10.1.4- Report on the Analysis of Flotation-recovered Archeobotanical Samples from Site 7K-F-ll, SR 1 North Freerica Grade Separated Intersection, Kent County, Delaware. Phase III Data Recovery by Justine McKnight.

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Report on the Analysis of Flotation-recovered Archeobotanical Samples from Site 7K-F-11, SR 1 North Frederica Grade Separated Intersection, Kent County, Delaware. Phase III Data Recovery.

INTRODUCTION

Phase III data recovery at the Gray Farm Site (7K-F-11) was conducted by Archaeological & Historical Consultants, Inc. (AHC), in 2009 as part of the Delaware Department of Transportation's SR 1 Frederica grade separated intersection project. Investigations at the site produced evidence of a probable lithic procurement and production locus, with diagnostic materials suggesting an intensity of occupation during period 1000 BC to AD 100 (based on the prevalence of Colbourne and other early Woodland ceramic types). The Phase III investigations included the excavation of hundreds of soil anomalies conforming to a variety of cultural feature types which relate to the intensive reuse of the site over a broad period of prehistory. In addition to prehistoric occupations, a nineteenth century farmstead has been identified within the site limits.

The data recovery effort focused on prehistoric occupations at the Gray Farm Site. An important research goal was the definition of subsistence strategies relied upon by site residents throughout all periods of prehistory. The excavated features yielded carbonized plant macro-remains which relate directly to site economy, site function, feature development, and local landscape conditions and change through time. In addition, archeobotanical data from 7K-F-11 contribute to our understanding of regional paleoethnobotany on the Delmarva Peninsula. The collection and processing of soil samples for the recovery of plant macro-remains comprised an integral part of AHC's Phase III research design (Rue 2010).

A total of 1,033 soil samples for flotation were collected from prehistoric contexts during Phase III data recovery at the Gray Farm Site. Where possible, standard one liter flotation samples were secured from all feature strata, and additional soil samples were taken from features of greater interest. Of this total, thirty samples were selected for processing and macro-botanical analysis based on their potential to provide information regarding prehistoric subsistence and land use issues. The selected samples derive from 28 discrete cultural features. Table 01 provides an overview of the analyzed material.

METHODS

Flotation Samples

Soil samples secured from recent archaeological investigations at Site 7K-F-11 ranged in from 0.24 to 1.5 liters in sediment volume. Each soil sample was thoroughly air dried and then individually processed using a Flote-Tech flotation system equipped with 0.325mm fine fraction and 1.0mm coarse fraction screens. The Flote-Tech system is a multi-modal flotation system which facilitates the separation and recovery of plant materials from the soil matrix via agitation in water. Processing resulted in two size fractions (heavy and light). Floted portions were air dried. Flotation processing was conducted by laboratory staff at Archaeological & Historical Consultants, Inc., in Centre Hall, Pennsylvania.

Table 01: Summary of analyzed flotation samples from cultural features.

feature number	feature description	number of flotation samples	AS#'s	soil sample volume (liters)	weight analyzed carbonized plant remains (grams)
9	basin	1	79	1.5	0.3
10	cylinder	2	364, 406	3	5.28
23	pit	1	352	1.5	0.64
47	FCR	1	408	1.5	0.23
178	cylinder	2	683, 702	3	0.105
180	tree throw	1	481	1	0.13
185	pit	1	439	1.5	0.63
190	FCR	1	573	1	0.64
195	basin	1	769	unk	0.25
197	basin	1	448	1.5	0.17
227	FCR	1	495	1.5	0.34
233	AIA	1	502	1.5	1.6
253	basin	1	663	1.5	0.21
279	pit	1	525	1.5	1.04
280	basin	1	737	1.5	0.1
295	AIA	1	450	1.5	0.48
308	basin	1	461	1.5	0.04
327	basin	1	677	1	0.185
330	cylinder	1	903	1	0.73
331	pit	1	764	1	0.54
332	pit	1	763	1	0.46
338	pit	1	868	1.5	0.175
340	pit	1	790	1.5	1.51
350	pit	1	700	1.5	0.23
371	pit	1	524	0.24	1.52
376	cylinder	1	929	1.5	0.665
419	cylinder	1	930	1.5	0.46
437	pit	1	940	1.5	1.05
total	28 features	30	30	>39.24 liters	19.71 grams

Recovered light and heavy fractions from the thirty processed flotation samples were submitted to archeobotanical consultant Justine McKnight's Severna Park, Maryland laboratory for analysis. Samples were individually passed through a 2mm geological sieve, yielding fractions of two different sizes for analysis. Weights and sample descriptions of the resulting greater than or equal to 2mm and less than 2mm fractions were recorded. The greater than or equal to 2mm

charcoal specimens were examined under low magnification (10X to 40X) and sorted into general categories of material (i.e. wood, nut, seed, miscellaneous material, etc.). Description, count and weight were taken for each category of the greater than or equal to 2mm carbonized material. The less than 2mm size fractions were examined under low magnification and carbonized seeds were isolated for identification and quantification.

The processed samples yielded both carbonized and non-carbonized plant remains. Non-carbonized plant remains observed in the flotation-derived botanical assemblage included modern roots and non-carbonized seeds. It is highly unlikely that these non-carbonized plant specimens relate to prehistoric occupations at the Gray Farm Site. Although the persistence of non-carbonized plant remains from consistently xeric or water-saturated environments does occur (Hastorf and Popper 1988; Minnis 1981; Pearsall 2000), such soil conditions do not describe the Frederica North project area. Non-carbonized plant remains occurring within archaeological soil samples from similar site environments are usually considered to be intrusive modern specimens (Minnis 1981; Keepax 1977). The recovery of non-carbonized plant remains may reveal specific contamination episodes associated with animal burrowing (i.e. rodent, insect, gastropod), the action of root growth and decay, aeolian or fluvial processes, or by some combination of these forces.

Sample matrices were predominantly composed of coarse sands and gravel (quartzitic), with various inclusions of natural ecofacts and cultural debris. Non-carbonized roots, shell fragments, insect egg cases and body parts, mica flakes, coal fragments, bone, burned bone, and lithic debitage were observed. Many of the analyzed flotation samples contained small quantities of spherical carbon residue. This residue is formed when plants high in silica (such as grasses) are burned and the silica melts and fuses into droplets which persist in the archaeological record. These round, black droplets are often mistaken for small, carbonized seeds. Unfortunately, this material lacks any diagnostic morphology on which to venture a taxonomic classification of the original plants from which the silica derived.

Identifications were routinely attempted on all seed, nut and miscellaneous plant remains, and on a sub-sample of twenty randomly selected wood fragments from each sample containing *more* than twenty specimens, in accordance with standard practice (Pearsall 2000). Identifications of all classes of botanical remains were made to the genus level when possible, to the family level when limited diagnostic information was available, and to the species level only when the assignment could be made with absolute certainty. When botanical specimens were found to be in such eroded or fragmentary condition as to prevent their complete examination or recognition, a variety of general categories were used to reflect the degree of identification possible: General wood categories within the analyzed assemblage include *'ring porous', 'deciduous'* and *'unidentifiable'* where specimens were so fragmentary or minute that no clear section could be obtained upon which to base identification. The category *'amorphous carbon'* was used in this report to classify burned plant remains which lacked any identifiable characteristics whatsoever. Identifications were made under low magnification (10X to 40X) with the aid of standard texts (Panshin and deZeeuw 1980; Edlin 1969; Schopmeyer 1974; Martin and Barkley 1961), and checked against plant specimens from a modern reference collection representative of the flora of the Delmarva Peninsula (McAvoy 2011; Taber 1960; Tatnall 1946).

RESULTS

Flotation-recovered plant remains from 30 soil samples collected from 28 cultural features were analyzed from the Gray Farm Site (7K-F-11). A total of approximately 39.24 liters of feature fill was processed, which yielded 19.71 grams of carbonized plant macro-remains (an average of 0.5023 grams per liter of soil). While the recovered archeobotanical assemblage was neither rich nor diverse, a variety of economically important wild plant resources were documented from contexts associated with deep human history at the site. Interestingly, hickory nutshells dominated the assemblage (based on weight), suggesting a firm reliance on native mast. Wood charcoal was ubiquitous across the analyzed samples, with hickory and white oak species being the most common wood types identified. The seeds of wild fruits and grasses provide additional evidence of a cultural reliance on wild plant foods. Miscellaneous plant materials identified include monocotyledonous stem fragments, galls, fungi and amorphous carbon. A summary of the flotation-recovered archeobotanical remains is provided in Table 02. A full inventory by AS number is provided in the Appendix, Table 01. A discussion of each class of plant material encountered within the assemblage is provided below.

Wood Charcoal

Wood charcoal was present in all but one of the flotation samples analyzed. A total of 1,344 fragments of carbonized wood (>2mm in diameter) weighing 9.22 grams was recovered (accounting for 46 percent of the analyzed plant carbon, by weight). Of the total wood charcoal, a sub-sample of 465 fragments (a maximum of 20 fragments per sample) was randomly selected for identification. This sub-sample revealed a predominance of hickory *(Carya spp.)* (73 fragments or 16 percent of the selected sub-sample), white oak species (*Quercus spp. LEUCOBALANUS group)* (53 fragments or 11 percent), red oak (*Quercus spp. ERYTHROBALANUS group)* (24 fragments or five percent), unspecified oak (*Quercus spp.)* (15 fragments or three percent), maple *(Acer sp.)* (six fragments or one percent), pine *(Pinus spp.)* (two fragments or less than one percent), and American chestnut *(Castanea dentata)* (one fragment or less than one percent). Wood specimens which were too minute or which exhibited incomplete morphology were assigned to the categories *'ring porous'* (one percent), *'deciduous'* (46 percent), and unidentifiable (15 percent). The percent composition of wood types from the Gray Farm Site flotation samples is illustrated in Figure 01.

Nuts

The remains of thick-walled hickory nuts were well-represented within the Gray Farm Site flotation samples. Present in 70 percent of the analyzed samples, hickory nutshell fragments totaled 540 (9.66 grams or 49 percent of the total carbonized plant remains recovered). The true (or thick-walled) hickories *(Carya spp.)* include a variety of native species which occupy a variety of ecological zones, and produce a heavy nut crop which ripens during September and October (Radford et al 1964:263-266). Four species of hickory are native to the Frederica North project area: Pignut *(Carya glabra);* Shagbark *(Carya ovata);* Mockernut *(Carya tomentosa)*, Bitternut *(Carya cordiformis)*. The true hickories bear oily, edible nuts which ripen in the autumn. Each hickory tree produces a nut crop annually, yielding an average of 1.5-3 bushels per tree (USDA 1948). The hickory nut is covered in a thick husk, which dries and falls away in 4 sections. The shagbark and mockernut hickory produce the sweetest nuts, while the pignut and bitternut hickories have notoriously bitter flesh. The prevalence of hickory remains from prehistoric archeological contexts attests to the importance of the species to human

subsistence, and the accessibility of the resource to local populations. Nut collection by aboriginal peoples probably focused on gathering fallen nuts from beneath trees. Hickory nuts (referred to as *'walnuts'*) are mentioned in early historic accounts of Algonquian diets (Lorant 1946:250; Quinn 1955:351), and the prevalence of hickory trees in the native forests of the eastern United States is noted by Hariot (Lorant 1946:256).

Table 02: Summary of Flotation-recovered archeobotanical remains.

n of samples		30
n of features		28
Soil sample volume (liters)		39.24
Weight analyzed carbonized plant remains (grams)		19.71
WOOD CHARCOAL (carbonized)	(no of fragments)	1341
	total weight (grams)	9.22
Acer sp. (maple)		6
Carya spp. (hickory)		73
Castanea sp. (chestnut)		1
Pinus spp. (pine)		2
Quercus spp. (oak)		15
Quercus spp. (white oak)		53
Quercus spp. (red oak)		24
ring porous		6
deciduous		215
unidentifiable		70
total identified fragments		465
NUTS (carbonized) (n of fragments)		540
	weight (grams)	9.66
Carya spp. (thick-walled hickory)		540
SEEDS (carbonized)	(n of specimens)	7
	total weight (grams)	0.035
Rubus spp. (raspberry or blackberry) seed		1
Vitis sp. (grape)		1
possible POACEAE (grass) seed		1
unidentifiable large seed fragment		1
unidentifiable, ovoid		1
unidentifiable		2
MISC PLANT REMAINS (carbonized)	(n of fragments)	102
	total weight (grams)	0.795
monocot stem fragment		9
gall		1
fungal fructification		4
amorphous carbon		85
unknown fragments		3

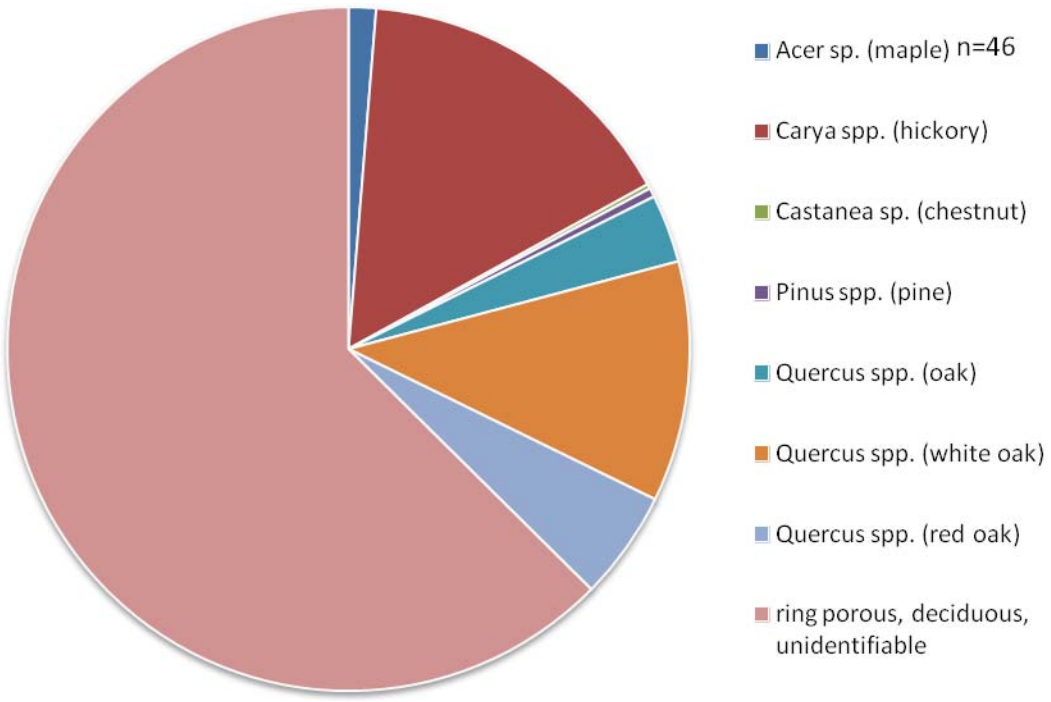

Figure 01: Percent composition of wood taxa represented in the assemblage.

Figure 02: Hickory *(Carya spp.)* nutshells recovered from Feature 376 (AS#929)

Figure 03. Raspberry/blackberry *(Rubus spp.)* seed recovered from Feature 376 (AS#929) *Scale = 1 grid*

Carbonized Seeds

Carbonized seed remains were scant within the Gray Farm Site flotation assemblage. A total of only seven seeds (0.035 grams) were recovered from Features 10, 178, 327, 338, 340 and 376. A minimum of three taxa are represented, and the seed assemblage reveals the presence of fleshy fruits. Raspberry or blackberry *(Rubus spp.)* (Figure 03), grape *(Vitis sp.),* and grass *(POACEAE)* were identified. Four seeds were fragmentary or lacking key morphological elements and were classified as unidentifiable.

Miscellaneous

Miscellaneous archeobotanical materials total 102 specimens weighing 0.792 grams. Nine fragments of monocot stem, a gall, four pieces of fungal fruiting bodies, 85 fragments of amorphous carbon and three unknown carbonized fragments were recovered.

Non-carbonized Seeds

Non-carbonized seed remains were present in 73 percent of the flotation samples analyzed. Twenty taxa were represented, including copperleaf *(Acalypha spp.)*, pigweed *(Amaranthus spp.)*, carpetweed *(Mollugo verticillata)*, poke *(Phytolacca americana)*, knotweed/dock *(Polygonum/Rumex.),* sumac *(Rhus sp.),* raspberry or blackberry *(Rubus sp.),* chickweed *(Stellaria media),* dandelion *(Taraxacum sp.),* clover *(Trifolium sp*.), nightshade *(SOLANACEAE)* and grass *(POACEAE)*. Table 03 illustrates the percentage presence of non-carbonized seed types within the analyzed flotation samples. The recovery of non-carbonized seeds of probable modern origin from prehistoric features at the Gray Farm Site accords with the regional pattern of feature contamination by minute organic materials through coastal plain sediments (Affleck et al. 1997: 108-115).

Table 03: Percentage presence of non-carbonized seed types within flotation samples.

non-carbonized seeds, presence within 30 samples analyzed		73%
common name	scientific name	
copperleaves	*Acalypha sp.*	3%
pigweed	*Amaranthus sp.*	20%
carpetweed	*Mollugo verticillata*	67%
poke	*Phytolacca americana*	3%
knotweed/dock	*Polygonum/Rumex*	3%
sumac	*Rhus sp.*	0%
blackberry/raspberry	*Rubus sp.*	3%
chickweed	*Stellaria media*	40%
dandelion	*Taraxacum sp.*	3%
clover	*Trifolium sp.*	3%
grass family	*POACEAE*	3%
nightshade family	*SOLANACEAE*	10%
unknown		3%

DISCUSSION

The archeobotanical data generated from 28 cultural features at the Gray Farm Site (7K-F-11) provide important information about human-plant interactions during the Woodland I and II periods in Delaware. The features yielded a variety of economically important wild plant foods which document a plant-derived subsistence base focused on the collection of locally abundant hickory nuts and wild fleshy fruits (canes, grape). Wood charcoal identified from the sampled features reveals a preference for hickory and oak species for fuel.

Archeobotanical remains represent largely biodegradable artifacts, with the great majority of plant remains originally deposited decomposing quickly and leaving only a limited and grossly prejudiced sample of the original material. These factors ensure that there are tremendous biases inherent in interpreting archeobotanical data. The recovery of adequate plant artifacts from archaeological contexts has proved particularly difficult from prehistoric sites in Delaware, where loose, coarse sediments provide a particularly sieve-like and abrasive matrix for the preservation of carbonized plant remains. Despite these biases, carbonized plant macro-remains are preserved in archaeological contexts, and they provide us, little by little, with critical information about human-plant relationships.

The flotation-recovered archeobotanical remains studied from the Gray Farm Site suggest a cultural focus on the harvest of fall-ripening hickory nuts. The abundance of nutshell remains recovered from the sampled features (nuts were more abundant than wood site-wide) and their ubiquity across feature types and through time evidence an enduring reliance on hickory nut resources to site residents. Recovered seed remains document that the wild, fleshy fruits of raspberry or blackberry and grape were also important to the subsistence economy of site residents.

While plant remains can be very strong markers for seasonality, data can often be skewed by the presence of storable food resources which can enter the archaeological record at other times of the seasonal cycle than that in which the product ripened. While the recovery of a variety of late-summer and fall ripening nuts and fruits suggest that the features sampled at the Gray Farm Site developed during this period of the year, the edible plant remains identified constitute readily storable food resources. Surplus harvest could have been stored for consumption during times of limited fresh-food availability.

The Frederica North project area is located in the Mid-drainage Zone of the Lower Coastal Plain physiographic province. The vicinity of the Gray Farm Site has been under mechanized field agriculture in recent years, but the land was fallow at the time of site excavation in 2009. Prior to European settlement of the region, Delaware supported vast forest and marshlands with plant communities largely determined by topography and the permanence of abundant water. The site lies within the Oak-Pine Forest (Atlantic Slope Section) as defined by Braun (1950:192) and the Oak-Hickory-Pine forest association outlined by Kuchler (1964). Native forest cover over the project area was characterized by a medium tall to tall forest of broadleaf deciduous and needleleaf evergreen trees. Dominant species would have included hickory, shortleaf pine, loblolly pine, white oak and post oak. The flotation-recovered wood assemblage from features at Gray Farm is composed of deciduous taxa common to this forest association (Little 1971; Sargent 1884; Taber 1960; Tatnall 1946). It is interesting that coniferous trees are not well-represented with the feature assemblage, although they would have comprised part of local forests during prehistory. The low frequency of coniferous woods suggests that the recovered wood remains represent species which were culturally selected for particular uses (perhaps for fuel, as both hickory and oaks are high-calorie woods) (Graves 1919).

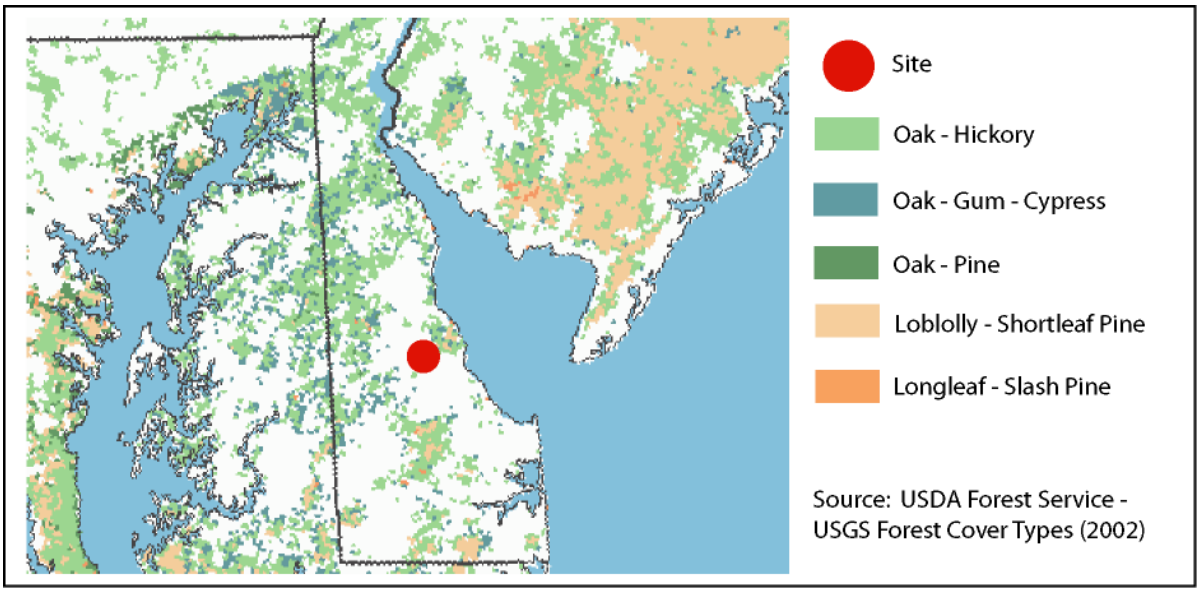

Figure 04: Existing forest cover over the Frederica North project area.

Examination of the recovered archeobotanical assemblage by feature reveals some interesting patterns (see Appendix Table 02). The greatest density of carbonized plant macro-remains is

evident within Feature 371 (a pit) where we see more than three and a half times greater carbon density than from any other feature (see Figure 05). On close examination, we see that this is a result of abundant wood charcoal within this context, and is probably influenced by the very small volume (0.24 liters) of soil selected for flotation from this context. Feature 237 (associated with an AIA) also produced a concentration of carbonized plant remains derived from wood charcoal. High densities of carbonized plant material are also present in Feature 10 (a cylinder feature) and Feature 340 (a pit), but in these two features the result is due to rich deposits of hickory nutshells – signaling different patterns of plant utilization associated with feature development.

Feature sampled for plant macro-remains at the Gray Farm Site confirm to six general types. An inventory of results arranged by feature type is presented in the Appendix Table 03:

AIA (Area of Intense Activity). These features large, shallow features with diffuse boundaries contained relatively rich concentrations of lithic debitage and tools. These features likely represent living surfaces. AIA features may represent task-specific activity areas. Two flotation samples were secured from features classed as AIA (Feature numbers 233, 295).

Basin. Describe shallow, round-bottom feature with little stratigraphic separation and low artifact density. Basin size was variable, but all were ovoid in plan view. Seven flotation samples were analyzed from Basin features at the Gray Farm Site (Feature Numbers 9, 195, 197, 253, 280, 308, 327).

Cylinder/Cylindrical Storage Pit. Characterized by a greater degree of stratigraphic separation than other cultural features encountered at the Gray Farm Site, these cylindrical features exhibited alternating strata of dark and light soils. Artifact densities were generally low, but varied by strata. Flotation samples analyzed from the Cylinder features total seven, from Feature Numbers 10, 178, 330, 376 and 419).

FCR (Fire Cracked Rock). FCR features were characterized by the presence of moderate to high quantities of heat-altered rock. These may represent hearth areas. Three flotation samples were studied from features classified as the FCR type (Feature Number 47, 190, and 227).

Pits. Pit features generally conformed to large, ovoid shaped stains with deep profile and little soil stratigraphy. Artifact density within the pit features varied greatly, but the highest densities tended to come from the upper levels of the pit features. A total of 10 flotation samples were processed from Pit features excavated at the Gray Farm Site (Feature Numbers 23, 185, 279, 331, 332, 338, 340, 350, 371, and 437).

Tree Throw. Feature 180 is categorized as a natural tree throw containing Woodland I cultural artifacts. A single flotation sample was processed from this feature/feature type.

By grouping both the flotation results together based on feature type, we see that Cylinders, followed by AIA features and Pits were generally the most productive based on grams of carbonized plant remains recovered per liter of feature fill (see Figure 06). Interesting patterns emerge when we examine the predominant source of the plant material within different feature

types. Wood charcoal dominates the floral assemblages from the FCR, AIA, tree throw and Basin features, while nutshells were the most abundant type of plant material recovered from Cylinder and Pit features. The predominance of nuts combined with the small quantity of wood charcoal within these feature types suggest that the Pit and Cylinder features may have functioned specifically in the realm of food processing or storage.

Patterns of difference are evident in the composition of wood charcoal types across the sampled features (Figure 07). Hickory is the most ubiquitous wood taxa identified across all feature types sampled, with oaks being a common constituent. The Pit feature class offers the greatest diversity of wood charcoal types. The wood assemblages documented from the FCR and AIA features are similar, suggesting that distinctive processes of fuel selection may have influenced the development of these features.

The presence of modern, non-carbonized seeds within flotation samples can help us to understand post-depositional processes influencing archaeological deposits. Figure 08 illustrates the percent presence of non-carbonized seeds within features of different types. The results show a ubiquity of modern seeds within the Tree Thrown, Basin and AIA feature types (modern seeds were present in 100% of the samples analyzed from these feature types). The presence of high levels of modern seeds signals the subterranean movement of small artifacts within these features.

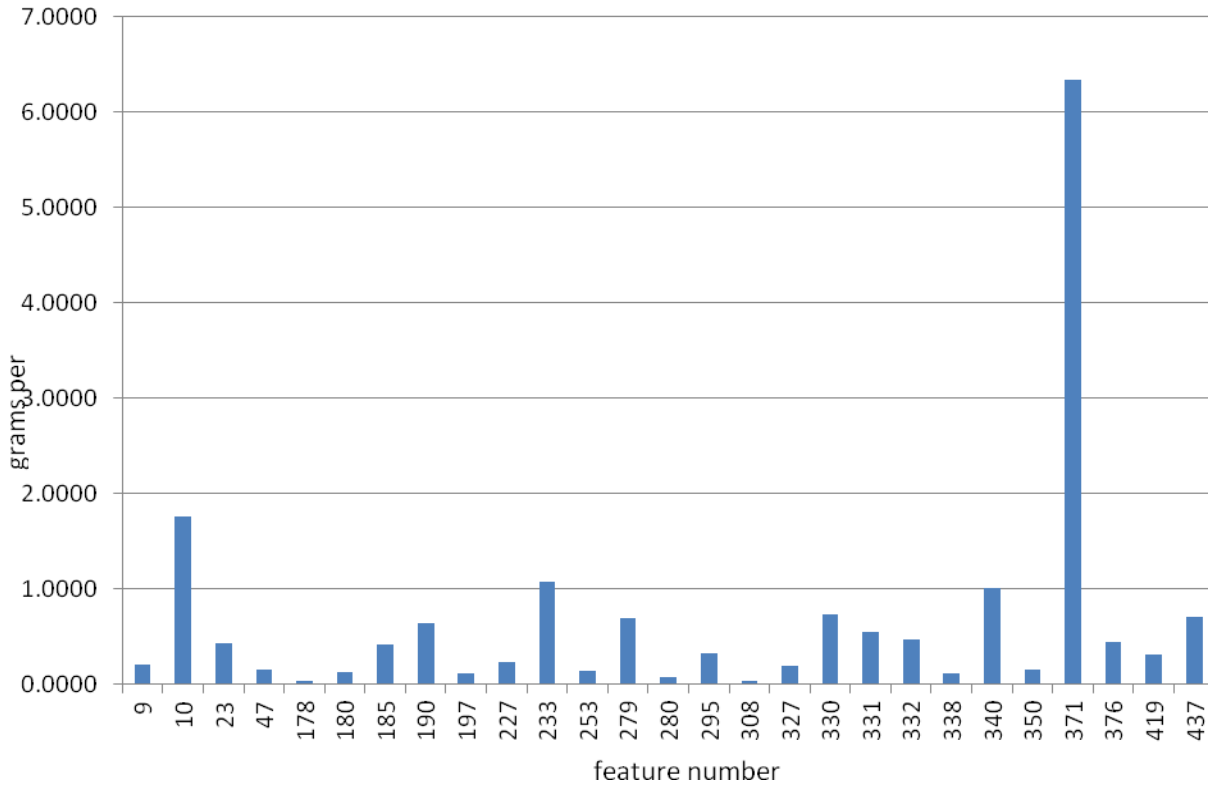

Figure 05: Comparison of charcoal density by individual feature.

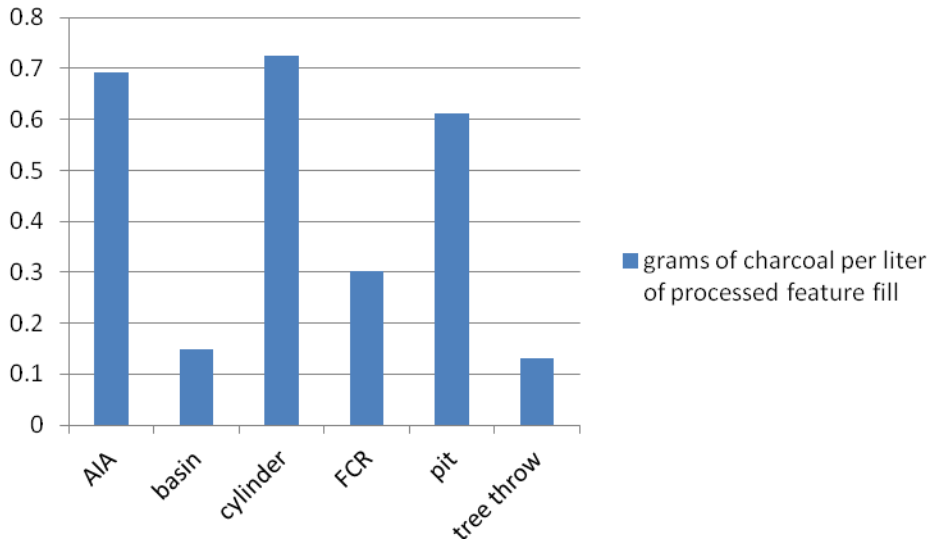

Figure 06: Comparison of charcoal densities by feature type.

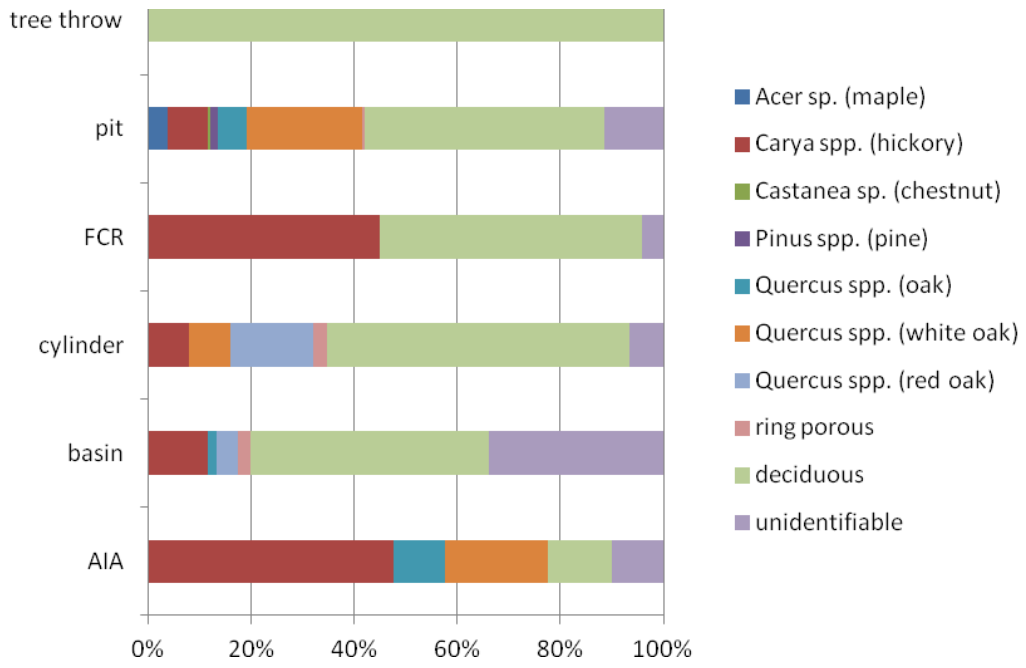

Figure 07: Composition of wood taxa by feature type.

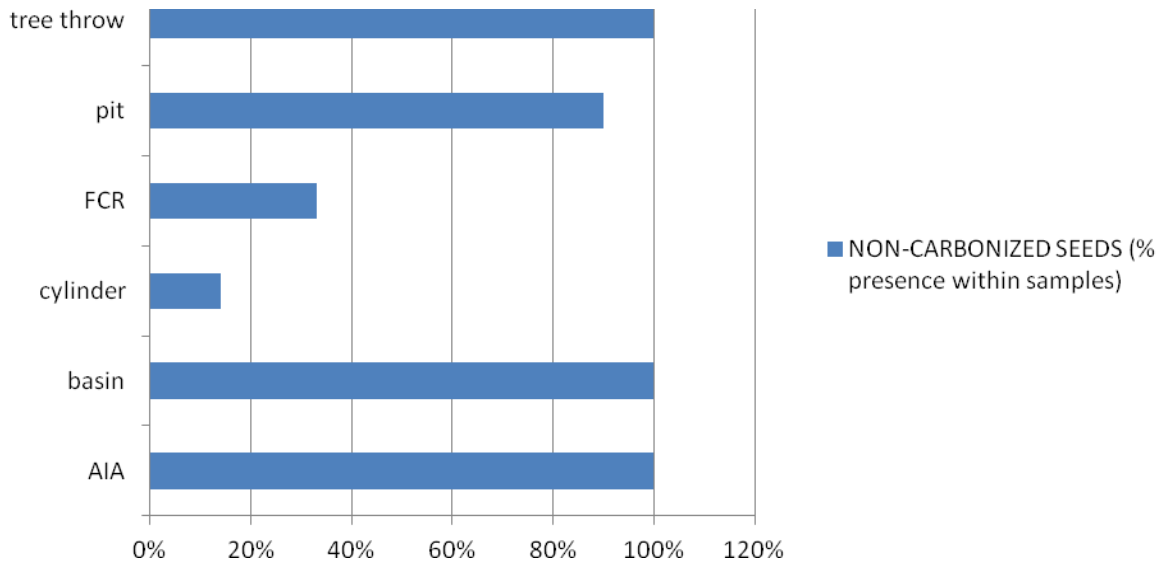

Figure 08: Percentage presence of non-carbonized seeds in features.

Cultural occupations sampled for archeobotanical remains at the Gray Farm Site span the Woodland I and Woodland II periods (Appendix Table 04). Twenty three of the sampled features were classifiable to cultural period based on the presence of diagnostic artifacts and radiocarbon dates. The temporal association of seven sampled features remains incompletely understood.

Woodland II features produced the greatest concentration of carbonized plant macro-remains (Figure 09), as well as the greatest density of nutshell remains based (Figure 10), suggesting an increased reliance on nut harvesting during the later period of occupation.

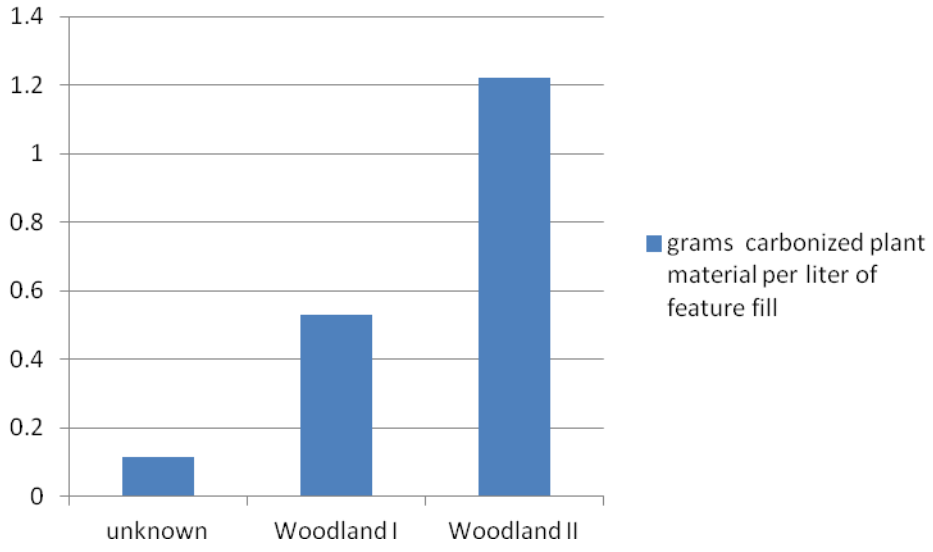

Figure 09: Density of carbonized plant remains by cultural period.

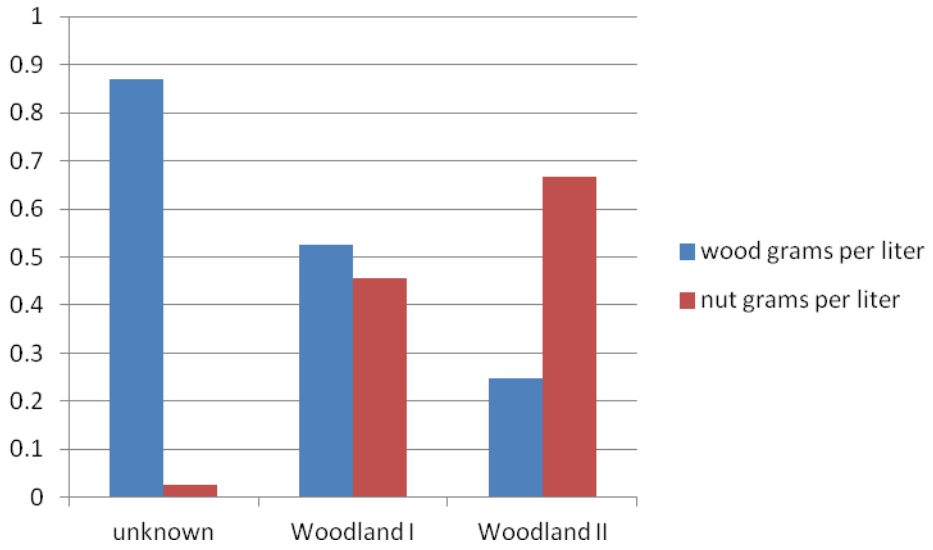

Figure 10: Comparison of wood and nut concentrations by cultural period.

Based on the floral data recovered from the Gray Farm Site and our understanding of Woodland I and II culture in Delaware (Custer 1994, 1989), we know that site residents undoubtedly used a wide spectrum of plants from the rich flora of the area for food, fuel, construction, tool manufacturing and medicine. The location of the Gray Farm Site would have permitted residents easily access to the productive potential of a variety of micro-environmental zones, including forested uplands, wooded bottom lands, tidal freshwater marshes, fertile flood plain areas as well as open water settings. Because the availability of various types of plant foods is strongly influenced by seasonal cycles, residents of the area would have maximized their dietary options by having direct access to this variety of vegetational zones throughout all seasons of the year, exploiting each in its turn. Surplus harvests, when available, would have been processed and stored for consumption during times of limited availability. The macro-botanical assemblage from Phase III data recovery at the Gray Farm Site fits with the regional picture of human-plant relationships during the Woodland I and Woodland II periods (Custer and Hodny 1989; Custer and Silber 1995; Custer, Watson and Silber, 1996; Custer, Riley and Mellin 1996; Kellog and Custer 1994; LeeDecker et al. 1996; LeeDecker et al 2005; Petraglia 2002).

Patterns of macro-botanical preservation across Delaware include a general scarcity of carbonized remains and evidence of considerable erosion and fragmentation attributed to coarse coastal plain sediments which permit the leaching and transport of organic remains. The presence of ubiquitous and abundant uncarbonized and non-Native seeds in the Gray Farm flotation samples is also consistent with the pattern observed at other Delaware sites, including Carey Farm, Leipsic, Pollack and Hickory Bluff (Custer, Watson and Silber 1996; Custer, Riley and Mellin 1996; Petraglia 2002; Affleck 1997).

SUMMARY

Archeobotanical remains recovered from 30 flotation samples retained from 28 cultural features document foodways and fuel use at a repeatedly utilized multi-component site in east central Delaware. A history of nut exploitation is evidenced in both the Woodland I and Woodland II

period features, with an increase in nut relative to wood within the Woodland II features. Exploitation of seasonally predictable nut crops and fleshy fruits for food, and the harvest of local forest environments for fuel materials describe human-plant interactions at the site. No evidence of plant husbandry is evidenced by the recovered plant macro-remains.

The archeobotanical data reveal evidence of a cultural reliance on the seasonally predictable products of the coastal plain forest. Hickory nuts are extremely well-represented at the site, suggesting a subsistence regime focused on nut harvest and processing. The distribution of plant remains across a wide variety of cultural features and feature types reveal patterns that contribute to understanding feature development and site activity areas. Importantly, the archeobotanical information from the Gray Farm Site contributes to the regional data set.

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APPENDIX
Inventories of Archeobotanical Remains

Gray Farm Site (7K-F-11)

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by AS#
Appendix Table 01

AS#	79	352	364	406	408	439	448	450	461	481	495	502
block			6	6	6							
trench							5	5	5	5		5
test unit	22	128		153/158								
level	2											
feature	**9**	**23**	**10**	**10**	**47**	**185**	**197**	**295**	**308**	**180**	**227**	**233**
portion			SE quad	E half	E half	S half	S half	N half	N half		N half	W half
feature description	basin	pit	cylinder	cylinder	FCR	pit	basin	AIA	basin	tree	FCR	AIA
strat	1	1	2	9	1	1	1	1	1	1	1	2
level	1	4	2	15	1	2	1	2	1	1	2	4
soil sample volume (liters)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1	1.5	1.5
weight analyzed carbonized plant remains (grams)	0.3	0.64	5.175	0.105	0.23	0.63	0.17	0.48	0.04	0.13	0.34	1.6
WOOD CHARCOAL (carbonized) (no of fragments)	52	7	145	12	24	56	46	84	10	12	61	197
total weight (grams)	0.3	0.06	1.18	0.06	0.18	0.63	0.13	0.45	0.04	0.11	0.29	1.56
Acer sp. (maple)						6						
Carya spp. (hickory)	3				1	4		7	3		11	12
Castanea sp. (chestnut)						1						
Pinus spp. (pine)												
Quercus spp. (oak)									2			4
Quercus spp. (white oak)						4		8			4	
Quercus spp. (red oak)	5		12									
ring porous							2					
deciduous	12	7	3	12	17	5		5	5	12	5	
unidentifiable			5		2		18					4
total identified fragments	20	7	20	12	20	20	20	20	10	12	20	20
NUTS (carbonized) (n of fragments)	0	32	60	6	0	0	0	3	0	2	4	2
weight (grams)	0	0.58	3.53	0.04	0	0	0	0.02	0	0.02	0.05	0.04
Carya spp. (thick-walled hickory)		32	60	6				3		2	4	2
SEEDS (carbonized) (n of specimens)	0	0	1	0	0	0	0	0	0	0	0	0
total weight (grams)	0	0	0.005	0	0	0	0	0	0	0	0	0
Rubus spp. (raspberry or blackberry) seed												
Vitis sp. (grape)												
possible POACEAE (grass) seed												
unidentifiable large seed fragment			1									
unidentifiable, ovoid												
unidentifiable												
MISC PLANT REMAINS (carbonized) (n of fragments)	0	0	54	1	2	0	2	3	0	0	0	0
total weight (grams)	0	0	0.46	0.005	0.05	0	0.04	0.01	0	0	0	0
monocot stem fragment			6									
gall			1									
fungal fructification				1								
amorphous carbon			47		2		2	3				
unknown fragments												
NON-CARBONIZED SEEDS (presence)	x	x				x	x	x	x	x	x	x
Acalypha sp. (copperleaves)												
Amaranthus sp. (pigweed)						x				x		
Mollugo verticillata (carpetweed)	x	x				x	x	x	x	x	x	x
Phytolacca americana (poke)										x		
Polygonum/Rumex (knotweed/dock)												
Rhus sp. (sumac)												
Rubus sp. (blackberry/raspberry)						x						
Stellaria media (chickweed)	x					x	x	x		x		
Taraxacum sp. (dandelion)												
Trifolium sp. (clover)												
POACEAE (grass family)												x
SOLANACEAE (nightshade family)										x		
unknown												

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by AS#
Appendix Table 01

AS#	524	525	573	663	677	683	700	702	737	763
block										
trench		5	5	5		4		4	5	5
test unit										
level										
feature	**371**	**279**	**190**	**253**	**327**	**178**	**350**	**178**	**280**	**332**
portion	S half		E half bisect	E half		SW half	N half		S half	W half bisect
feature description	pit	pit	FCR	basin	basin	cylinder	pit	cylinder	basin	pit
strat	1	1	1	1	1	3	1	8	1	1
level	8	5	1	1	2	2	14	7	1	1
soil sample volume (liters)	0.24	1.5	1	1.5	1	1.5	1.5	1.5	1.5	1
weight analyzed carbonized plant remains (grams)	1.52	1.04	0.64	0.21	0.185	0.095	0.23	0.01	0.1	0.46
WOOD CHARCOAL (carbonized) (no of fragments)	190	59	72	19	20	11	64	0	12	69
total weight (grams)	1.33	0.41	0.6	0.12	0.14	0.09	0.21	0	0.08	0.34
Acer sp. (maple)										
Carya spp. (hickory)		4	10		1	4	3		2	
Castanea sp. (chestnut)										
Pinus spp. (pine)										
Quercus spp. (oak)		9								
Quercus spp. (white oak)	15					3				3
Quercus spp. (red oak)			7							
ring porous	1					2			1	
deciduous	4	7	3		19	2	8		5	17
unidentifiable				19			9		4	
total identified fragments	20	20	20	19	20	11	20	0	12	20
NUTS (carbonized) (n of fragments)	18	25	0	5	1	0	0	0	3	9
weight (grams)	0.19	0.63	0	0.09	0.01	0	0	0	0.02	0.1
Carya spp. (thick-walled hickory)	18	25		5	1				3	9
SEEDS (carbonized) (n of specimens)	0	0	0	0	1	1	0	0	0	0
total weight (grams)	0	0	0	0	0.005	0.005	0	0	0	0
Rubus spp. (raspberry or blackberry) seed										
Vitis sp. (grape)										
possible POACEAE (grass) seed					1					
unidentifiable large seed fragment										
unidentifiable, ovoid						1				
unidentifiable										
MISC PLANT REMAINS (carbonized) (n of fragments)	0	0	10	0	7	0	2	3	0	3
total weight (grams)	0	0	0.04	0	0.03	0	0.02	0.01	0	0.02
monocot stem fragment										
gall										
fungal fructification										3
amorphous carbon			10		7		2			
unknown fragments								3		
NON-CARBONIZED SEEDS (presence)		x		x	x	x	x	x	x	x
Acalypha sp. (copperleaves)		x								
Amaranthus sp. (pigweed)		x			x					x
Mollugo verticillata (carpetweed)		x		x	x	x	x		x	x
Phytolacca americana (poke)										
Polygonum/Rumex (knotweed/dock)				x						
Rhus sp. (sumac)										
Rubus sp. (blackberry/raspberry)										
Stellaria media (chickweed)				x			x		x	x
Taraxacum sp. (dandelion)					x					
Trifolium sp. (clover)										
POACEAE (grass family)										
SOLANACEAE (nightshade family)								x		
unknown						x				

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by AS#
Appendix Table 01

AS#	764	769	790	868	903	929	930	940	total
block									30 samples
trench	5	5	5	5		5	5	5	
test unit									
level									
feature	**331**	**195**	**340**	**338**	**330**	**376**	**419**	**437**	
portion	W half bisect	S half	S half	W half	N half			W half	
feature description	pit	basin	pit	pit	cylinder	cylinder	cylinder	pit	
strat	1	1	1	1	1	1	1	1	
level	1	1	1	3	3	5	4	4	
soil sample volume (liters)	1	unk	1.5	1.5	1	1.5	1.5	1.5	39.24
weight analyzed carbonized plant remains (grams)	0.54	0.25	1.51	0.175	0.73	0.665	0.46	1.05	19.71
WOOD CHARCOAL (carbonized) (no of fragments)	28	29	13	14	14	10	8	3	1341
total weight (grams)	0.24	0.24	0.12	0.1	0.09	0.02	0.07	0.03	9.22
Acer sp. (maple)									6
Carya spp. (hickory)		5	1		2				73
Castanea sp. (chestnut)									1
Pinus spp. (pine)				2					2
Quercus spp. (oak)									15
Quercus spp. (white oak)	12				2		1	1	53
Quercus spp. (red oak)									24
ring porous									6
deciduous	4	15	12	7	10	10	7	2	215
unidentifiable	4			5					70
total identified fragments	20	20	13	14	14	10	8	3	465
NUTS (carbonized) (n of fragments)	26	3	108	6	66	44	32	85	540
weight (grams)	0.3	0.01	1.38	0.07	0.6	0.6	0.36	1.02	9.66
Carya spp. (thick-walled hickory)	26	3	108	6	66	44	32	85	540
SEEDS (carbonized) (n of specimens)	0	0	1	2	0	1	0	0	7
total weight (grams)	0	0	0.01	0.005	0	0.005	0	0	0.035
Rubus spp. (raspberry or blackberry) seed						1			1
Vitis sp. (grape)			1						1
possible POACEAE (grass) seed									1
unidentifiable large seed fragment									1
unidentifiable, ovoid									1
unidentifiable				2					2
MISC PLANT REMAINS (carbonized) (n of fragments)	0	0	0	0	6	3	6	0	102
total weight (grams)	0	0	0	0	0.04	0.04	0.03	0	0.795
monocot stem fragment							3		9
gall									1
fungal fructification									4
amorphous carbon					6	3	3		85
unknown fragments									3
NON-CARBONIZED SEEDS (presence)	x	x	x	x				x	73%
Acalypha sp. (copperleaves)									3%
Amaranthus sp. (pigweed)								x	20%
Mollugo verticillata (carpetweed)	x	x	x					x	67%
Phytolacca americana (poke)									3%
Polygonum/Rumex (knotweed/dock)									3%
Rhus sp. (sumac)									0%
Rubus sp. (blackberry/raspberry)									3%
Stellaria media (chickweed)	x		x					x	40%
Taraxacum sp. (dandelion)									3%
Trifolium sp. (clover)				x					3%
POACEAE (grass family)									3%
SOLANACEAE (nightshade family)				x					10%
unknown									3%

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by Feature Number
Appendix Table 02

feature	**9**	**10**	**23**	**47**	**178**	**180**	**185**
feature description	basin	cylinder	pit	FCR	cylinder	tree	pit
number of samples	1	2	1	1	2	1	1
AS#'s	79	364, 406	352	408	683, 702	481	439
soil sample volume (liters)	1.5	3	1.5	1.5	3	1	1.5
weight analyzed carbonized plant remains (grams)	0.3	5.28	0.64	0.23	0.105	0.13	0.63
WOOD CHARCOAL (carbonized) (no of fragments)	52	157	7	24	11	12	56
total weight (grams)	0.3	1.24	0.06	0.18	0.09	0.11	0.63
Acer sp. (maple)							6
Carya spp. (hickory)	3			1	4		4
Castanea sp. (chestnut)							1
Pinus spp. (pine)							
Quercus spp. (oak)							
Quercus spp. (white oak)					3		4
Quercus spp. (red oak)	5	12					
ring porous					2		
deciduous	12	15	7	17	2	12	5
unidentifiable		5		2			
total identified fragments	20	32	7	20	11	12	20
NUTS (carbonized) (n of fragments)	0	66	32	0	0	2	0
weight (grams)	0	3.57	0.58	0	0	0.02	0
Carya spp. (thick-walled hickory)		66	32			2	
SEEDS (carbonized) (n of specimens)	0	1	0	0	1	0	0
total weight (grams)	0	0.005	0	0	0.005	0	0
Rubus spp. (raspberry or blackberry) seed							
Vitis sp. (grape)							
possible POACEAE (grass) seed							
unidentifiable large seed fragment		1					
unidentifiable, ovoid					1		
unidentifiable							
MISC PLANT REMAINS (carbonized) (n of fragments)	0	55	0	2	3	0	0
total weight (grams)	0	0.465	0	0.05	0.01	0	0
monocot stem fragment		6					
gall		1					
fungal fructification		1					
amorphous carbon		47		2			
unknown fragments		0			3		
NON-CARBONIZED SEEDS (presence)	x		x		x	x	x

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by Feature Number
Appendix Table 02

feature	**190**	**195**	**197**	**227**	**233**	**253**	**279**	**280**
feature description	FCR	basin	basin	FCR	AIA	basin	pit	basin
number of samples	1	1	1	1	1	1	1	1
AS#'s	573	769	448	495	502	663	525	737
soil sample volume (liters)	1	unk	1.5	1.5	1.5	1.5	1.5	1.5
weight analyzed carbonized plant remains (grams)	0.64	0.25	0.17	0.34	1.6	0.21	1.04	0.1
WOOD CHARCOAL (carbonized) (no of fragments)	72	29	46	61	197	19	59	12
total weight (grams)	0.6	0.24	0.13	0.29	1.56	0.12	0.41	0.08
Acer sp. (maple)								
Carya spp. (hickory)	10	5		11	12		4	2
Castanea sp. (chestnut)								
Pinus spp. (pine)								
Quercus spp. (oak)					4		9	
Quercus spp. (white oak)				4				
Quercus spp. (red oak)	7							
ring porous			2					1
deciduous	3	15		5			7	5
unidentifiable			18		4	19		4
total identified fragments	20	20	20	20	20	19	20	12
NUTS (carbonized) (n of fragments)	0	3	0	4	2	5	25	3
weight (grams)	0	0.01	0	0.05	0.04	0.09	0.63	0.02
Carya spp. (thick-walled hickory)		3		4	2	5	25	3
SEEDS (carbonized) (n of specimens)	0	0	0	0	0	0	0	0
total weight (grams)	0	0	0	0	0	0	0	0
Rubus spp. (raspberry or blackberry) seed								
Vitis sp. (grape)								
possible POACEAE (grass) seed								
unidentifiable large seed fragment								
unidentifiable, ovoid								
unidentifiable								
MISC PLANT REMAINS (carbonized) (n of fragments)	10	0	2	0	0	0	0	0
total weight (grams)	0.04	0	0.04	0	0	0	0	0
monocot stem fragment								
gall								
fungal fructification								
amorphous carbon	10		2					
unknown fragments								
NON-CARBONIZED SEEDS (presence)		x	x	x	x	x	x	x

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by Feature Number
Appendix Table 02

feature	**295**	**308**	**327**	**330**	**331**	**332**	**338**	**340**
feature description	AIA	basin	basin	cylinder	pit	pit	pit	pit
number of samples	1	1	1	1	1	1	1	1
AS#'s	450	461	677	903	764	763	868	790
soil sample volume (liters)	1.5	1.5	1	1	1	1	1.5	1.5
weight analyzed carbonized plant remains (grams)	0.48	0.04	0.185	0.73	0.54	0.46	0.175	1.51
WOOD CHARCOAL (carbonized) (no of fragments)	84	10	20	14	28	69	14	13
total weight (grams)	0.45	0.04	0.14	0.09	0.24	0.34	0.1	0.12
Acer sp. (maple)								
Carya spp. (hickory)	7	3	1	2				1
Castanea sp. (chestnut)								
Pinus spp. (pine)							2	
Quercus spp. (oak)		2						
Quercus spp. (white oak)	8			2	12	3		
Quercus spp. (red oak)								
ring porous								
deciduous	5	5	19	10	4	17	7	12
unidentifiable					4		5	
total identified fragments	20	10	20	14	20	20	14	13
NUTS (carbonized) (n of fragments)	3	0	1	66	26	9	6	108
weight (grams)	0.02	0	0.01	0.6	0.3	0.1	0.07	1.38
Carya spp. (thick-walled hickory)	3		1	66	26	9	6	108
SEEDS (carbonized) (n of specimens)	0	0	1	0	0	0	2	1
total weight (grams)	0	0	0.005	0	0	0	0.005	0.01
Rubus spp. (raspberry or blackberry) seed								
Vitis sp. (grape)								1
possible POACEAE (grass) seed			1					
unidentifiable large seed fragment								
unidentifiable, ovoid								
unidentifiable							2	
MISC PLANT REMAINS (carbonized) (n of fragments)	3	0	7	6	0	3	0	0
total weight (grams)	0.01	0	0.03	0.04	0	0.02	0	0
monocot stem fragment								
gall								
fungal fructification						3		
amorphous carbon	3		7	6				
unknown fragments								
NON-CARBONIZED SEEDS (presence)	x	x	x		x	x	x	x

Gray Farm Site 7K-F-11
Inventory of Flotation-recovered Plant Remains by Feature Number
Appendix Table 02

feature	**350**	**371**	**376**	**419**	**437**	**total**
feature description	pit	pit	cylinder	cylinder	pit	28 features
number of samples	1	1	1	1	1	
AS#'s	700	524	929	930	940	
soil sample volume (liters)	1.5	0.24	1.5	1.5	1.5	39.24
weight analyzed carbonized plant remains (grams)	0.23	1.52	0.665	0.46	1.05	19.71
WOOD CHARCOAL (carbonized) (no of fragments)	64	190	10	8	3	1341
total weight (grams)	0.21	1.33	0.02	0.07	0.03	9.22
Acer sp. (maple)						6
Carya spp. (hickory)	3					73
Castanea sp. (chestnut)						1
Pinus spp. (pine)						2
Quercus spp. (oak)						15
Quercus spp. (white oak)		15		1	1	53
Quercus spp. (red oak)						24
ring porous		1				6
deciduous	8	4	10	7	2	215
unidentifiable	9					70
total identified fragments	20	20	10	8	3	465
NUTS (carbonized) (n of fragments)	0	18	44	32	85	540
weight (grams)	0	0.19	0.6	0.36	1.02	9.66
Carya spp. (thick-walled hickory)		18	44	32	85	540
SEEDS (carbonized) (n of specimens)	0	0	1	0	0	7
total weight (grams)	0	0	0.005	0	0	0.035
Rubus spp. (raspberry or blackberry) seed			1			1
Vitis sp. (grape)						1
possible POACEAE (grass) seed						1
unidentifiable large seed fragment						1
unidentifiable, ovoid						1
unidentifiable						2
MISC PLANT REMAINS (carbonized) (n of fragments)	2	0	3	6	0	102
total weight (grams)	0.02	0	0.04	0.03	0	0.795
monocot stem fragment				3		9
gall						1
fungal fructification						4
amorphous carbon	2		3	3		85
unknown fragments						3
NON-CARBONIZED SEEDS (presence)	x				x	73%

Gray Farm Site (7K-F-11)
Inventory of Flotation-recovered Plant Remains by Feature Type
Appendix Table 03

feature type	**AIA**	**basin**	**cylinder**	**FCR**	**pit**	**tree throw**	**28 features**
number of samples	2	7	7	3	10	1	
feature	**233, 295**	**9, 195, 197, 253, 280, 308, 327**	**10, 178, 330, 376, 419**	**47, 190, 227**	**23, 185, 279, 331, 332, 338, 340, 350, 371, 437**	**180**	**total**
AS numbers	450, 502	79, 679, 448, 663, 737, 461, 677	364, 406, 683, 702, 903, 929, 930	408,573, 495	352, 439, 525, 764, 763, 868, 790, 700, 524, 940	481	
soil sample volume (liters)	3	8.5	10	4	12.74	1	39.24
weight analyzed carbonized plant remains (grams)	2.08	1.255	7.24	1.21	7.795	0.13	19.71
		0	0		0		
WOOD CHARCOAL (carbonized) (no of fragments)	281	188	200	157	503	12	1341
total weight (grams)	2.01	1.05	1.51	1.07	3.47	0.11	9.22
Acer sp. (maple)	0	0	0	0	6		6
Carya spp. (hickory)	19	14	6	22	12		73
Castanea sp. (chestnut)	0	0	0	0	1		1
Pinus spp. (pine)	0	0	0	0	2		2
Quercus spp. (oak)	4	2	0	0	9		15
Quercus spp. (white oak)	8	0	6	4	35		53
Quercus spp. (red oak)	0	5	12	7	0		24
ring porous	0	3	2	0	1		6
deciduous	5	56	44	25	73	12	215
unidentifiable	4	41	5	2	18		70
total identified fragments	40	121	75	60	157	12	465
	0	0	0	0	0		
NUTS (carbonized) (n of fragments)	5	12	208	4	309	2	540
weight (grams)	0.06	0.13	5.13	0.05	4.27	0.02	9.66
Carya spp. (thick-walled hickory)	5	12	208	4	309	2	540
	0	0	0	0	0		
SEEDS (carbonized) (n of specimens)	0	1	3	0	3	0	7
total weight (grams)	0	0.005	0.015	0	0.015	0	0.035
Rubus spp. (raspberry or blackberry) seed	0	0	1	0	0		1
Vitis sp. (grape)	0	0	0	0	1		1
possible POACEAE (grass) seed	0	1	0	0	0		1
unidentifiable large seed fragment	0	0	1	0	0		1
unidentifiable, ovoid	0	0	1	0	0		1
unidentifiable	0	0	0	0	2		2
	0	0	0	0	0		
MISC PLANT REMAINS (carbonized) (n of fragments)	3	9	73	12	5	0	102
total weight (grams)	0.01	0.07	0.585	0.09	0.04	0	0.795
monocot stem fragment	0	0	9	0	0		9
gall	0	0	1	0	0		1
fungal fructification	0	0	1	0	3		4
amorphous carbon	3	9	59	12	2		85
unknown fragments	0	0	3	0	0		3
NON-CARBONIZED SEEDS (presence)	100%	100%	14%	33%	90%	100%	73%

Gray Farm Site (7K-F-11)
Inventory of Flotaiton-recovered Plant Remains by Temporal Association
Appendix Table 04

cultural period	unknown	Woodland I	Woodland II	total
number of samples	7 samples	20 samples	3 samples	30 samples
AS numbers	79, 408, 683, 702, 737, 677, 700	352, 481, 439, 573, 769, 448, 495, 502, 525, 450, 461, 903, 764, 763, 868, 790, 524, 929, 930, 940	364, 406, 663	
feature numbers	**9, 47, 178, 280, 327, 350**	**23, 180, 185, 190, 195, 197, 227, 233, 279, 295, 308, 330, 331, 332, 338, 340, 371, 376, 419, 437**	**10, 253**	
soil sample volume (liters)	10	24.74	4.5	39.24
weight analyzed carbonized plant remains (grams)	1.15	13.07	5.49	19.71
WOOD CHARCOAL (carbonized) (no of fragments)	183	982	176	1341
total weight (grams)	1	6.86	1.36	9.22
Acer sp. (maple)	0	6	0	6
Carya spp. (hickory)	14	59	0	73
Castanea sp. (chestnut)	0	1	0	1
Pinus spp. (pine)	0	2	0	2
Quercus sp. (oak)	0	15	0	15
Quercus spp. (white oak)	3	50	0	53
Quercus spp. (red oak)	5	7	12	24
ring porous	3	3	0	6
deciduous	63	137	15	215
unidentifiable	15	31	24	70
total identified fragments	103	311	51	465
NUTS (carbonized) (n of fragments)	4	465	71	540
weight (grams)	0.03	5.97	3.66	9.66
Carya spp. (thick-walled hickory)	4	465	71	540
SEEDS (carbonized) (n of specimens)	2	4	1	7
total weight (grams)	0.01	0.02	0.005	0.035
Rubus spp. (raspberry or blackberry) seed)	0	1	0	1
Vitis sp. (grape)	0	1	0	1
possible POACEAE (grass) seed	1	0	0	1
unidentifiable large seed fragment	0	0	1	1
unidentifiable, ovoid	1	0	0	1
unidentifiable	0	2	0	2
MISC PLANT REMAINS (carbonized) (n of fragments)	14	33	55	102
total weight (grams)	0.11	0.22	0.465	0.795
monocot stem fragment	0	3	6	9
gall	0	0	1	1
fungal fructificaion	0	3	1	4
amorphous carbon	11	27	47	85
unknown fragments	3	0	0	3
NON-CARBONIZED SEEDS (presence)	86%	75%	33%	73%