Analysis of Plant Remains from 31JK553

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Table of Contents

Introduction

Archaeological plant and animal assemblages represent only a small fraction of what was originally used and deposited by humans in open-air settings. Natural and cultural factors can significantly modify organic remains, resulting in recovered assemblages that differ dramatically from the original deposits. As archaeologists, we examine collections that have undergone a series of processes—from the original selection of plants and animals by humans, to food preparation, cooking, discard, animal and insect scavenging, burial, decay, and weathering, to the recovery of food residues by archaeologists. Using standard methodological procedures for sampling, quantification, and analysis allows us to make sense of our assemblages in spite of the deleterious effects of these processes. Here we report on the identification and analysis of the archaeobotanical assemblage from 31JK553, a site in North Carolina that has three components, dating to the Late Archaic, Woodland, and Qualla periods (in addition to plants from undefined contexts). The plant data from flotation samples are discussed in this report. Plant remains recovered from screened contexts were identified and those data are presented in the Appendix A.

Recovery and Preservation Bias

The circumstances under which plants preserve best archaeologically involve extreme conditions (e.g., exceptionally wet, dry, or cold environments) that prohibit decomposition of organic matter (Miksicek 1987). Plants can also preserve through exposure to fire, which can transform plant material from organic matter into carbon (Miksicek 1987). The likelihood that a plant will become carbonized varies according to the type of plant, how it is prepared and used, and whether it has a dense or fragile structure (Scarry 1986). Plants that are eaten whole are less likely to produce discarded portions that may find their way into a fire. Plants that require the removal of inedible portions (e.g., hickory nutshell, corn cobs) are more likely to find their way into a fire, and thus into the archaeological record. Inedible plant parts represent intentional discard that is often burned as fuel. Moreover, because inedible portions tend to be dense and fibrous, they are more likely to survive the process of carbonization than the edible parts (e.g., hickory nutshell vs. nutmeats). Physical characteristics are also important for determining whether or not a plant will survive a fire. Thick, dense nutshells are more likely to survive a fire than smaller, more fragile grass seeds. Food preparation activities also affect potential plant carbonization. The simple process of cooking provides the opportunity for carbonization through cooking accidents. Foods that are conventionally eaten raw, however, are less likely to be deposited in fires than cooked foods. Some plants that find their way into the archaeological record in carbonized form were not eaten at all. Wood fuel is the most obvious example. Other non-food plants that become carbonized are incidental inclusions, such as seeds blown by wind dispersal (Miksicek 1987; Minnis 1981; Scarry 1986). Indeed, most secondary invaders are weedy species with lots of seeds (e.g., cheno/am plants) (Minnis 1981).

While we cannot ever hope to know the absolute quantities or importance of different plants in any past subsistence economy, the preservation and recovery biases discussed above do not prohibit quantitative analyses of archaeobotanical assemblages. The most commonly used plant resources in any subsistence economy are more likely to be subject to activities that result in carbonization (e.g., through fuel use and accidental burning) and ultimately, deposition (Scarry 1986; Yarnell 1982). Thus, we can quantitatively examine the relative importance of commonly-used plant resources through time and across space.

Methods of Quantification

Quantitative methods in archaeobotany have developed significantly over the past several decades, and as a result, have been a subject of much critical discussion (Hastorf and Popper 1988). The most common methods for recording and quantifying plant remains are counts and weights. Because of problems with comparability between different types of plant taxa, however, raw (or absolute) counts and weights are not appropriate comparative measures (Scarry 1986). For example, denser taxa yield higher weights than more fragile taxa, and some taxa yield higher seed counts than others (e.g., grasses versus fruits) (Scarry 1986). Thus, using absolute counts or weights to summarize plant data is highly problematic. Most archaeobotanists agree that absolute counts are inadequate for assessing past people-plant interactions in that they do not control for biases related to preservation and sampling error (Kandane 1988; Miller 1988; Popper 1988; Scarry 1986). Absolute counts and weights are simply raw, unstandardized data.

One way to avoid the problems of absolute counts/weights is through the use of ubiquity measures (Godwin 1956; Hubbard 1975, 1976, 1980; Popper 1988, Willcox 1974). This type of analysis is essentially a presence/absence analysis that sidesteps the problems of counts and weights by measuring the frequency of occurrence instead of abundance. In other words, ubiquity analysis measures the number of samples in which a taxon was identified, as opposed to the number of specimens represented by that taxon. The researcher first records the presence of a specific taxon in each sample, and then computes the percentage of all samples in which the taxon is present (Popper 1988). For example, if acorn shell is present in four out of ten samples, then its ubiquity value is 40%. Thus, each taxon is evaluated independently (Hubbard 1980). Because different types of plants are disposed of differently, direct comparisons of ubiquity values between taxa are problematic (Hubbard 1980:53). For example, a 70% ubiquity value for hickory nutshell would not be equivalent to a 70% ubiquity value for beans as these categories have different preservation opportunities—hickory nutshell represents a processing by-product often used as fuel, while beans represent edible portions.

As with any quantitative measure, ubiquity analysis has its disadvantages. A sufficient number of samples is necessary to provide meaningful results as using too few samples creates a high likelihood of sampling error. Hubbard (1976:60) suggests a minimum of 10 samples. Moreover, although ubiquity analysis may mitigate for preservation biases, it is not immune to them (Hubbard 1980:53; Scarry 1986:193). Most importantly, because ubiquity deals with occurrence frequency and not abundance, it can potentially obscure patterns where occurrence frequency does not change but abundance does (Scarry 1986). As Scarry (1986:193) notes: "the frequency with which a resource is used may remain constant, while the quantity used varies." For example, a family may consistently eat corn on a daily basis, but the quantity they consume may vary from day to day. Despite these weaknesses, ubiquity analysis is a good starting point and can provide meaningful results when used alongside other measures.

While ubiquity measures may sidestep the problems inherent in absolute counts, it does not provide a means for calculating relative abundances of different plant taxa. Using comparative ratios is one way of determining the relative abundances of different plants. Essentially, calculating a ratio is a means of standardizing raw measures. In other words, we can deal with the problems of absolute counts and weights by standardizing them in terms of some constant variable (Miller 1988; Scarry 1986). The density measure standardizes data in terms of soil volume—the absolute count or weight of carbonized plant material (for individual taxa or for larger collapsed categories, e.g., corn kernels or corn) is divided by total soil volume for each sample or context. Density measures calculate the abundance of plants per liter of soil, and it is generally assumed that larger volumes of soil will yield more plant remains. However, differences in the context and manner of deposition between soil samples structure the relationship between soil volume and the size of the plant assemblage. For example, a 10 L soil sample from an intact house floor would probably yield a smaller sample of carbonized plant remains than a 10 L soil sample from a refuse midden, because people tend to keep their houses cleaner than their trash dumps. Thus, density measures are useful in determining feature function.

Laboratory Procedures

Flotation samples from the site were collected with variable volumes. Both the light and heavy fractions of the flotation samples were analyzed. Although the materials from the light and heavy fractions were processed and sorted separately, data from the two fractions were combined for analysis. According to standard practice, the light fractions were weighed and then sifted through 2.0 mm, 1.4 mm, and 0.7 mm standard geological sieves. Carbonized plant remains from both fractions were sorted in entirety down to the 2.0 mm sieve size with the aid of a stereoscopic microscope (10–40 X). Residue less than 2.0 mm in size was scanned for seeds, which were removed and counted; in addition, taxa encountered in the 1.4 mm sieve that were not identified from the 2.0 mm sieve were also removed, counted, and weighed. Corn cupules and acorn nutshell were also collected from the 1.4 mm sieve as these tend to fragment into smaller pieces and can be underrepresented in the 2.0 mm sieve.

Botanical materials were identified with reference to the paleoethnobotanical comparative collection at the University of California, Santa Barbara (UCSB) paleoethnobotany lab, various seed identification manuals (Martin and Barkley 1961; Delorit 1970), the USDA pictorial website (http://www.ars-grin.gov/npgs/images/sbml/), and Minnis (2003) which allowed us to identify the range of taxa native to the region. Taxonomic identification was not always possible—some plant specimens lacked diagnostic features altogether or were too highly fragmented. As a result, these specimens were classified as "unidentified" or "unidentified seed." In other cases, probable identifications were made—for example, if a specimen closely resembled a corn cupule, but a clear taxonomic distinction was not possible (e.g., the specimen was highly fragmented), then the specimen was identified as a probable corn cupule and recorded as "corn cupule cf.".

Once the plant specimens were sorted and identified, we recorded counts, weights (in grams), portion of plant (e.g., corn kernels versus cupules), and provenience information. Wood was weighed but not counted, and no wood identification was conducted. Generally, most of the seeds identified in the samples were too small to weigh, and thus only counts were recorded. Hickory nutshell and corn remains were identified only as fragments, and were both counted and weighed. Other than counts and weights, no other measurements were taken on any specimens.

Below we report on basic results from the Late Archaic, Woodland, and Qualla periods (Tables 1-6). The samples from the undefined contexts are not discussed below, but the data from these samples is reported in Tables 7 and 8.

Basic Results: Late Archaic Samples

This section presents the results of the identification of the carbonized plant remains from the Late Archaic contexts at 31JK553. Given the limited number of samples analyzed from this site, no quantitative analysis was conducted beyond the calculation of basic measures (e.g., density, relative percents, and ubiquity). Plant data from flotation samples are summarized by site in Tables 1 and 2 (data summary by sample is listed in Appendix A, along with results of the identifications of plants from screened contexts). Raw counts and weights are provided for each taxon, in addition to plant weight, wood weight, and soil volume are also provided; summary measures are also reported (ubiquity, relative percentages, and density).

A total of 6 Archaic period flotation samples from the site were sent to UCSB for analysis. Of these 6 samples, all samples were sorted, representing a total of 44 liters of soil with a total plant weight of 36.5 grams. Combined, these samples yielded 12 plant taxa (identified to the Genus level), a variety of nuts and fruits, and numerous small seeds (Table 1). A consideration of relative percentages and density reveal that nuts composed the primary basis for the diet, with hickory providing the bulk of calories.

Nutshell recovered from the flotation samples includes acorn (*Quercus* sp.), hickory (*Carya* sp.), and hazelnut (*Corylus* sp.). Hickory was the most abundant nut recovered, followed by acorn and hazel in small quantities. While the nutmeats of hazelnuts can be easily extracted from the shell, hickory nuts and some acorns require extensive processing before they are rendered palatable (Petruso and Wickens 1984). The hickory kernels are so tightly enmeshed in the interior shell that picking the nutshells from the cracked shell casing is a time-consuming task. Instead, hickory nuts were generally pounded into pieces and boiled to extract the oil (Ulmer and Beck 1951). The process of boiling the pounded hickory nuts separates the pieces of shell, which sink to the bottom of the pot, from the oil, which rises to the top as the nutmeats dissolve and can be skimmed off or decanted. This oil or milk would then be used as an added ingredient in soups and stews, as a condiment for vegetables, or as a general sauce or beverage (Scarry 2003; Talalay et al. 1984).

The hazelnut identified in the assemblage probably represents the American hazelnut (*Corylus americana*). Unlike the other nuts which come from trees, hazels are shrubs; they prefer open and anthropogenic habitats, and form dense thickets (Scarry 2003). While the nuts begin to ripen in the late summer, they don't fall to the ground until October/November, at which time they are quickly consumed by animals (Scarry 2003). These factors would have resulted in low collection rates for this type of nut (Scarry 2003; Talalay et al. 1984). Hazelnuts are high in fat and were probably processed for the nutmeats themselves, as opposed to the oil they produce (Scarry 2003).

Acorn processing depends upon whether the nuts derive from white or red oak trees. Nuts from the red oak are high in tannin and are extremely bitter as a result. White oaks, however, yield sweeter nuts; the nutmeats from these acorns can be used for cooking immediately after extraction from the shell (Scarry 2003). The tannin present in the bitter acorns, however, requires an additional processing step. Leaching the tannin from acorns can be accomplished either by soaking them in water, or parching and then boiling them with an alkaline substance such as wood ash. Once processed, acorns were generally ground into a fine meal, which could then be used to make gruel, bake bread, or thicken stews. Less often, acorns were boiled and the oil extracted (Swanton 1944:260, 277).

Fruit taxa recovered from the samples are represented only by wild grape (*Vitis* sp.) seeds. Two edible seed species were also identified, including an unidentified legume and three chenopod seeds. People probably collected and consumed the seeds of chenopod. Other seeds that probably represent incidental inclusions in the assemblage include bedstraw, spurge, wax myrtle, and seeds from the sedge and grass families. Bedstraw may also have been consumed as a tea and the weedy legume may have been used as food (Hedrick 1972; Peterson 1977). Spurge is not usually consumed by humans, but wax myrtle leaves can be dried and used for seasoning; their berries are edible but bitter (http://hubpages.com/hub/Common-Edible-Wild-Plants---Part-I).

Basic Results: Woodland Sample

This section presents the results of the identification of the carbonized plant remains from the Woodland context at the site (Tables 3 and 4). Only one sample dates to this context, representing a total of 15 liters of soil with a total plant weight of 17.14 grams. This sample yielded 6 plant taxa (identified to the Genus level). Quantities of the taxa were extremely limited in the sample.

Nutshell recovered from the flotation samples includes fragments of acorn (*Quercus* sp.), hickory (*Carya* sp.), and hazelnut (*Corylus* sp.). While the nutmeats of hazelnuts can be easily extracted from the shell, hickory nuts and some acorns require extensive processing before they are rendered palatable (Petruso and Wickens 1984). The hickory kernels are so tightly enmeshed in the interior shell that picking the nutshells from the cracked shell casing is a time-consuming task. Instead, hickory nuts were generally pounded into pieces and boiled to extract the oil (Ulmer and Beck 1951). The process of boiling the pounded hickory nuts separates the pieces of shell, which sink to the bottom of the pot, from the oil, which rises to the top as the nutmeats dissolve and can be skimmed off or decanted. This oil or milk would then be used as an added ingredient in soups and stews, as a condiment for vegetables, or as a general sauce or beverage (Scarry 2003; Talalay et al. 1984).

The hazelnut identified in the assemblage probably represents the American hazelnut (*Corylus americana*). Unlike the other nuts which come from trees, hazels are shrubs; they prefer open and anthropogenic habitats, and form dense thickets (Scarry 2003). While the nuts begin to ripen in the late summer, they don't fall to the ground until October/November, at which time they are quickly consumed by animals (Scarry 2003). These factors would have resulted in low collection rates for this type of nut (Scarry 2003; Talalay et al. 1984). Hazelnuts are high in fat and were probably processed for the nutmeats themselves, as opposed to the oil they produce (Scarry 2003).

Acorn processing depends upon whether the nuts derive from white or red oak trees. Nuts from the red oak are high in tannin and are extremely bitter as a result. White oaks, however, yield sweeter nuts; the nutmeats from these acorns can be used for cooking immediately after extraction from the shell (Scarry 2003). The tannin present in the bitter acorns, however, requires an additional processing step. Leaching the tannin from acorns can be accomplished either by soaking them in water, or parching and then boiling them with an alkaline substance such as wood ash. Once processed, acorns were generally ground into a fine meal, which could then be used to make gruel, bake bread, or thicken stews. Less often, acorns were boiled and the oil extracted (Swanton 1944:260, 277).

The remaining taxa include three maypop (*Passiflora incarnata*) fruit seeds, and four seeds each from chenopod (*Chenopodium* sp.) and pokeweed (*Phytolacca americana*). All are edible seeds, and poke also can be used to make a dye.

Basic Results: Qualla Samples

This section presents the results of the identification of the carbonized plant remains from the Qualla contexts at the site. Given the limited number of samples analyzed from this site, no quantitative analysis was conducted beyond the calculation of basic measures (e.g., density, relative percents, and ubiquity). Plant data from flotation samples are summarized by site in Tables 5 and 6 (data summary by sample is listed in Appendix A, along with results of the identifications of plants from screened contexts). Raw counts and weights are provided for each taxon, in addition to plant weight, wood weight, and soil volume are also provided; summary measures are also reported (ubiquity, relative percentages, and density).

A total of 5 flotation samples from Qualla contexts at 31JK553 were sent to UCSB for analysis. All 5 samples were sorted, representing a total of 37 liters of soil with a total plant weight of 137.58 grams. Combined, these samples yielded 15 plant taxa (identified to the Genus level), including corn, a variety of nuts and fruits, and numerous small seeds (Table 5).

Corn (*Zea mays*) and squash/gourd (*Cucurbita* sp.) were the only definitive field cultigens present in the samples. Corn remains represent the most common and frequent taxon in the assemblage, according to measures of relative percent and plant density (see Table 6). The most ubiquitous plant taxon, however, is hickory nutshell.

Nutshell recovered from the flotation samples includes acorn (*Quercus* sp.), hickory (*Carya* sp.), hazel (*Corylus* sp.), walnut (*Juglans* sp.), and possible beechnut (*Fagus* sp. cf.). Hickory was the most abundant nut recovered, followed closely by walnut and acorn. Hazel and possible beech were only represented by a handful of specimens. While the nutmeats of walnuts can be easily extracted from the shell, hickory nuts and some acorns require extensive processing before they are rendered palatable (Petruso and Wickens 1984). The hickory kernels are so tightly enmeshed in the interior shell that picking the nutshells from the cracked shell casing is a time-consuming task. Instead, hickory nuts were generally pounded into pieces and boiled to extract the oil (Ulmer and Beck 1951). The process of boiling the pounded hickory nuts separates the pieces of shell, which sink to the bottom of the pot, from the oil, which rises to the top as the nutmeats dissolve and can be skimmed off or decanted. This oil or milk would then be used as an added ingredient in soups and stews, as a condiment for vegetables, or as a general sauce or beverage (Scarry 2003; Talalay et al. 1984).

The hazelnut identified in the assemblage probably represents the American hazelnut (*Corylus americana*). Unlike the other nuts which come from trees, hazels are shrubs; they prefer open and anthropogenic habitats, and form dense thickets (Scarry 2003). While the nuts begin to ripen in the late summer, they don’t fall to the ground until October/November, at which time they are quickly consumed by animals (Scarry 2003). These factors would have resulted in low collection rates for this type of nut (Scarry 2003; Talalay et al. 1984). Hazelnuts are high in fat and were probably processed for the nutmeats themselves, as opposed to the oil they produce (Scarry 2003).

Acorn processing depends upon whether the nuts derive from white or red oak trees. Nuts from the red oak are high in tannin and are extremely bitter as a result. White oaks, however, yield sweeter nuts; the nutmeats from these acorns can be used for cooking immediately after extraction from the shell (Scarry 2003). The tannin present in the bitter acorns, however, requires an additional processing step. Leaching the tannin from acorns can be accomplished either by soaking them in water, or parching and then boiling them with an alkaline substance such as wood ash. Once processed, acorns were generally ground into a fine meal, which could then be used to make gruel, bake bread, or thicken stews. Less often, acorns were boiled and the oil extracted (Swanton 1944:260, 277).

The only fruit taxa recovered from the samples were peach (*Prunus persica*) and possible hawthorn (*Crataegus* sp.) The presence of peach, an Old World species, does not necessarily indicate direct contact with Europeans. Rather, this species was probably incorporated into native food systems through traditional exchange networks (Gremillion 1993). A variety of other seeds were also identified in the Qualla samples from the site. These include: (*Chenopodium* sp.), maygrass (*Phalaris* sp.), bedstraw (*Galium* sp.), bulrush (*Scirpus* sp.), possible spiderling (*Boerhavia* sp. cf.), and sumac (*Rhus* sp.). People probably collected and consumed the seeds of chenopod and maygrass (Hedrick 1972; Medsger 1966, Ulmer and Beck 1951). Chenopod (*Chenopodium* sp.), a common weed throughout the southeastern U.S., is represented in the assemblage by 40 seeds. These chenopod seeds likely represent a combination of wild and domesticated Chenopodium. Bedstraw may also have been consumed as a tea and the weedy legume may have been used as food (Hedrick 1972; Peterson 1977).

Conclusions

In general, there is a shift from a reliance on nuts during the Late Archaic period to a focus on crop plants during the Qualla phase. During both occupations, however, other plant food categories (fruits and edible seeds) represent only a very small supplement to the overall staple foods (nuts during the Archaic occupation, and crops and nuts during the Qualla occupation). Although the Woodland sample represents a bridge between the Archaic and Qualla periods, it is difficult to characterize plant diet during this occupation based on the results of a single sample.

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Table 1. Summary of plant data for all taxa for the Late Archaic period.

Total Samples	**6**				
Soil Volume (L)	**44**				
Total Plant Weight (g)	**36.5**				
Total Wood Weight (g)	**10.23**				
		Count	Weight (g)	Ubiquity (%)	Density (count/liters)
<u>Nuts</u>					
Acorn	*Quercus* sp.	2	0.02	33.3	0.05
Hazelnut	*Corylus* sp.	14	0.12	16.7	0.32
Hickory	*Carya* sp.	2747	25.95	100.0	62.43
<u>Fruits</u>					
Grape	*Vitis* sp.	3	0.01	16.7	0.07
<u>Edible Seeds</u>					
Bean family cf.	Fabaceae cf.	1		16.7	0.02
Chenopod	*Chenopodium* sp.	3		50.0	0.07
<u>Miscellaneous Seeds</u>					
Bedstraw	*Galium* sp.	1		16.7	0.02
Grass family	Poaceae	1		16.7	0.02
Sedge family cf.	Cyperaceae cf.	1		16.7	0.02
Spurge cf.	*Euphorbia* sp. cf.	1		16.7	0.02
Wax myrtle	*Myrica* sp.	1		16.7	0.02
<u>Other</u>					
Pine pitch	*Pinus* sp.	8	0.04	16.7	0.18
<u>UIDs</u>					
Unidentifiable		26	0.12	66.7	0.59
Unidentifiable seed		5		33.3	0.11
TOTALS		**2814**	**26.26**		**63.95**

Table 2. Summary measures of plant groups for the Late Archaic period.

Total Samples	**6**		
Soil Volume (L)	**44**		
Total plant density (plant wt/liters)	**0.83**		
Total wood density (wood wt/liters)	**0.23**		
	Count	Relative %	Density
Nuts	2763	99.3	62.80
Fruits	3	0.1	0.07
Edible Seeds	4	0.1	0.09
Miscellaneous Seeds	5	0.2	0.11
Other	8	0.3	0.18
UIDs	31		0.70
TOTALS	**2814**		**63.95**

Table 3. Summary of plant data for all taxa for the Woodland period.

Total Samples	**1**				
Soil Volume (L)	**15**				
Total Plant Weight (g)	**17.14**				
Total Wood Weight (g)	**16.93**				
		Count	Weight (g)	Ubiquity (%)	Density (count/liters)
Nuts					
Acorn	*Quercus* sp.	1		100	0.07
Hazelnut	*Corylus* sp.	1	0.01	100	0.07
Hickory	*Carya* sp.	3	0.03	100	0.20
Fruits					
Maypop	*Passiflora incarnata*	3		100	0.20
Edible Seeds					
Chenopod	*Chenopodium* sp.	4		100	0.27
Miscellaneous Seeds					
Pokeweed	*Phytolacca americana*	4		100	0.27
UIDs					
Unidentifiable		110	0.17		7.33
TOTALS		**126**	**0.21**		**8.40**

Table 4. Summary measures of plant groups for the Woodland period.

Total Samples	**1**		
Soil Volume (L)	**15**		
Total plant density (plant wt/liters)	**1.14**		
Total wood density (wood/liters)	**1.13**		
	Count	Relative %	Density
Nuts	5	31.3	0.33
Fruits	3	18.8	0.20
Edible Seeds	4	25.0	0.27
Miscellaneous Seeds	4	25.0	0.27
UIDs	110		7.33
TOTALS	**126**		**8.40**

Table 5. Summary of plant data for all taxa for the Qualla period.

Total Samples	**5**				
Soil Volume (L)	**37**				
Total Plant Weight (g)	**137.58**				
Total Wood Weight (g)	**94.87**				
		Count	Weight (g)	Ubiquity (%)	Density (count/liters)
Crops					
Corn cob frag	*Zea mays*	2	2.23	20	0.05
Corn cupule	*Zea mays*	3893	28.69	40	105.22
Corn kernel	*Zea mays*	25	0.19	60	0.68
Squash/gourd rind cf.	*Cucurbita* sp. cf.	2	0.01	20	0.05
Nuts					
Acorn	*Quercus* sp.	36	0.07	40	0.97
Beechnut cf.	*Fagus* sp. cf.	8	0.16	20	0.22
Hazelnut	*Corylus* sp.	3	0.02	20	0.08
Hickory	*Carya* sp.	499	8.98	100	13.49
Walnut	*Juglans nigra*	53	2.03	40	1.43
Fruits					
Hawthorn cf.	*Crataegus* sp. cf.	8	0.02	40	0.22
Peach	*Prunus persica*	4	0.18	20	0.11
Edible Seeds					
Chenopod	*Chenopodium* sp.	40		60	1.08
Maygrass	*Phalaris* sp.	2		20	0.05
Miscellaneous Seeds					
Bedstraw	*Galium* sp.	2		20	0.05
Bulrush cf.	*Scirpus* sp. cf.	4		40	0.11
Cheno/am		2		20	0.05
Spiderling cf.	*Boerhavia* sp. cf.	2		20	0.05
Sumac	*Rhus* sp.	2		20	0.05
UIDs					

Unidentifiable		310	2.03	80	8.38
Unidentifiable seed		5		40	0.14
TOTALS		**4902**	**44.61**		**132.49**

Table 6. Summary measures of plant groups for the Qualla period.

Total Samples	**5**		
Soil Volume (L)	**37**		
Total plant density (plant wt/liters)	**3.72**		
Total wood density (wood/liters)	**2.56**		
	Count	Relative %	Density
Crops	3922	85.50	106.00
Nuts	599	13.06	16.19
Fruits	12	0.26	0.32
Edible Seeds	42	0.92	1.14
Miscellaneous Seeds	12	0.26	0.32
UIDs	315		8.51
TOTALS	**4902**		**132.49**

Table 7. Summary of plant data for all taxa from undefined contexts.

Total Samples	**6**				
Soil Volume (L)	**56**				
Total Plant Weight (g)	**819.81**				
Total Wood Weight (g)	**809.58**				
		Count	Weight (g)	Ubiquity (%)	Density (count/liters)
Crops					
Corn cupule cf.	*Zea mays* cf.	15	0.15	16.67	0.27
Nuts					
Acorn	*Quercus* sp.	854	1.85	33.33	15.25
Hazelnut	*Corylus* sp.	25	0.12	33.33	0.45
Hickory	*Carya* sp.	447	5.87	83.33	7.98
Edible Seeds					
Chenopod	*Chenopodium* sp.	89		16.67	1.59
UIDs					
Unidentifiable		171	0.81	66.67	3.05
TOTALS		**1601**	**8.80**		**28.59**

Table 8. Summary measures of plant groups from undefined contexts.

Total Samples	**6**		
Soil Volume (L)	**56**		
Total plant density (plant wt/liters)	**819.81**		
Total wood density (wood/liters)	**809.58**		
	Count	Relative %	Density
Crops	15	1.05	0.27
Nuts	1326	92.73	23.68
Edible Seeds	89	6.22	1.59
UIDs	171		3.05
TOTALS	**1601**		**28.59**