographic changes during the Early Holocene (12,000-8,000 B.P.). According to Joseph Schuldenrein:

> It follows that the 5,000-year interval of mid-Holocene time was the “window of adjustment” during which postglacial environments stabilized, stream channels adjusted to renascent floodplains, hill and slope sedimentation rates diminished, and critical resource zones emerged. Along the coastal plains, estuaries, and inlets, sea level rise slowed appreciably and littoral-marine habitats assumed their present configurations. [Schuldenrein 1996: 3]

This climatic “window of adjustment” led to a coinciding adjustment period for human subsistence, during which peoples of the North American Southeast became more reliant on riverine resources (Kidder 2006: 195). Though climate change is likely not the only motivator for peoples of the Southeast to become more sedentary and to interact with their environment in new and different ways, it is certainly a large factor in this process. Gremillion acknowledges a "model of initial plant domestication" proposed by Bruce Smith which focuses largely on climatic changes:

> He (Smith) argues that the creation of extensive slow-moving aquatic habitats beginning around 6500 B.P. during the Hypsithermal climatic episode…attracted human foragers to bottomland settlements. The repeated occupation of favored locations resulted in ongoing disturbance of existing vegetation, creating favorable environments for several weedy species including chenopod…, sumpweed or marshelder…, and sunflower. [Smith 1996a: 102]

The Late Archaic and Middle Woodland periods took place in the context of the mid- to late Holocene, which according to Gremillion (1993) "gives the impression of being an undifferentiated and monotonous continuation of the nut harvesting and limited environmental disturbance that characterized the early Holocene" (Gremillion 1993: 99). Indeed, gathering nuts is widely regarded as an "important prehistoric subsistence activity" (Gardner 1997). However, this climate change certainly set the stage for extensive exploitation of riverine resources, and in the case of Site 40DV7, botanical remains are interspersed in the shell midden.

Mobility

Another factor of great importance in subsistence patterns is the mobility of Late Archaic populations in the Southeastern United States. Mobility patterns can be influenced by a number of different stimuli, including but not limited to environmental change, social disruption or conflict, and population growth, and the change in settlement patterns from the Late Archaic to the Early and Middle Woodland likely would not have been motivated by a single factor. One of these factors may be population growth, which according to Amick and Carr, typically results in an "entrenched mobility system[s]" (1993: 45-46).). Entrenched mobility can be seen as a transitional step between a nomadic hunting and gathering lifestyle and a more sedentary, horticultural lifestyle. Though not in the Southeast, the Davidson site in Ontario is an excellent example this, described by Estaugh et. al. to exhibit this sort of settlement pattern, which involves "longer seasonal occupations (with fewer residential moves each year), occupation by larger groups of people, and consistent return to the same locations (Estaugh et. al. 2013: 279).

Furthermore, entrenched mobility is often accompanied by resource stockpiling and possibly "…the regular use of task groups or part-time specialists in toolstone procurement and tool manufacture" (Amick and Carr 46). Stockpiling is a resource management tool that laid the foundation for the development of more socio-politically complex societal functions, and became more prevalent throughout the Woodland periods, during which sedentism was a more ubiquitous mode of operation (Amick and Carr 46).

Mobility is closely linked to food exploitation, as where you are and when is a large determining factor in food procurement. As stated by Moore and Dekle (2010), "the perception of immobile organisms as major food sources greatly altered the Archaic landscape…", meaning that as being began to rely more heavily on plant food sources and riverine resources that could be extensively exploited for long periods of time from one place, thus minimizing the need to follow animal food sources (601).

CHAPTER 4: DATA AND METHODS

Overall, the species with the largest definite representation among the archaeobotanical assemblage at Site 40DV7 is hickory (*Carya* sp.). As charred nut is typically highly visible in the archaeological record, this most likely reflects a relatively high level of purposeful hickory nut usage at the site—in other words, when nutshell is present, it is unlikely to be overlooked (Whittaker et. al. 34). As is the case with large, multi-year projects involving many contributors, some information concerning the provenience of samples has fallen by the wayside, so I am unable to attribute all of them to specific units to interpret their provenience or analyze them to their fullest potential. Despite this, the genera represented at Site 40DV7 can still offer valuable insight into Archaic and Woodland subsistence in the Nashville Basin and the American Southeast. The following table presents the data from 40DV7 as it pertains to various genera represented by seeds, hickory endocarp (nutshell), black walnut (*Juglans* sp.) endocarp, and charred wood specimens of undetermined species (xylem).

Chapman and Watson (1993: 36) provide brief summaries of Early-, Middle-, and Late Archaic plant use as follows:

> Early (8000-6000 B.C.): Nuts, principally hickory, acorn, and walnut, but also chestnut, hazelnut, and beechnut occur in archaeobotanical samples. Grapes and honey locust pods may have been constituents in the plant food spectrum. Occurrences of chenopod, purslane, knotweed, amaranth, bedstraw, and pokeweed are probably environmental coincidents.
>
> Middle (6000-3000 B.C.): Focus continues on nut crops with the addition of wild and cultigen cucurbits. Herbaceous seeds were probably of minor importance at best.

> Late (3000-1000 B.C.): Abundant nuts, berries, and other wild seeds were supplemented by cultigen cucurbits, sumpweed (ca. 2000 B.C.), chenopod (ca. 1500 B.C., sunflower (ca. 1000 B.C.), and perhaps maygrass. By 800-700 B.C., a full-fledged horticultural complex…is present in many valleys of the Midsouth and Southeast. [Chapman and Watson 1993: 36]

Based on these summaries, it is evident that though nuts were intensively exploited, there is clear evidence of use of other plants, in particular during the Late Archaic, when the amount of diversity in species exploited seems to skyrocket. It is important to note, however, that "nutshell, like bone and mollusk shell, is not a food and is much more likely than grain to be carbonized and thus to be overrepresented in our records, as much as tubers and greens are underrepresented." (Yarnell 1993: 21). It is thus prudent not to discount the scarce few non-nut species in the data presented here.

Organized by level, this table provides a presentation of archaeobotanical specimens in reverse chronological order, meaning that the lower the level number, the more recently the specimen found its way into the soil. Where level 1 would include any specimen found up to ten centimeters deep in the soil, level 24 would include specimens found from between 230 and 240 centimeters deep. Thus, the higher the level number, generally the older the specimens are. In the case of 40DV7, the flooding that warranted its emergency excavation may well have muddled some of the upper levels, so it is important to note that this site has indeed been disturbed, and this must be accounted for in data analysis. It is also important to note that that this is not the only disturbance the site has endured—we cannot account for unrecorded disturbances from the site's abandonment to its designation as an archaeological site.

The macroremains from site 40DV7 have passed through many hands since they have been at Middle Tennessee State University. I began working on this project in Spring 2016, in part to earn Honors credit for a non-honors archaeology course, and I concluded the first leg of the project in August 2017, which was identifying the macroremains from each sample. I did so by sifting each sample through a two-millimeter and a one-millimeter sieve, examining each sample under a microscope and sorting faunal remains (including primarily shell and bone), lithic materials, and plant remains from one another. Some remains were readily and easily identifiable—some had the characteristic longitudinal lines associated with the xylem of burnt wood, where others had the characteristic endocarp roughness and cruciform division of a walnut.

After I sieved the remains, I recorded the weights of the different levels of the sieves—for example, I weighed the portion of the sample remained on top the two-millimeter sieve, then I separately weighed the portion that fell through onto the top of the one-millimeter sieve, and finally I weighed the remains that fell through both sieves. Following this, I sorted the remains to the best of my ability, separating endocarp from xylem, as well as other types of remains such as faunal (i.e. shell, bone) as well as lithic (flakes). Though data concerning fauna and stone tools does not necessarily contribute to the project at this time, perhaps researchers will analyze them in the future.

Throughout my experience identifying macroremains from site 40DV7, I found that there were many I could not identify with certainty. The high number of unknowns in the records for 40DV7 warranted more extensive use of a comparative collection (Pearsall 2000: 119). According to Pearsell (119):

> A key to successful identification is access to adequate comparative material. Because many archaeological botanical remains are fragmented or otherwise altered from their fresh condition, comparative specimens are most useful if reeducated to a similar state. [Pearsall 2000: 119]

In Fall 2017, I began to create my comparative collection to reduce the number of unknowns in the records for 40DV7. I began by collecting various nuts that I believed would be most useful in identifying macroremains from around the campus of Middle Tennessee State University. These included walnuts, hickory nuts, and acorns. It was fortunate that I decided to take on this aspect of the project during the fall, as the nuts I needed were mature and ready to be harvested. Because the remains I worked with in my samples were carbonized, I then took on the next step of burning the nuts I collected.

For this endeavor, I followed Pearsall's (129) instructions for preparing a working laboratory collection:

> There are several ways to char comparative materials. The easiest is to heat materials in a muffle furnace or kiln. Such units achieve high temperatures in a short time, allowing rapid processing, and their temperature is easily controlled. To obtain a pattern of charring that is comparable to charred archaeological remains, it may be necessary to experiment with specimens of different sizes and moisture contents. [Pearsall 2000: 129]

I did not have access to a muffle furnace or a kiln, so to char the nuts I collected, I made use of a portable grill. The most important aspect of charring materials for a comparative collection is to ensure that oxygen cannot reach the specimens so that they do not immediately degrade to ash. I wrapped each group of specimens at least twice in aluminum foil and lit the charcoal in the grill. Once the charcoal seemed to hold a steady flame, I placed the four aluminum pouches among the briquettes and closed the hood of the grill. I then opened the vent very slightly and left the nuts to burn for the remainder of the day (approximately nine hours) and the whole night.

The next morning, the charcoal had all burnt down to ash, and I was able to retrieve the nuts. The nuts had blackened, but not crumbled—the anticipated and ideal outcome. They are perfect for a comparative collection, and I burnt so many that I could break some of them to document what they look like under different conditions.

The abundance of nuts that I burned in this experiment will contribute to future research because while theoretically one sample of each species should be enough to examine the contours of the endocarp, the number of samples I created will allow me and other researchers to break them, crush them, or otherwise modify them to draw a better comparison to the archaeological sample. Unfortunately, it is virtually impossible to identify every single plant species present in the archaeological samples; they simply do not preserve well, and it is possible that there are species present that we do not have a comparison for (i.e., that do not exist today). For example, I wanted to include more species in my comparative collection, such as American Chestnuts (*Castanea dentata)*; however, due to the chestnut blight that ravaged *Castanea dentata* populations in the early 20th century and the continued presence of the offending fungus, *Cryphonectria parasitica*, survival in its natural habitat is incredibly difficult.

Table 1. 40DV7 Archaeobotanical Data

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
1	7	>0.01	Parenchymous Tissue	U/K	U/K	U/K
1	1	0.01	Seed	U/K	U/K	U/K
1	10	0.115	Seed	U/K	U/K	U/K
1	10	0.001	Seed	U/K	U/K	U/K
1	1	0.001	Seed	U/K	U/K	U/K
1	1	0.011	Seed	U/K	U/K	U/K
1	2	0.011	Seed Coat	U/K	U/K	U/K
1	2	0.005	Seed Coat	U/K	U/K	U/K
1	1	0.001	Seed Coat	U/K	U/K	U/K
1	1	0.004	Seed Coat	U/K	U/K	U/K
1	4	0.119	Seed Coat	U/K	U/K	U/K
1	2	0.003	Seed Coat	U/K	U/K	U/K
1	13	0.005	Xylem	U/K	U/K	U/K
1	21	0.12	Xylem	U/K	U/K	U/K
2	12	0.011	Endocarp	Juglandaceae	U/K	U/K
2	8	0.053	Endocarp	Juglandaceae	U/K	U/K
2	2	0.007	Seed	Phytolaccaceae	*Phytolacca americana*	American Pokeweed
2	>50	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
2	27	0.002	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
2	2	0.003	Seed	Papaveraceae	*Argemone* sp.	Hedgehog Prickly-poppy
2	5	0.004	Seed	Polygonaceae	*Polygonum* sp.	Knotweed
2	1	<0.001	Seed	Asteraceae	U/K	U/K
2	2	<0.001	Seed	U/K	U/K	U/K
2	3	0.001	Seed	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
2	2	<0.001	Seed	U/K	U/K	U/K
2	1	<0.001	Seed	U/K	U/K	U/K
2	1	<0.001	Seed	U/K	U/K	U/K
2	3	<0.001	Seed	U/K	U/K	U/K
2	3	<0.001	Seed	U/K	U/K	U/K
2	1	<0.001	Seed Coat	U/K	U/K	U/K
2	4	0.01	Seed Coat	U/K	U/K	U/K
2	1	0.002	Xylem	U/K	U/K	U/K
2	16	0.005	Xylem	U/K	U/K	U/K
2	10	0.028	Xylem	U/K	U/K	U/K
3	10	0.038	Endocarp	Juglandaceae	U/K	U/K
3	6	0.038	Endocarp	Juglandaceae	U/K	U/K
3	>50	U/K	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
3	>50	0.005	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
3	>50	0.007	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
3	9	0.001	Seed	Chenopodiaceae	*Chenopodium* sp.	Goosefoot
3	1	0.007	Seed	Polygonaceae	*Polygonum* sp.	Knotweed
3	2	0.003	Seed	Euphorbiaceae	U/K	U/K
3	1	<0.001	Seed	U/K	U/K	U/K
3	6	0.002	Seed	U/K	U/K	U/K
3	1	<0.001	Seed	U/K	U/K	U/K
3	1	0.003	Seed	U/K	U/K	U/K
3	1	0.002	Seed	U/K	U/K	U/K
3	1	<0.001	Seed	U/K	U/K	U/K
3	1	0.009	Seed	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
3	8	0.097	Seed Coat	U/K	U/K	U/K
3	1	<0.001	Seed Coat	U/K	U/K	U/K
3	1	<0.001	Seed Coat	U/K	U/K	U/K
3	32	0.043	Xylem	U/K	U/K	U/K
4	8	0.169	Endocarp	Juglandaceae	U/K	U/K
4	20	0.0071	Endocarp	Juglandaceae	U/K	U/K
4	7	0.007	Endocarp	Juglandaceae	U/K	U/K
4	13	0.018	Endocarp	Juglandaceae	U/K	U/K
4	1	0.004	Endocarp	Juglandaceae	U/K	U/K
4	1	0.007	Endocarp	Juglandaceae	U/K	U/K
4	7	0.064	Endocarp	Juglandaceae	U/K	U/K
4	28	0.182	Endocarp	Juglandaceae	U/K	U/K
4	1	0.001	Parenchymous Tissue	U/K	U/K	U/K
4	>50	0.387	Parenchymous Tissue	U/K	U/K	U/K
4	U/K	U/K	Parenchymous Tissue	U/K	U/K	U/K
4	U/K	U/K	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
4	>50	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
4	15	0.004	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
4	16	0.002	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
4	U/K	U/K	Seed	Carophyllaceae	*Stellaria* sp.	Chickweed
4	1	0.001	Seed	U/K	U/K	U/K
4	4	0.048	Seed	U/K	U/K	U/K
4	2	0.004	Seed	U/K	U/K	U/K
4	1	<0.001	Seed	U/K	U/K	U/K
4	1	<0.001	Seed	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
4	2	0.067	Seed	U/K	U/K	U/K
4	1	<0.001	Seed	U/K	U/K	U/K
4	1	<0.001	Seed	U/K	U/K	U/K
4	1	<0.001	Seed	U/K	U/K	U/K
4	1	0.018	Seed	U/K	U/K	U/K
4	U/K	U/K	Seed Coat	U/K	U/K	U/K
4	2	0.012	Xylem	U/K	U/K	U/K
4	2	0.003	Xylem	U/K	U/K	U/K
4	4	0.025	Xylem	U/K	U/K	U/K
4	34	0.103	Xylem	U/K	U/K	U/K
4	19	0.013	Xylem	U/K	U/K	U/K
4	5	0.002	Xylem	U/K	U/K	U/K
4	8	0.025	Xylem	U/K	U/K	U/K
4	14	0.009	Xylem	U/K	U/K	U/K
5	2	0.031	Endocarp	U/K	U/K	U/K
5	17	0.011	Endocarp	Juglandaceae	U/K	U/K
5	<100	0.889	Endocarp	Juglandaceae	U/K	U/K
5	43	0.169	Endocarp	Juglandaceae	U/K	U/K
5	19	<.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
5	4	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
5	1	0.002	Seed	Lamiaceae	U/K	U/K
5	2	<0.001	Seed	Asteraceae	*Ambrosia* sp.	Ragweed
5	2	<0.001	Seed	U/K	U/K	U/K
5	8	<0.001	Seed	U/K	U/K	U/K
5	1	<0.001	Seed	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
5	7	0.073	Seed	U/K	U/K	U/K
5	3	0.006	Xylem	U/K	U/K	U/K
5	35	0.011	Xylem	U/K	U/K	U/K
5	4	0.004	Xylem	U/K	U/K	U/K
5	>50	0.071	Xylem	U/K	U/K	U/K
6	2	0.002	Endocarp	Juglandaceae	U/K	U/K
6	3	<0.001	Endocarp	Juglandaceae	U/K	U/K
6	6	0.003	Endocarp	Juglandaceae	U/K	U/K
6	~43	0.189	Endocarp	Juglandaceae	U/K	U/K
6	<100	0.538	Endocarp	Juglandaceae	U/K	U/K
6	28	0.178	Endocarp	Juglandaceae	U/K	U/K
6	3	<0.001	Parenchymous Tissue	U/K	U/K	U/K
6	0.103	U/K	Parenchymous Tissue	U/K	U/K	U/K
6	2	0.005	Parenchymous Tissue	U/K	U/K	U/K
6	11	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
6	1	<0.001	Seed	Rosaceae	*Rubus* sp.	Blackberry
6	1	0.002	Seed	U/K	U/K	U/K
6	1	0.004	Seed	U/K	U/K	U/K
6	1	<0.001	Seed	U/K	U/K	U/K
6	1	0.001	Seed	U/K	U/K	U/K
6	2	0.019	Seed	U/K	U/K	U/K
6	3	0.023	Seed	U/K	U/K	U/K
6	2	0.004	Seed Coat	U/K	U/K	U/K
6	1	<0.001	Seed Coat	U/K	U/K	U/K
6	1	0.006	Seed Coat	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
6	2	0.009	Xylem	U/K	U/K	U/K
6	7	0.02	Xylem	U/K	U/K	U/K
6	27	0.052	Xylem	U/K	U/K	U/K
6	9	0.003	Xylem	U/K	U/K	U/K
6	6	0.002	Xylem	U/K	U/K	U/K
7	5	0.009	Endocarp	Juglandaceae	U/K	U/K
7	6	0.005	Endocarp	Juglandaceae	U/K	U/K
7	10	0.012	Endocarp	Juglandaceae	U/K	U/K
7	3	0.012	Endocarp	Juglandaceae	U/K	U/K
7	4	0.007	Endocarp	Juglandaceae	U/K	U/K
7	2	0.002	Parenchymous Tissue	U/K	U/K	U/K
7	4	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
7	8	0.004	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
7	1	<0.001	Seed	Caryophyllaceae	*Stellaria media*	Chickweed
7	1	<0.001	Seed	Oxalidaceae	*Oxalis* sp.	Sorrel
7	4	0.039	Seed	Cyperaceae	U/K	U/K
7	3	0.003	Seed	U/K	U/K	U/K
7	1	0.004	Seed	U/K	U/K	U/K
7	1	0.007	Seed	U/K	U/K	U/K
7	1	0.007	Seed Coat	U/K	U/K	U/K
7	6	0.001	Xylem	U/K	U/K	U/K
7	1	0.002	Xylem	U/K	U/K	U/K
7	32	0.029	Xylem	U/K	U/K	U/K
7	19	0.054	Xylem	U/K	U/K	U/K
8	3	0.058	Endocarp	Juglandaceae	*Juglans* sp.	Black Walnut

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
8	~50	0.225	Endocarp	Juglandaceae	*Carya* sp.	Hickory
8	11	0.016	Endocarp	Juglandaceae	U/K	U/K
8	1	0.002	Endocarp	Juglandaceae	U/K	U/K
8	7	0.004	Endocarp	Juglandaceae	U/K	U/K
8	52	0.177	Endocarp	Juglandaceae	U/K	U/K
8	14	0.067	Endocarp	Juglandaceae	U/K	U/K
8	23	0.083	Endocarp	Juglandaceae	U/K	U/K
8	3	<0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
8	2	0.002	Seed	Oxalidaceae	*Oxalis* sp.	Sorrel
8	2	0.003	Seed	U/K	U/K	U/K
8	2	0.002	Seed	U/K	U/K	U/K
8	1	0.014	Seed	U/K	U/K	U/K
8	1	<0.001	Seed	U/K	U/K	U/K
8	2	0.014	Seed	U/K	U/K	U/K
8	1	0.009	Seed	U/K	U/K	U/K
8	1	0.105	Seed	U/K	U/K	U/K
8	1	0.009	Seed	U/K	U/K	U/K
8	10	0.012	Xylem	U/K	U/K	U/K
8	2	0.006	Xylem	U/K	U/K	U/K
8	2	0.002	Xylem	U/K	U/K	U/K
8	31	0.051	Xylem	U/K	U/K	U/K
8	13	0.006	Xylem	U/K	U/K	U/K
8	2	<0.001	Xylem	U/K	U/K	U/K
8	2	<0.001	Xylem	U/K	U/K	U/K
9	12	0.131	Endocarp	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
9	2	<0.001	Endocarp	Juglandaceae	U/K	U/K
9	27	0.201	Endocarp	Juglandaceae	U/K	U/K
9	49	0.252	Endocarp	Juglandaceae	U/K	U/K
9	1	<0.001	Parenchymous Tissue	U/K	U/K	U/K
9	2	0.004	Xylem	U/K	U/K	U/K
9	2	0.015	Xylem	U/K	U/K	U/K
9	13	0.17	Xylem	U/K	U/K	U/K
10	12	0.006	Parenchymous Tissue	U/K	U/K	U/K
10	1	>0.001	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
10	1	>0.001	Seed	U/K	U/K	U/K
10	1	>0.001	Seed	U/K	U/K	U/K
10	U/K	U/K	Seed	U/K	U/K	U/K
10	1	U/K	Seed	U/K	U/K	U/K
10	1	>0.00	Seed	U/K	U/K	U/K
10	3	>0.00	Xylem	U/K	U/K	U/K
10	1	<0.001	Xylem	U/K	U/K	U/K
12	15	0.043	Endocarp	Juglandaceae	U/K	U/K
12	1	0.029	Seed	U/K	U/K	U/K
14	3	0.025	Endocarp	Juglandaceae	*Juglans* sp.	Black Walnut
14	>100	1.4	Endocarp	Juglandaceae	*Carya* sp.	Hickory
14	<100	1.696	Endocarp	Juglandaceae	*Carya* sp.	Hickory
14	5	0.002	Endocarp	Juglandaceae	U/K	U/K
14	3	0.002	Endocarp	Juglandaceae	U/K	U/K
14	1	<0.001	Seed	Oxalidaceae	*Oxalis* sp.	Sorrel
14	>100	3.6	Xylem	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
14	5	<0.001	Xylem	U/K	U/K	U/K
14	3	0.004	Xylem	U/K	U/K	U/K
15	1	0.088	Endocarp	Juglandaceae	*Juglans* sp.	Black Walnut
15	>100	U/K	Endocarp	Juglandaceae	U/K	U/K
15	~50	1.364	Endocarp	Juglandaceae	U/K	U/K
15	~50	0.26	Xylem	U/K	U/K	U/K
15	6	0.032	Xylem	U/K	U/K	U/K
15	7	0.005	Xylem	U/K	U/K	U/K
16	15	1	Endocarp	Juglandaceae	U/K	Black Walnut
16	>100	6.7	Endocarp	Juglandaceae	*Carya* sp.	Hickory
16	30	0.189	Endocarp	Juglandaceae	U/K	U/K
16	8	0.1	Xylem	U/K	U/K	U/K
16	6	0.007	Xylem	U/K	U/K	U/K
17	>100	2	Endocarp	Juglandaceae	*Carya* sp.	Hickory
17	11	0.08	Xylem	U/K	U/K	U/K
18	24	0.075	Endocarp	Juglandaceae	U/K	U/K
18	5	0.011	Endocarp	Juglandaceae	U/K	U/K
18	16	0.42	Seed	Molluginaceae	*Mollugo verticillata*	Carpetweed
18	3	0.075	Xylem	U/K	U/K	U/K
18	1	0.006	Xylem	U/K	U/K	U/K
19	<121	6.215	Endocarp	Juglandaceae	U/K	U/K
19	40	1.306	Endocarp	Juglandaceae	U/K	U/K
19	6	0.017	Endocarp	Juglandaceae	U/K	U/K
19	2	0.03	Parenchymous Tissue	U/K	U/K	U/K
19	11	0.408	Xylem	U/K	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
19	2	0.002	Xylem	U/K	U/K	U/K
20	7	0.002	Xylem	U/K	U/K	U/K
21	1	<0.001	Seed	U/K	U/K	U/K
21	2	0.002	Seed Coat	U/K	U/K	U/K
21	2	0.003	Xylem	U/K	U/K	U/K
22	2	0.06	Seed	U/K	U/K	U/K
22	2	0.12	Xylem	U/K	U/K	U/K
23	3	0.58	Endocarp	Juglandaceae	U/K	U/K
23	3	0.028	Endocarp	Juglandaceae	U/K	U/K
23	6	0.07	Xylem	U/K	U/K	U/K
24	13	0.056	Endocarp	Juglandaceae	U/K	U/K
24	35	0.232	Endocarp	Juglandaceae	U/K	U/K
24	14	0.048	Xylem	U/K	U/K	U/K
24	8	0.05	Xylem	U/K	U/K	U/K
U/K	<70	0.206	Endocarp	Juglandaceae	*Juglans* sp.	Black Walnut
U/K	~50	0.341	Endocarp	Juglandaceae	*Juglans* sp.	Black Walnut
U/K	>100	7.137	Endocarp	Juglandaceae	*Carya* sp.	Hickory
U/K	>100	5.92	Endocarp	Juglandaceae	*Carya* sp.	Hickory
U/K	~20+	0.152	Endocarp	Juglandaceae	*Carya* sp.	Hickory
U/K	>50	0.188	Parenchymous Tissue	Poeaceae	U/K	U/K
U/K	4	0.029	Parenchymous Tissue	U/K	U/K	U/K
U/K	1	0.002	Parenchymous Tissue	U/K	U/K	U/K
U/K	>50	0.08	Endocarp	Juglandaceae	U/K	U/K
U/K	>50	0.046	Endocarp	Juglandaceae	U/K	U/K
U/K	31	0.063	Endocarp	Juglandaceae	U/K	U/K

Level	# of Items	Weight (g.)	Plant Part	Plant Family	Taxonomic Name	Common Name
U/K	~50+	0.111	Endocarp	Juglandaceae	U/K	U/K
U/K	20	0.041	Endocarp	Juglandaceae	U/K	U/K
U/K	>100	16.6	Endocarp	Juglandaceae	U/K	U/K
U/K	>100	8.65	Endocarp	Juglandaceae	U/K	U/K
U/K	4	0.1	Seed	U/K	U/K	U/K
U/K	1	>0.001	Seed	U/K	U/K	U/K
U/K	14	<0.001	Seed	U/K	U/K	U/K
U/K	1	0.003	Seed	U/K	U/K	U/K
U/K	1	0.136	Seed	U/K	U/K	U/K
U/K	1	<0.001	Seed Coat	U/K	U/K	U/K
U/K	1	<0.001	Seed/Endocarp	U/K	U/K	U/K
U/K	10	0.1	Xylem	U/K	U/K	U/K
U/K	<50	0.019	Xylem	U/K	U/K	U/K
U/K	~16	0.29	Xylem	U/K	U/K	U/K
U/K	>50	0.14	Xylem	U/K	U/K	U/K
U/K	~40	0.5	Xylem	U/K	U/K	U/K
U/K	72	0.453	Xylem	U/K	U/K	U/K
U/K	83	0.74	Xylem	U/K	U/K	U/K
U/K	26	0.025	Xylem	U/K	U/K	U/K
U/K	>50	0.013	Xylem	U/K	U/K	U/K
U/K	10	0.148	Xylem	U/K	U/K	U/K
U/K	4	0.031	Xylem	U/K	U/K	U/K
U/K	39	0.061	Xylem	U/K	U/K	U/K
U/K	28	0.051	Xylem	U/K	U/K	U/K

Figure 2. Weight of Juglandaceae in Known Levels

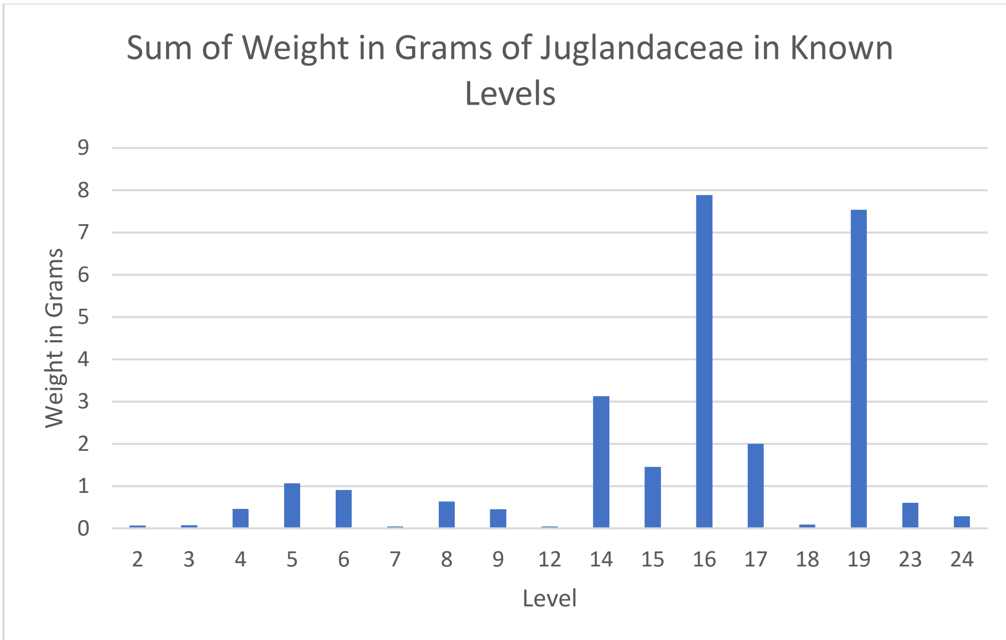
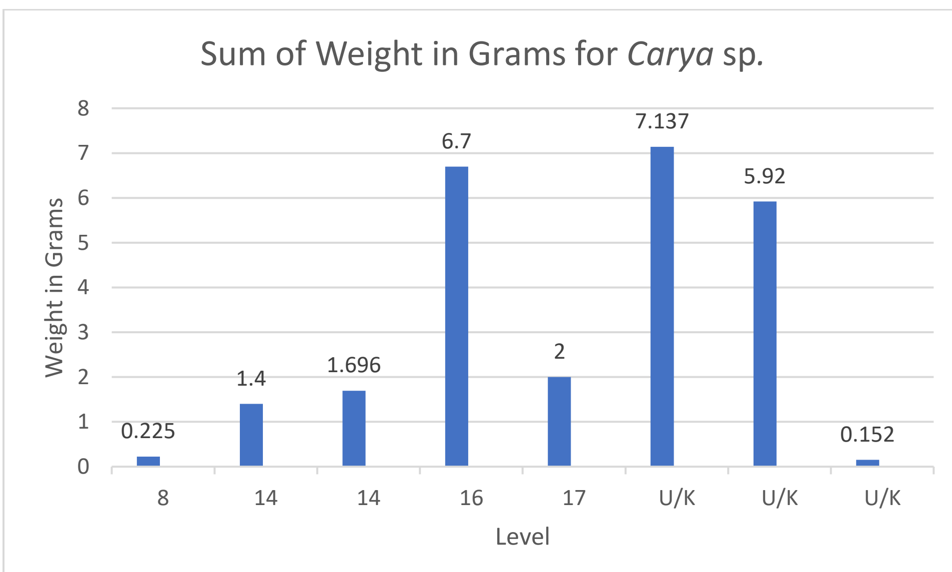


Figure 3. Weight of *Carya* sp.



Interpreting the Data

Some overall trends visible based on the data presented in these tables and graphs show that nut endocarp has been recovered in greater densities than xylem (from wood charcoal) or seeds. Juglandaceae, the plant family to which hickory, black walnuts, and butternuts belong, was the most well represented among identified specimens, and interspersed instances of carpetweed (*Mollugo verticillata*), chickweed (*Stellaria* sp.), sorrel (*Oxalis* sp.), ragweed (*Ambrosia* sp.), and knotweed (*Polygonum* sp.) suggest that domestication of these species may have been beginning in the Archaic period at 40DV7 (Moore and Dekle 596). Species domestication can begin simply because some plants (typically considered weeds now) thrive in disturbed environments like base camps (notice how the plants listed above almost all have "-weed" in their name).

Many of the identified seeds came from the more recent levels, but some came from the older Archaic levels. Level 11 (no samples from level 11 are indicated on the table) marks the most recent known Archaic component, so it is certain that there is at least one instance of a possible domesticated species (*Mollugo verticillata)* present in the Archaic levels. More research is necessary to continue identifying seeds from this site, but because this species is so prevalent in more recent levels, it is certainly possible that the domestication process began in the Archaic period. The high density of nut endocarp suggests extensive use of nuts as a food source, and possibly even a fuel source, and it is possible that it could indicate that people were managing tree nut stands to encourage maximum yield from hickory and walnut trees (Gardner 1997: 161-178).

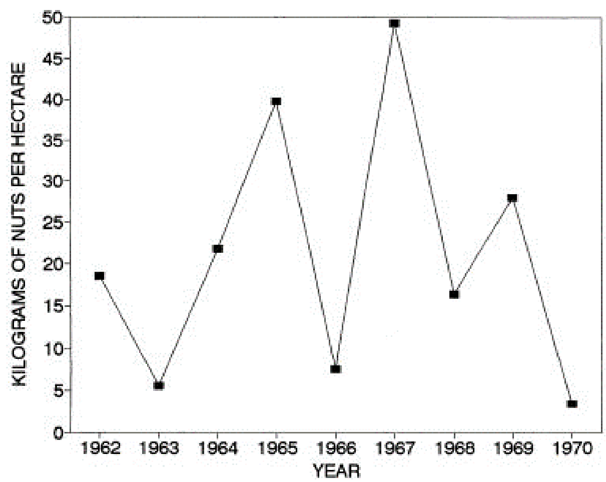
CHAPTER 5: DISCUSSION AND CONCLUSIONS

Because Site 40DV7 was excavated under emergency circumstances, there are comparatively few samples to analyze. Furthermore, this project has taken place over multiple years, and many students contributed to its success before I began work on it. As a result, some data is incomplete, and it is important to note that some information in the data is missing. In any case, the data presented and interpreted in the previous chapter is typical of the Archaic and Woodland components of other southeastern sites (Crites 1986 and 1988; Dixon 1995; Gremillion 1993).

Despite the limitations of a primarily quantitative data analysis, it is important to consider the overarching implications of such data. Several hypotheses have been proposed that outline possible settlement-subsistence strategies. As Gardner proposes in *The Ecological Structure and Behavioral Implications of Mast Exploitation Strategies*, it is possible that the people who inhabited Site 40DV7 in the Archaic period were managing nut stands due to the nature of nut-bearing tree yields, which in the case of hickory is generally periodically low every other year (Gardner). Figure 4. is borrowed from Gardner and depicts the annual yields of hickory nuts in southeastern Ohio from 1962 to 1970. The concept of stockpiling, which I mention in Chapter 3, fits well within this hypothesis, as to continue consuming nuts at a consistent rate during off-years it would be important to stockpile (Amick and Carr 46; Gardner). He continues by explaining that nut harvests are available in the fall, during which game is highly available and other plant resources like fruit are ripe; thus, it is possible that nuts would not be a vital resource in this season, but during the winter, game and plants are much less readily available.

Managing nut stands can be done by ring girdling nonproductive trees to open forest canopies, which “would have had the unexpected consequence of increasing the available habitats for sun-loving weeds” (Gardner). If this model is accurate, it is possible that intentional cultivation of these sun-loving weeds like carpetweed, ragweed, knotweed, and chickweed could easily have been taking place at 40DV7 during the Archaic.

Figure 4. Annual Yields of Hickory Nuts in Southeastern Ohio (Gardner)



Another possibility that Gardner proposes is that the “high density of nutshell at sites probably results from the collectors gorging on the abundant nuts during the harvest period” (Gardner). Because the nutshell present in the assemblage of Site 40DV7 is derived from a shell midden, I find this possibility likely as riverine mussels were also a widely exploited food source (Moore and Dekle 596). Moore and Dekle, as well as Gardner, argue that the movement towards larger settlements at river shoals resulted in *unintended* domestication of plants represented in 40DV7's data like chickweed, carpetweed, sumpweed, and ragweed. Though creating an environment in which these plants thrive may have been unintentional, I think it is important to acknowledge the agency of Archaic peoples and that taking advantage of these conditions could not be unintentional.

Conclusions

40DV7 likely would have been a long-term base camp or repeatedly visited camp, as it is advantageously located by the Cumberland River to exploit shellfish resources. It is possible that due to the presence of human remains at the site that this site "gained special meaning as [a] traditional gathering place where ritually- and socially-important events also took place" (Jefferies, Thompson, and Milner 9). The presence of nutshell and seeds in the midden and the additional presence of human remains additionally suggest that the Archaic and Woodland peoples that used 40DV7 dealt with "periodic shortages in critical resources…through diversification, storage, mobility, and exchange" (19).

In any case, the presence of human remains likely suggests that people would have stayed at 40DV7 for long-term periods, or generally used it repeatedly and frequently. According to Jefferies, Thompson, and Milner, repeated occupation of camps yields a disturbance and enrichment of soil, which makes it easy for the sun-loving plants mentioned in Chapter 2 to thrive (19). Situated along the river, Archaic and Woodland peoples would be positioned to take advantage of plants, terrestrial animals, and shellfish all from one location and thus minimize the risk of relying too heavily on one resource (20). It is likely that this led to a more sedentary lifestyle and resulted in low-level food production of cultigens like chickweed, ragweed, carpetweed, and possibly chenopod (see Table 1) (Moore and Dekle 598-599).

Today, we live in what Chapman and Watson refer to as the "Paleoethnobotanical Era", and they bring up valid points about the continuing "foci of Archaic-period research," among which is the potential redundancy of quantifying nutshell (Chapman and Watson 37). Though it will always be important to continue quantifying archaeobotanical remains, regardless of species, it is more useful to the field of archaeobotany to direct attention to those species that are underrepresented in the archaeological record. We know that some species (chenopod, sumpweed, etc.) are underrepresented, so low representation should not necessarily suggest a lack of use or cultivation of those species.

Much work in the Middle Tennessee area remains to be done, and I hope that this thesis will contribute to the growing body of knowledge of the Late Archaic/Middle Woodland transition. Many sites must be examined to formulate a more universal model of the shift between more mobile, hunting-based subsistence strategies and more sedentary, cultivation-based subsistence strategies. Of the utmost importance to this research is presenting the available data in a way that is easily compiled with other data to examine subsistence trends for larger areas, and I believe I have done so with the large table in Chapter 4. Furthermore, I hope that this site will be revisited by future researchers to determine the plant families or species of the unknown specimens in the data and to create a better understanding of 40DV7 and its uses.

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