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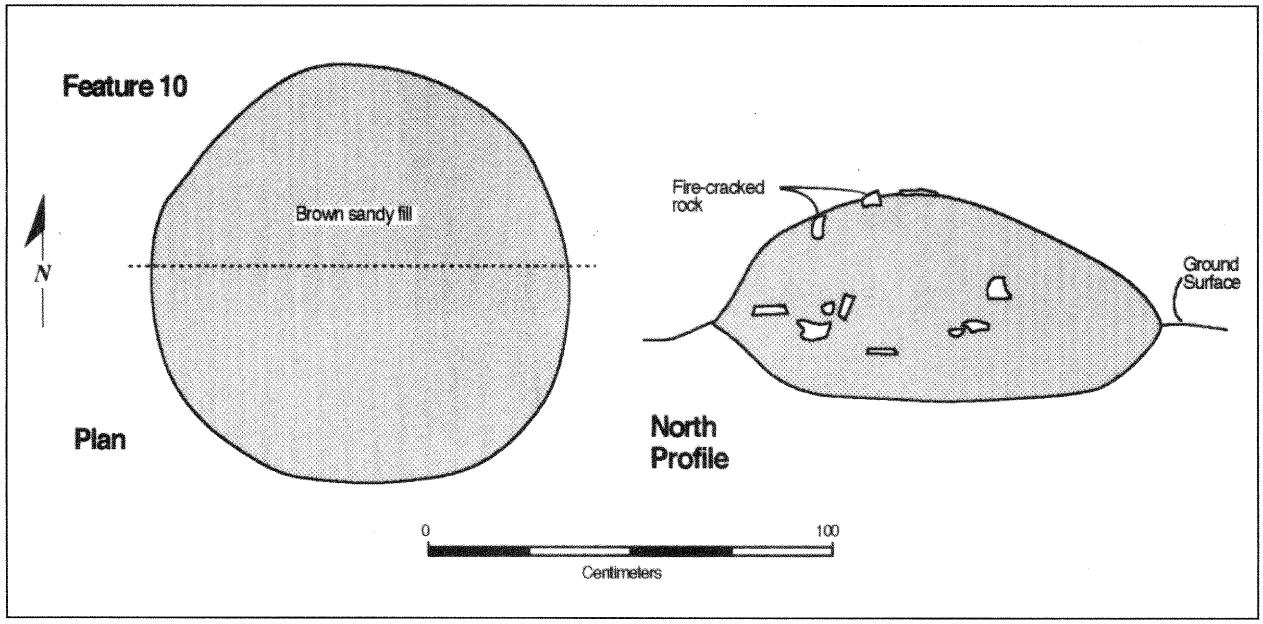
EARLY HORTICULTURAL SETTLEMENT IN THE JAMES RIVER PIEDMONT:

Excavations at The Partridge Creek Site (44AH193), Stapleton, Virginia



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Virginia Department of Historic Resources
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Author:
Martin Gallivan
Department of Anthropology
College of William and Mary
Williamsburg, Virginia 23187-8795

with a contribution by:
Justine Woodard McKnight

2003

ABSTRACT

The Partridge Creek site (44AH193) represents the remains of Late Woodland occupations on the James River floodplain in the western Piedmont. Overbank flooding of the James River in 1985 scoured the site's surface, exposing 48 pit features that were systematically excavated under Perry Tourtellotte's (1990) direction. Temporal patterns in ceramic style, lithic tool use, and feature construction became apparent with the benefit of an occupational chronology for the site based on eight radiocarbon-dated features and an application of Michael Klein's (1994) absolute seriation method. Justine McKnight's paleobotanical study of Partridge Creek site material (Appendix) identified domesticates in a substantial percentage of the analyzed features. Maize, bean, and squash were identified within a feature which returned a radiocarbon date of 980 +/- 50 bp (uncalibrated), the earliest dated context containing these three domesticates in the region. The site generally reflects the dynamic nature of Piedmont floodplain settlement subsequent to the adoption of maize-based horticulture and prior to the appearance of large village communities in the region.

ACKNOWLEDGMENTS

Funding for the analysis of the Partridge Creek site was provided by the Virginia Department of Historic Resources' Threatened Sites Fund. There would be no archaeology of the Partridge Creek site without the quick response and extraordinary efforts of several individuals who salvaged the data set from destruction. Thomas Mackie initially recognized the research potential of the site and called it to the attention of professional archaeologists. Careful excavation and recording of the Partridge Creek site were directed by Perry Tourtellotte. Fieldwork at the site was also conducted by Claudia Chang, Michael Barber, Archeological Society of Virginia volunteers, and Sweet Briar College students. I thank Justine McKnight for her thorough analysis of the paleobotanical material from the Partridge Creek site. Her results are some of the most significant to emerge from the Partridge Creek site analysis. I also thank Thomas Klatka of the Department of Historic Resources who orchestrated the flotation of feature soil from the site and Michael Barber for his faunal analysis of Partridge Creek site material. Michael Klein's meticulous efforts to develop tools for chronology construction provide the foundation for the analysis that follows. Jeff Hantman helped me to understand the importance of the Partridge Creek site as a critical part of Late Woodland culture history in the region. I owe a special debt to Keith Egloff of the Department of Historic Resources who went to great lengths to facilitate my study of the Partridge Creek site material, initially for my dissertation research and later for this report. Keith also photographed the artifacts for this publication. Finally, I appreciate the comments and suggestions regarding a draft of this report provided by Randolph Turner and David Hazzard of the Department of Historic Resources.

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1 Introduction

In 1985, high magnitude overbank flooding of the James River scoured a 3,500 square meter portion of the floodplain downstream of the confluence of Partridge Creek and the James River. The flooding not only stripped plow zone soils from the area to uncover the previously unrecorded Partridge Creek site (44AH193), but also removed subsoil surrounding many of the pit features present at the site. This process created a bizarre landscape of cylindrical, tree stump-like features, several of which protruded 20 - 40 centimeters above the scoured ground surface (Figure 1). As outlined in Perry Tourtellotte's (1990) report, salvage excavations involving Archeological Society of Virginia volunteers, Virginia Research Center for Archaeology (VRCA) staff, and Sweet Briar College students identified the remains of 48 pit features and midden deposits.

Despite the destructive flooding of the site and the rather unorthodox means of its discovery, the Partridge Creek site produced a critical data set for understanding Late Woodland settlement on the Piedmont floodplain. Ushered in by the sporadic appearance of maize throughout the region, the Late Woodland (A.D. 900 - 1500) represents a period of rapid cultural transformation throughout the Chesapeake. Despite the recent intensification of archaeological analysis within the central Virginia Piedmont (e.g., Hantman 1990; Klein 1994; Dunham 1994; Gold 1998), important questions remain concerning the culture and history of the region that was home to the Monacans during the Contact period. The Partridge Creek site offers insights related to chronological changes in Piedmont material culture, settlement structure, and subsistence. The purpose of this report is to establish a site chronology and to summarize analyses of the artifacts, features, paleobotanical

Figure 1. Partridge Creek Site Following Flooding of the James River in 1985.

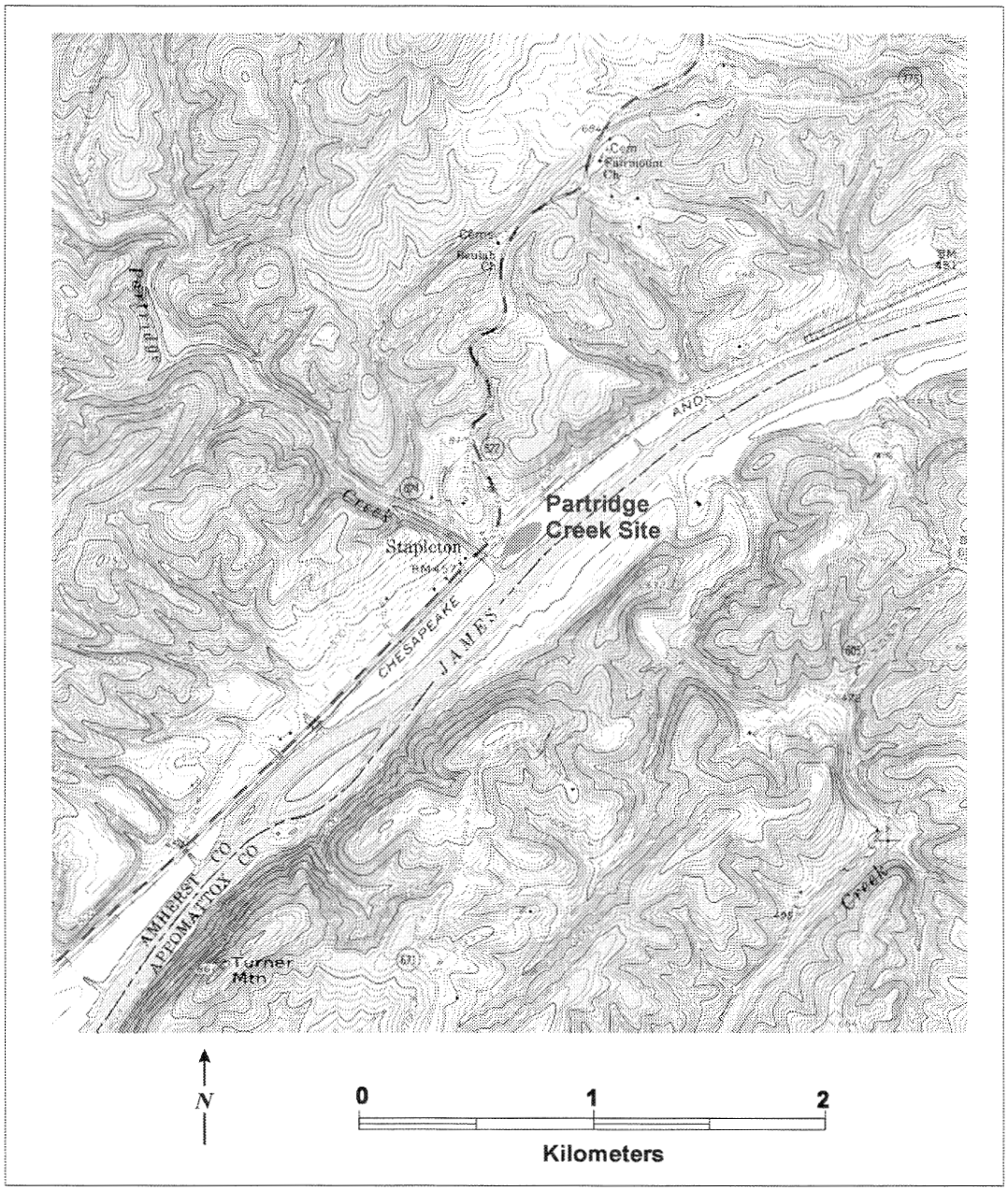

Figure 2. Partridge Creek Site Location

remains, and faunal materials.

Located near Stapleton, Virginia, the Partridge Creek site is in Amherst County along the James River floodplain immediately east of Partridge Creek's confluence with the James (Figure 2). The site is approximately 25 miles east of the Blue Ridge and 30 miles north of the Roanoke River. Features at the site were scattered along the south (river) side of a floodplain levee running northeast to southwest, parallel to the course of the James (Figure 3). More intense scouring of soils occurred on the north side of the levee, resulting in nearly 1 meter of soil removed from some areas (Tourtellotte 1990:1). To the south, 10 - 15 centimeters of soil were removed from the site surface.

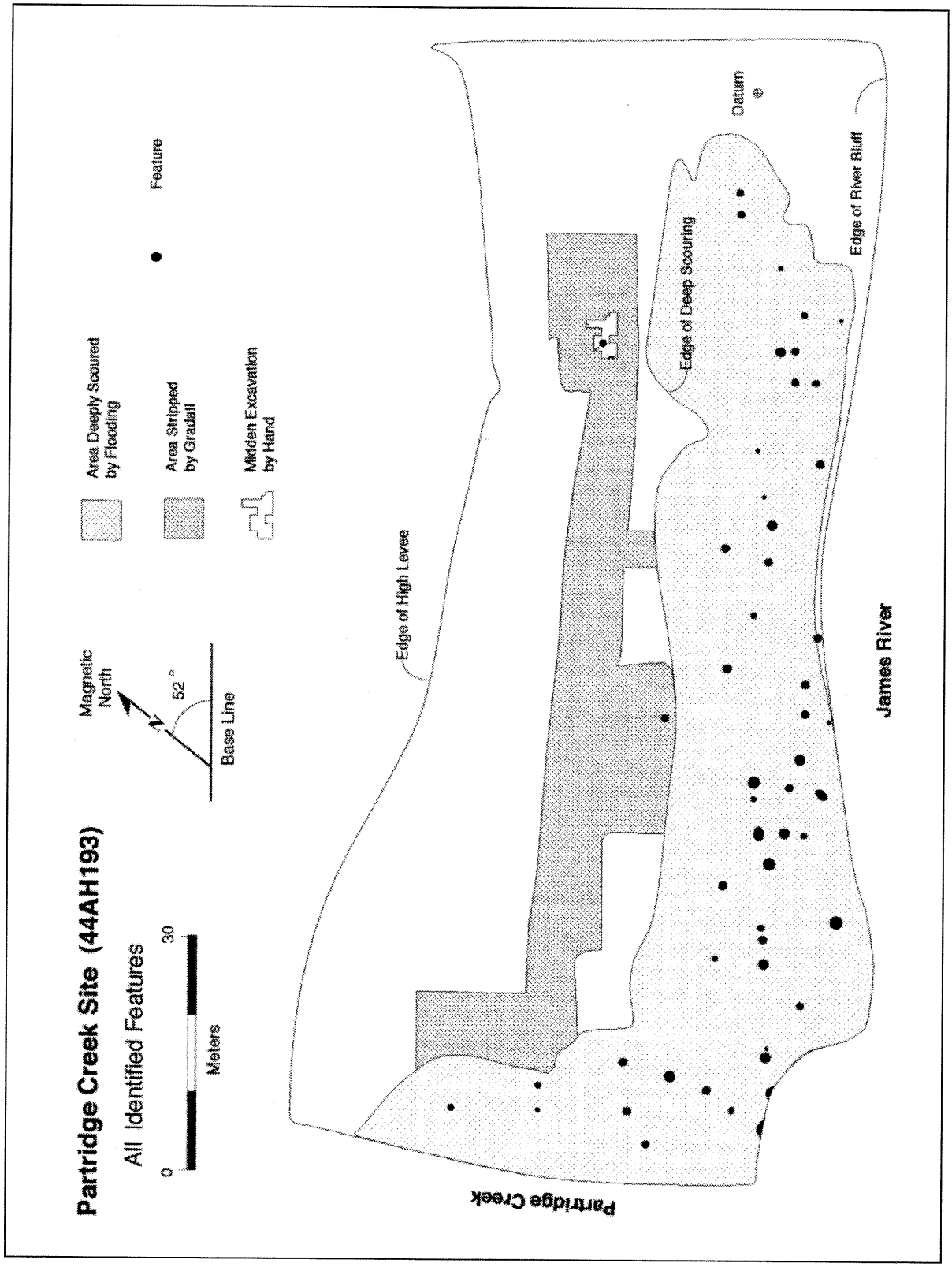

Figure 3. Partridge Creek Site Features.

For a month after its exposure, the Partridge Creek site was the subject of unrecorded pot hunting. After visiting the site, Amherst County Historian Thomas Mackie contacted Tourtellotte, a U.S. Forest Service archaeologist. Once aware of the site, Tourtellotte began systematic data recovery from the site by mapping its features with the help of Claudia Chang of Sweet Briar College, VRCA staff, and Michael Barber. Features eroding off the edge of the levee were salvaged for artifacts prior to winterizing the site (Figure 4). Subsequent excavations in the spring under the direction of Tourtellotte and Chang were conducted by Sweet Briar College students.

All of the identified features at the site were excavated during this fieldwork. As described by Tourtellotte (1990:3-7), excavation methods entailed bisecting features on an east-west axis with the south half excavated by trowel and screened through 1/4 inch hardware cloth. Photographs were taken and profile drawings were made of the bisected features. Most of the fill from the north half of the features was then water-screened through 1/8 inch mesh. Excavators also collected two liter soil samples from each feature that were used for soil flotation conducted by Tom Klatka of the Virginia Department of Historic Resources and analyzed by Justine McKnight (1999).

Tourtellotte interpreted the cultural deposits that were buried beneath the plow zone northwest of the area scoured by flooding as midden soils. It is unclear whether these deposits represent relatively intense, short-term trash deposition or the long-term accumulation of soil and artifacts that accompanies a stable floodplain environment. Given the occupation dates for the site, the latter alternative seems more likely. During the early centuries of the Late Woodland period, flood frequency and sedimentation rates declined in the James River Piedmont and the floodplain saw the intensive formation of organic- and artifact-rich deposits (Hayes and Monaghan 1998). As depicted in Figure 3, a gradall was used to strip remaining plowzone soils from an irregularly-shaped area northwest of the flood-scoured portion of the site, exposing one pit feature. Midden depths ranged from 15 to 30 centimeters, with scattered historic artifacts intruding into the top 5 - 10 cm. A small portion of the midden was also excavated by hand, Figure 4.

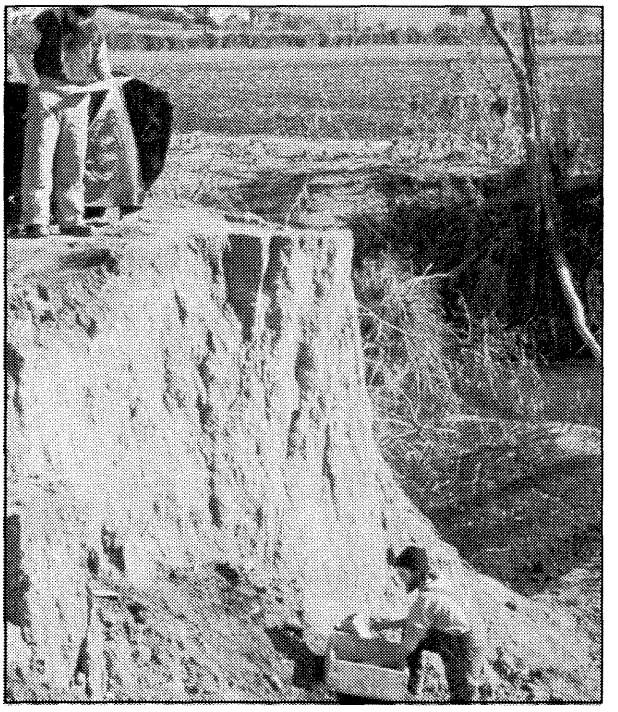

Figure 4.
Salvaging Materials Eroding from the Bluff.

uncovering five postmolds, two additional features, and large fragments of two ceramic vessels (Tourtellotte 1990:22). The paucity of features located in the midden portion of the site – a total of three features were identified in this area – suggests that settlement was concentrated on the river side of the floodplain levee.

Tourtellotte's (1990) analysis of the materials recovered from the Partridge Creek site entailed a categorization of artifacts into general classes (i.e., projectile points, flakes, rim sherds, body sherds). He also noted the recovery of carbonized evidence of beans, squash, and sunflower seeds in addition to hickory and walnut shell.

2 Occupation Chronology

Developing an occupation chronology for the Partridge Creek site required two related dating methods: radiocarbon assays and analysis of temporally-sensitive ceramic attributes. As listed in Table 1, the radiocarbon dates obtained from Partridge Creek site features span the early Late Woodland centuries. These radiocarbon date means and standard deviations were used to evaluate the potential coevalness of the radiocarbon assays from Partridge Creek. Due to the probabilistic nature of radiocarbon dating, statistical tests may be used to evaluate the contemporaneity of radiocarbon dates and to combine those dates which appear, on statistical and archaeological grounds, to be nearly contemporaneous. These probability tests determine whether radiocarbon dates from the same archaeological site appear to represent an "instant" in time or if differences between assays imply the likelihood of multiple occupations (Long and Rippeteau 1974:206; Thomas 1986:249).

When applied to the Partridge Creek site's radiocarbon dates, the statistical tests of radiocarbon assay contemporaneity described by Thomas (1986:206) and Long and Rippeteau (1974:249) indicate that the earliest radiocarbon date obtained from a feature (feature 10) differs statistically at the 0.05 significance level from the feature 37 date ($F = 5.45$, $t = 2.21$) and the feature39 date ($F = 18.00$, $t = 4.21$), the twdatest radiocarbon dates at the site. Not surprisingly, these results suggest that feature construction occurred over multiple occupations at Partridge Creek.

Other features at the Partridge Creek site were assigned a date using Michael Klein's (1994) "absolute" seriation approach to dating feature contexts in order to develop a more refined interpretation of the site's occupation history. Drawing on Braun's (1983) ceramic engineering model, Klein eschewed typological analysis of ceramics for an approach that would allow more precise dating of site components. Klein's seriation formulas are based on regression equations calculated from changes in quantifiable ceramic attributes. The ceramics included in his study were recovered from radiocarbon-dated features in the James, Potomac, and Roanoke river drainages. Klein determined that from A.D. 200 - 1600 in the southern Piedmont and Ridge and Valley region, which includes the James River Piedmont, sherd thickness decreased, temper size decreased, and the percentage of decorated or stamped pottery increased. Klein's seriation allows ceramic assemblages from sealed contexts to be assigned an absolute calendrical date with an error factor of approximately 200 years, making it an ideal tool for disentangling the Partridge Creek site's occupation chronology. Klein's formula for dating Piedmont assemblages is as follows: Date bp = $1065.0958 - 3862.2699\,X_1 + 214.5402\,X_2 - 63.3226\,X_3 + / - 188$. In this formula, X_1 is the reciprocal of mean sherd thickness, X_2 is the log mean size of quartz inclusions, and X_3 is the logit of the percentage of stamped plus decorated sherds. Table 2 reports the results of this analysis, listing the necessary attributes for calculating the formula. The Figure 5 histogram graphically depicts the results of the absolute seriation technique once applied to Partridge Creek site features.

Figure 5 suggests the possibility of a bimodal distribution of feature dates at the site with peaks centered near A.D. 1025 and A.D. 1225 (uncalibrated). Tests of radiocarbon assay contemporaneity indicate that the earliest and latest radiocarbon dates in the first hypothesized mode do not differ significantly at the 0.05 level ($F = 3.4$, $t = 1.74$), nor do the two radiocarbon assays from within the second (i.e., later) mode ($F = 0.33$, $t = 0.58$). The results of these tests and the Figure 5 histogram imply that occupations at the Partridge Creek site were concentrated within two distinct temporal intervals. It is unlikely that all of the materials recovered and features identified at the Partridge Creek site were deposited during two discrete settlement events. Yet the absolute dating of feature contexts provides a sound empirical basis for a division between earlier and later features at the Partridge Creek site rather than implying a continuous series of Late Woodland occupations.

Feature	Uncalibrated age (years bp)	Calibration (years AD) Lower limits 2σ	1σ	Calibration Curve Intercept(s)	Upper limits 1σ	2σ	Lab number	Adjusted for...
10	980 ± 50	983	1013	**1028**	1156	1180	Beta-16841	-
Midden	950 ± 70	978	1016	**1041, 1150**	1177	1250	Beta-16840	-
24	930 ± 75	983	1021	**1052, 1085, 1121, 1139, 1156**	1216	1277	Beta-16843	-
12	890 ± 80	1004	1032	**1168**	1247	1287	Beta-16842	-
22	870 ± 50	1126	1063	**1195**	1134	1279	Beta-54245	Fractionation effect
40	830 ± 70	1031	1165	**1225**	1280	1296	Beta-54247	Fractionation effect
37	790 ± 70	1051	1213	**1263**	1288	1373	Beta-54246	C13 / C12 ratio
39	680 ± 50	1268	1285	**1298**	1386	1401	Beta-16840	-

Table 1. Radiocarbon Dates.

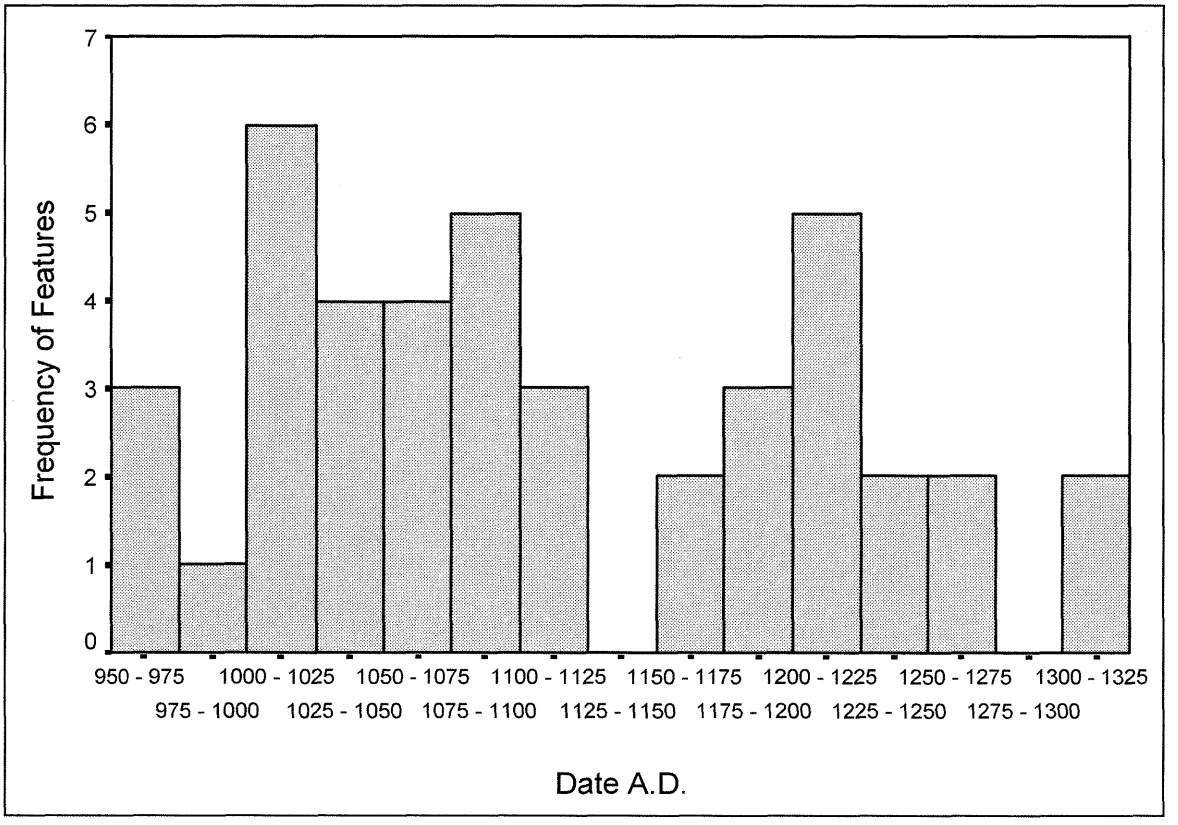

Figure 5. Uncalibrated Dates Obtained through Absolute Dating Methods.

Averaging the radiocarbon assays that fall under the early mode using Long and Rippeteau's (1974:206-210) method results in a mean date (uncalibrated) of A.D. 1025 +/- 27. The mean date (uncalibrated) for the later mode is A.D. 1233 +/- 41. Based on these results, features at the Partridge Creek site appear to be grouped into two settlement phases, the first dating to the early eleventh century A.D., the second to the early thirteenth century A.D.

My interpretation of the Partridge Creek

site as composed of features that fall into two distinct eras of the Late Woodland period provides a basis for a comparison of two phases of settlement within a single Piedmont location. This ability to keep floodplain location constant while comparing feature contexts from different eras is unusual in a region that has few stratified sites, making the Partridge Creek site particularly important for evaluating Late Woodland cultural patterns. Since the Klein absolute dating method applied to most of the features at the site has a fairly large error factor (+/- 188 years), some of the features may be dated incorrectly. Nonetheless, feature dates at the Partridge Creek site do appear to cluster around two different temporal phases, implying that the central tendencies of the two groups probably parallel cultural changes during the early centuries of the Late Woodland period in the western Piedmont.

Context	n	Thickness	Temper size	Proportion decorated or stamped	Date bp	Date A.D.	C14 Date bp
F.1	101	8.12	2.52	0.06	851	1099	
F.2	19	7.88	1.72	0.00	923	1027	
F.3	88	7.89	2.62	0.02	906	1044	
F.4	51	8.54	1.98	0.00	974	976	
F.6	39	7.96	1.87	0.10	775	1175	
F.7	93	6.67	1.77	0.04	736	1214	
F.8	251	7.78	1.91	0.00	927	1023	
F.9	33	6.83	1.02	0.00	799	1151	
F.10	64	7.96	1.58	0.05			980 +/- 50
F.11	68	7.29	1.75	0.02	853	1097	
F.12	131	8.30	2.50	0.07			890 +/- 80
F.14	11	7.48	0.60	0.09	648	1302	
F.15	20	7.61	2.18	0.00	928	1022	
F.17	16	7.73	1.90	0.13	748	1202	
F.18	51	7.03	1.67	0.06	739	1211	
F.19	27	6.84	1.76	0.00	851	1099	
F.20	42	6.59	1.28	0.09	646	1304	
F.22	78	6.86	1.66	0.12			870 +/- 50
F.23	24	7.45	1.54	0.08	739	1211	
F.24	30	6.55	1.85	0.00			930 +/- 75
F.25	61	7.01	1.78	0.02	828	1122	
F.26	9	8.18	1.78	0.00	944	1006	
F.27	21	7.29	1.29	0.00	857	1093	
F.28	32	7.08	0.87	0.06	678	1272	
F.33	31	6.55	1.37	0.03	720	1230	
F.34	18	7.58	1.46	0.06	771	1179	
F.35	9	7.24	2.14	0.00	900	1050	
F.37	48	7.04	1.89	0.19			790 +/- 70
F.38	16	7.52	2.07	0.00	917	1033	
F.39							680 +/- 50
F.40	52	7.66	1.57	0.02			830 +/- 70
F.41							
F.43	5	8.70	1.15	0.00	932	1018	
F.44	15	8.75	1.79	0.00	976	974	
F.47	7	7.65	0.90	0.00	848	1102	
F.48	9	8.43	2.29	0.00	981	969	
F.49	5	7.13	2.25	0.00	896	1054	
F.50	1	6.00	1.50	0.00	757	1193	
F.51	75	6.77	1.20	0.04	712	1238	
F.52	2	8.20	1.25	0.00	913	1037	
F.53	2	6.95	2.40	0.00	889	1061	
F.54	7	7.37	2.13	0.14	727	1223	
Midden							950 +/- 70

Table 2. Ceramic Attribute Measurements for Absolute Seriation.

3 Feature Classification

Given the large number of feature contexts at the Partridge Creek site, it became important to classify pit function in a systematic fashion. Archaeologists generally agree that, with important exceptions, the contents of pits identified archaeologically do not bear a direct reflection of their original purposes. As DeBoer (1988:4) noted with regard to storage pits, "an archaeological pit chock-full of nuts or maize is a monument to failed intentions" since the contents were never consumed. As a result, interpretations of feature function generally rely on morphological attributes including feature diameters, depths, and profile shapes. Burial pits generally may be defined by the human remains entombed within. Hearths and food preparation facilities, including those labeled variously as cooking pits, roasting pits, and earth ovens, may also be identified in part through their contents. Archaeological identification of such pits may rely effectively on the presence of fire-cracked rock, burned soil, calcined bone, or other heat-altered materials. The possibility that these materials may be swept into an open pit as a convenient means of disposal complicates this association, although the presence of burned soil surrounding a feature or substantial amounts of charred material implies the likelihood of a fire-related use.

Dickens' (1985) analysis of the form, function, and formation of garbage-filled pits excavated in the Southeast provides an elegant feature typology that proved effective in categorizing Partridge Creek site features. Dickens' study draws on archaeobotanical evidence of seasonality to test the functional categories of pit features generally employed in the Eastern Woodlands. Pit types are described with ideal dimensional ranges and plan and profile shapes as listed in Table 3 (1985:38-40). Dickens hypothesized the seasons in which feature types would most likely be abandoned and then examined the seasonality profiles of the botanical remains recovered from each feature type. Analysis of the associated macrobotanical remains largely supported Dickens' hypothesized pit feature types.

Despite the flood scouring of the Partridge Creek site, most features could be categorized according to Dickens' typology (Table 4). The depth ranges for features categorized as hearth and roasting pits were broadened slightly from Dickens' typology in order to accommodate features at the Partridge Creek site that appear on other grounds to fall within these classes.

Type	Orifice shape	Diameter (m)	Profile	Depth (m)	Contents / Association
Storage	Circular	0.60 -1.40	Straight-sided or bell-shaped	0.60 -1.30	Rock slab covering
Structure floor	Elliptical or rectangular	5.00 -10.00	Basin-shaped	0.10 - 0.40	Packed floor, associated posts / pits
Hearth	Circular	0.40 -1.00	Basin-shaped	0.05 - 0.40	Lined with rocks or burnt clay; associated with structure floor
Roasting pit	Circular	1.00 - 2.00	Straight-sided or basin-shaped	0.40 - 1.05	Burnt areas or concentrations of fire-cracked rock
Palisade ditch	Linear	1.20 - 1.80	Shallow sloping sides	0.30 - 0.80	Adjacent postmold alignment
Posthole	Circular	0.05 - 0.30	Straight sides and round to pointed bottom	0.10 -1.20	May occur individually, in an aligned pattern, or within a trench
Burial pits	Elliptical or rectangular	0.80 -1.60	Straight sided or undercut	0.50 -1.20	Human remains

Table 3. Pit Feature Classification (modified from Dickens 1985:38-40).

Feature	Length (m)	Width (m)	Depth (m)	Profile	Condition	Fire reddened, charcoal, or FCR	Functional interpretation
1	1.00	0.95	0.26	cylindrical	Slightly eroded	Y	hearth
2	1.25	0.94	0.38	basin	Little of feat. left below ground surface	Y	hearth
3	1. 44	1.35	0.48	basin		Y	roasting
4	1.30	1.30	0.63	bell-shaped	Half of feat. eroded	N	storage
5					Feat. spalled off of levee		
6	1.20	1.05	0.60	cylindrical	Eroded surface, some pot-hunter disturbance	N	storage
7	1.12	1.06	0.40	cylindrical	Pot hunter disturbance, high density of FCR	Y	roasting
8	1.30	1.07	0.93	cylindrical	Layer of burned soil	Y	storage
9	1.90	1.73	0.68	cylindrical	Top of feat. severely eroded	N	storage
10	1.05	1.00	0.50	basin		Y	roasting
11	1.05	1.00	0.75	cylindrical		N	storage
12	1.10	1.00	0.85	cylindrical	Complex stratigraphy	Y	roasting
13	0.90	0.85	0.05		Feat. almost completely destroyed by flooding	N	
14	1.05	1.05	0.68	basin		Y	roasting
15	1.10	1.00	0.55	basin		Y	roasting
16	1.00	1.00	0.15		Skeletal remains poorly preserved	N	burial
17	1.45	1.20	0.62	basin		Y	roasting
18	0.83	0.75	0.55	cylindrical	Intrusive historical artifacts	N	storage
19	1.20	1.00	0.74	cylindrical		N	storage
20	1.00	0.80	0.40	basin		Y	hearth
22	1.25	1.10	0.60	cylindrical	Pot hunter disturbance	N	storage
23	1.05	0.95	0.85	cylindrical		N	storage
24	1.20	1.05	0.75	basin	Pot hunter disturbance	Y	roasting
25	1.20	1.15	0.70	basin	Feat. surface heavily scoured by flooding	N	storage
26	1.20	1.15	0.20	basin	Feat. almost completely destroyed by flooding		
27	1.45	0.93	0.38	basin	Feat. almost completely destroyed by flooding	N	
28	1.42	1.42	0.43	basin		Y	roasting
31					Feat. disappeared after discovery		
32	1.18	1.10	0.10		Feat. all but destroyed by flood scouring	N	
33	1.00	0.85	0.35	cylindrical	Pot hunter disturbance	Y	hearth
34	0.90	0.87	0.32	cylindrical		N	storage
35	0.83	0.78	0.14	basin		Y	hearth
36					Feat. disappeared after discovery		
37	1.25	1.15	0.37	basin		Y	roasting
38	0.92	0.85	0.25	cylindrical	Pot hunter disturbance	Y	hearth
39	0.88	0.85	0.52	cylindrical	High density of carbonized plant material	Y	roasting
40	0.92	0.75	0.38	bell-shaped		N	storage
41	0.68	0.60	0.10			N	
43	0.98	0.92	0.28			N	
44	0.60	0.50			Feat. stain lacked depth	N	
45	0.90	0.40	0.10		No artifacts found in feat.	N	
47	0.90	0.82	0.12	basin		N	
48	0.95	0.71	0.25	basin	Eroded surface	Y	hearth
49	0.70	0.60	0.10		Feat. almost completely destroyed by flooding	N	
50	0.50	0.50	0.18		Possibly a section of preserved midden	N	
51	1.25	1.15	0.70	cylindrical		N	storage
52	0.70	0.70			Partially excavated	N	
53	0.48	0.30		basin		Y	hearth
54	0.85	0.80	0.32	cylindrical		N	storage
Midden							

Table 4. Feature Morphology.

Feature 16, a shallow grave, represents the only burial identified at the site. The poorly preserved and fragmentary portions of cranium, mandible, and femur bones recovered from the burial suggested to Tourtellotte a flexed position (Tourtellotte 1990:12 - 13). The paucity of burial features amidst the relatively large number of features at the Partridge Creek site raises several issues related to mortuary practices. The use of mound burial in the Ridge and Valley and in the Piedmont during the Late Woodland may relate to this pattern, with burial possibly occurring in central locations as part of multi-community events.

The remaining Partridge Creek site features that could be categorized using Dickens' approach fell into the storage, hearth, and roasting pit classes. All three of these feature categories are referenced in the colonial ethnohistories of the Chesapeake region (e.g., Swanton 1946:363, Smith 1986:161). Storage pits, of course, mark facilities used for caching food or other items. Hearths fulfilled a generalized heating and lighting function. Roasting pits served as locations for the preparation of large amounts of food, with some ethnohistorical references suggesting that these features frequently served as ritual feasting facilities (Ward 1993). One example of a small roasting pit at the Partridge Creek site, feature 39, contained a concentration of carbonized maize cupules and leaf debris that appear to be from maize plants (McKnight 1999:13), evidence which offers support for the validity of this feature category. As with the interpretation of feature chronology, some of these features may be classified incorrectly. However, this method of feature classification offers a parsimonious means of interpreting the original purpose of garbage-filled depressions.

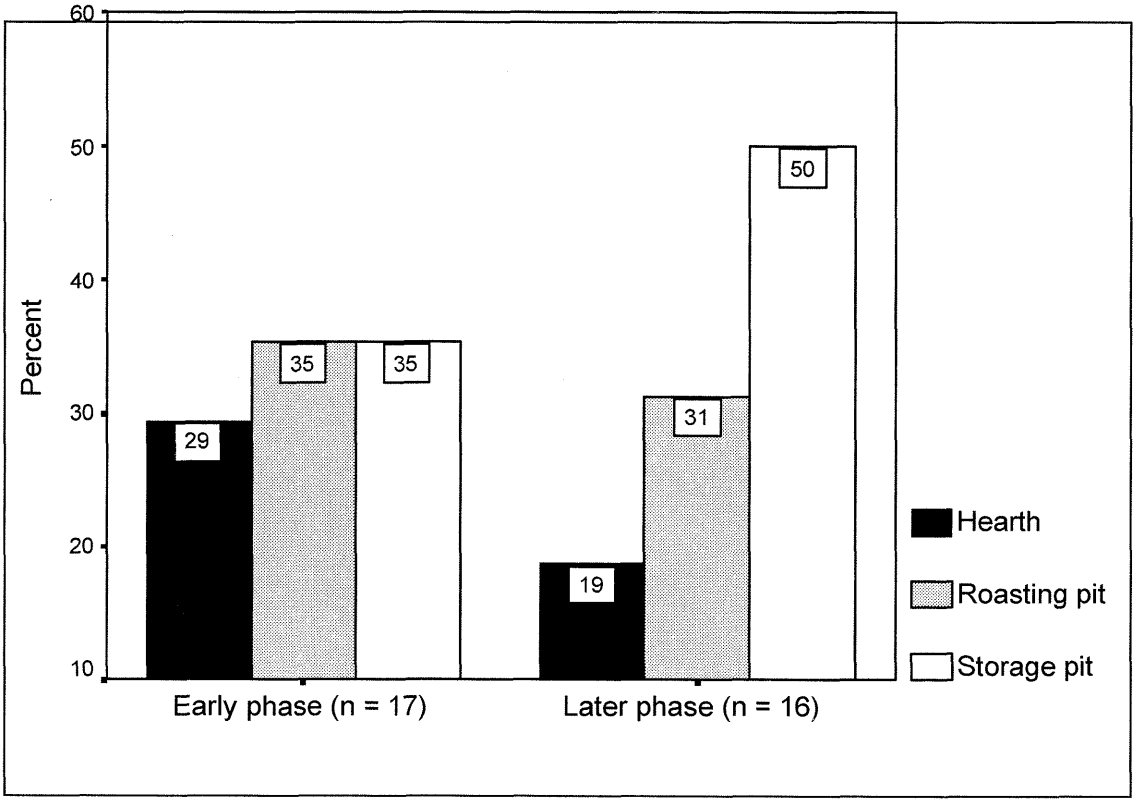

Figure 6. Feature Type by Settlement Phase.

In conjunction with the chronological interpretation outlined above, this classification of feature categories provides a basis for interpreting changes in feature use within a floodplain location during the early centuries of the Late Woodland period. Figure 6 depicts changes in the suite of features found at the site during the early and the later phase of settlement. During the early settlement phase at the Partridge Creek site, the three principal feature types occur in relatively even percentages. A shift toward the construction of storage features occurred at the Partridge Creek site, with storage pits making up half of the identifiable features that fall within the later mode. Increases in feature volume and depth are apparent in the later features as well, although the differences are not statistically significant (Table 5).The patterning in feature use at the site parallels changes in the nature of floodplain settlement activities during the early centuries of the Late Woodland period in the region. My interpretations are necessarily contingent upon the assumptions involving chronology and feature function described above. The relative increase in storage pit use at the expense of hearths corresponds with a contemporaneous increase in settlement permanence detected in a study of James River basin community organization (Gallivan 1999). Throughout the drainage, the predominance of hearth features at Middle Woodland sites on the floodplain gave way to the appearance of larger and more diverse pit features and post-in-ground structures by the final Late Woodland centuries. These developments point to the tethering of settlement to specific floodplain locations and to changes in the way Native Americans dealt with resource variability. The Partridge Creek site feature usage patterns suggest a shift toward the increased use of the temporal averaging mechanism of storage. Increases in sedentariness and the storage of surplus had profound implications for social dynamics in the region.

Variable	Phase	N	Mean	Standard deviation	t	df	One-tail significance
Feature depth	Early	21	0.458	0.256	- 0.630	36	0.267
(meters)	Late	17	0.504	0.1760			
Feature volume	Early	21	0.362	0.279	- 0.771	36	0.223
(cubic meters)	Late	17	0.446	0.389			

Table 5. Comparison of Early and Late Partridge Creek Site Feature Size.

4 Ceramic Analysis

Ceramics recovered from Partridge Creek site features fall under the "Albemarle" series classification defined by Evans (1955). Albemarle series pottery is tempered with crushed quartz and is generally fabric-impressed or cord-marked. These ceramics appear in the James River Piedmont during the Middle Woodland Period and persist into the Late Woodland period. Beyond Klein's (1994) absolute seriation, Albemarle pottery's temporal and stylistic patterning is poorly understood. Albemarle series ceramics appear to have been decorated less frequently than contemporary wares (e.g., Dan River, Shepard, Potomac Creek, and Page) common in the Roanoke, Potomac, and Shenandoah river drainages. Pottery from the Partridge Creek site comprises the largest data set of Albemarle ceramics recovered from feature contexts in the James River Piedmont, providing an excellent means of defining this ware more clearly.

Table 6 lists the principal attributes of five large vessel sections from Partridge Creek site features. While none were complete enough to allow estimation of vessel height, the vessel sections do provide information regarding vessel forms and decoration at the site. The two vessel sections recovered from the midden came from semi-conical vessels with direct rims lacking decoration. The two vessel sections from the midden match the relatively simple, undecorated Albemarle fabric-impressed pottery common to contexts radiocarbon dated to A.D. 600 - A.D. 1200 in the James River Piedmont. Charcoal from the midden at the Partridge Creek site returned a radiocarbon date 950 +/- 70 bp, although the relationship between the charcoal and the two vessels recovered from this context is unclear.

The three other large vessel sections recovered from the Partridge Creek site were all decorated. Two sections recovered from feature 40, radiocarbon dated to 830 +/- 70 bp, have everted rims and cord-wrapped dowel impressions on their lips. The cord-marked vessel from feature 40 exhibits a constricted neck that is common on Dan River series pottery. The surface-collected sherd comes from a relatively small vessel that has a collared rim (i.e., includes an applied rim strip) and appears to be globular in form. With the exception of its fabric-impressed surface, the sherd shares stylistic and formal attributes with Shepard ware vessels typical of the Potomac River Piedmont (Stevens 1998). Not surprisingly, the large vessel sections from the Partridge Creek site indicate that Albemarle vessels shared some attributes with pottery from adjacent regions.

For the remainder of the ceramics recovered from features, I considered sherd thickness, temper size, surface treatment, and rim decoration as recorded in tables 7 and 8. The feature ceramic assemblages (n = 42) had an average sherd thickness of 7.46 mm. with a range of 6.00 to 8.75 mm. Temper size by feature assemblage ranged from 0.60 to 2.62 mm. with a mean value of 1.70 mm. As described previously, patterning in the thickness, temper size, and percentage of decorated sherds recovered from feature contexts was used to generate the site chronology.

As listed in Table 7, Partridge Creek site ceramics were predominantly fabric impressed or cord marked. Seven limestone-tempered, cord-marked sherds recovered from feature 3 fall under the Page series classification (Evans 1955). The presence of these sherds at the Partridge Creek site is not entirely unexpected given the site's proximity to the Ridge and Valley province, approximately 25 miles to the west. Figure 8 summarizes the surface treatment data by settlement phase, indicating that fabric impression decreased from the early to the late phase at the site while cord-marking increased. The differences in the percentages of fabric impression and in cord-marking between the phases are not statistically significant at the 0.10 level.

Provenience	Portion	Surface	Est. diameter (cm)	Rim form	Rim decoration	Collar decoration	Neck decoration
15S 10W (midden)	rim, partial body	fabric	28	straight, direct	none	-	-
15S 9W (midden)	parts of rim, body, base	fabric	22	straight, direct	none	-	-
Feature 40	rim, constricted neck, partial body	cord	26	everted, direct	cord wrapped dowel impressions on lip	-	3 lines incised parallel to rim
Feature 40	rim, partial body	fabric	-	everted, direct	cord wrapped dowel impressions on lip	-	-
Surface	rim, partial body	fabric	16	straight, collared		cord wrapped dowel impression diagonal to lip, 1 incised line parallel to lip	-

Table 6. Attributes of Large Vessel Sections.

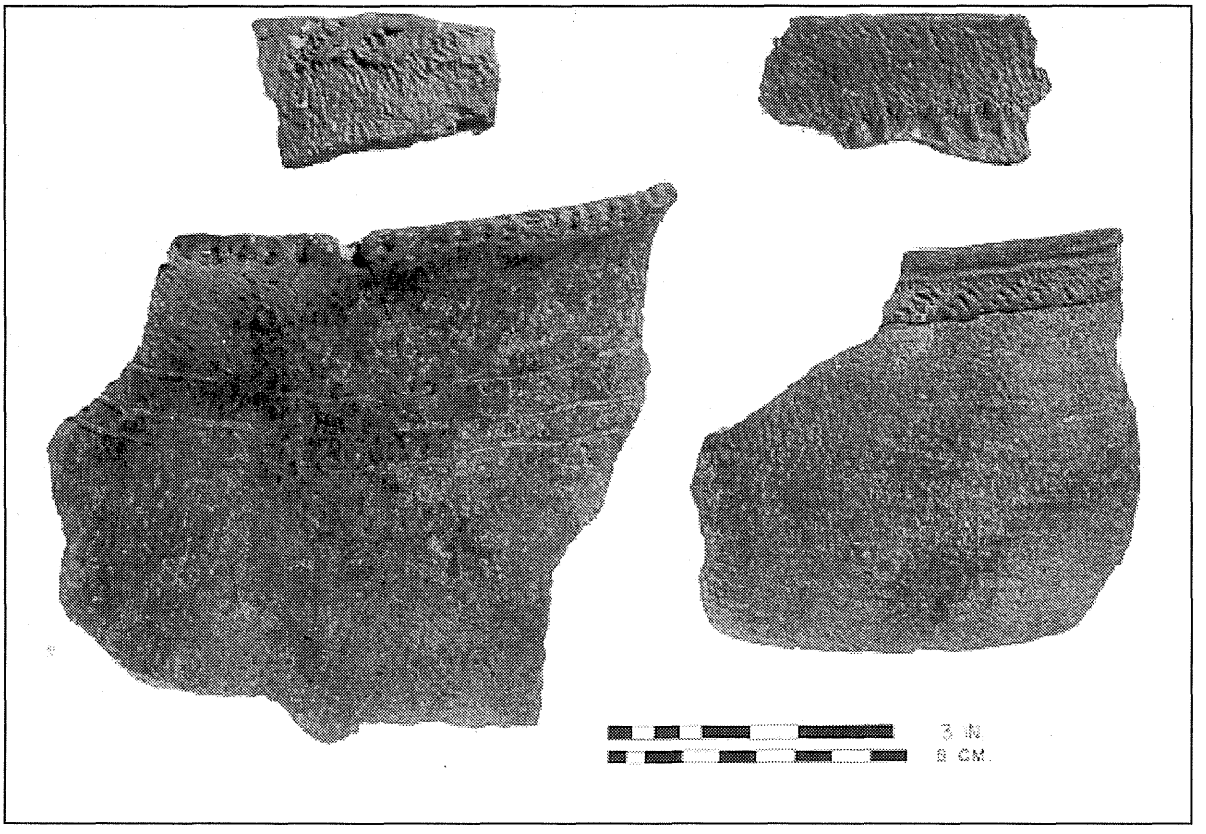

Figure 7. Decorated Pottery.

Feature	Quartz Tempered						Limestone tempered	Mean sherd thickness (mm)	Mean temper size (mm)	Ceramic total
	Fabric	Cord	Net	Simple stamped	Plain	Unidentified	Cord			
1	20	59	1	-	-	21	-	8.12	2.52	**81**
2	14	1	-	-	-	4	-	7.88	1.72	**5**
3	46	14	-	1	6	21	7	7.89	2.62	**49**
4	25	4	-	-	-	22	-	8.54	1.98	**26**
6	4	14	-	-	7	14	-	7.96	1.87	**35**
7	50	35	-	1	7	48	-	6.67	1.77	**91**
8	74	127	-	1	12	35	-	7.78	1.91	**175**
9	24	-	7	-	-	2	-	6.83	1.02	**9**
10	23	23	-	-	-	12	-	7.96	1.58	**35**
11	28	15	-	-	-	25	-	7.29	1.75	**40**
12	5	69	-	-	4	53	-	8.30	2.50	**126**
14	1	10	-	-	-	-	-	7.48	0.60	**10**
15	12	-	-	-	1	7	-	7.61	2.18	**8**
16	-	2	-	1	-	-	-	7.10	1.75	**3**
17	8	2	-	-	-	6	-	7.73	1.90	**8**
18	1	27	-	-	4	18	-	7.03	1.67	**49**
19	3	12	-	-	1	11	-	6.84	1.76	**24**
20	12	10	1	-	3	17	-	6.59	1.28	**31**
22	16	26	1	1	6	27	-	6.86	1.66	**61**
23	9	3	1	-	1	3	-	7.45	1.54	**8**
24	6	5	-	-	-	19	-	6.55	1.85	**24**
25	35	11	-	-	1	14	-	7.01	1.78	**26**
26	3	1	-	-	3	2	-	8.18	1.78	**6**
27	5	12	2	-	-	2	-	7.29	1.29	**16**
28	-	12	3	-	3	14	-	7.08	0.87	**32**
32	-	1	-	-	-	-	-	7.55	1.05	**1**
33	2	19	-	-	2	7	-	6.55	1.37	**28**
34	8	8	-	-	-	2	-	7.58	1.46	**10**
35	4	1	-	-	-	4	-	7.24	2.14	**5**
37	4	30	-	-	-	14	-	7.04	1.89	**44**
38	8	3	-	-	-	5	-	7.52	2.07	**8**
40	12	25	-	-	7	7	-	7.66	1.57	**39**
43	1	2	-	-	-	2	-	8.7	1.15	**4**
44	-	10	-	-	-	5	-	8.75	1.79	**15**
47	7	-	-	-	-	-	-	7.65	0.90	**0**
48	-	7	-	-	2	-	-	8.43	2.29	**9**
49	3	2	-	-	-	-	-	7.13	2.25	**2**
50	1	-	-	-	-	-	-	6	1.50	**0**
51	24	20	-	1	1	29	-	6.77	1.20	**51**
52	1	-	-	-	1	-	-	8.2	1.25	**1**
53	1	1	-	-	-	-	-	6.95	2.40	**2**
54	2	3	-	-	2	-	-	7.37	2.13	**7**

Table 7. Feature Ceramics.

Early settlement phase:

Feature	A	B	C	D	E	F	G	H	Undecorated	Total
1	1 fabric	-	4 cord	1 fabric	-	-	-	-	1 net, 1 cord	**8**
2	-	-	-	-	-	-	-	-	1 fabric, 1 cord	**2**
3	2 fabric	-	-	-	-	-	-	-	2 fabric, 2 plain	**6**
4	-	-	-	-	-	1 cord	-	-	1 plain	**2**
8	-	-	-	-	-	-	-	1 fabric	3 fabric, 3 cord	**7**
10	1 fabric	-	-	-	-	2 cord	-	-	-	**3**
11	-	-	1 cord	-	-	-	-	-	3 fabric	**4**
12	-	8 cord	-	-	-	1 cord	-	-	5 cord	**14**
19	-	-	-	-	-	-	-	-	1 cord, 1 plain	**2**
24	-	-	-	-	-	-	-	-	1 cord	**1**
25	1 fabric, 1 cord	-	-	-	-	-	-	-	3 cord	**5**
26	-	-	-	-	-	-	-	-	1 cord	**1**
27	-	-	-	-	-	-	-	-	2 cord	**2**
40	-	-	-	1 cord	-	-	-	-	2 cord, 1 fabric, 1 plain	**5**
43	-	-	-	-	-	-	-	-	1 plain	**1**
49	-	-	-	-	-	-	-	-	1 cord	**1**
53	-	-	-	-	-	-	-	-	1 cord	**1**

Late settlement phase:

Feature	A	B	C	D	E	F	G	H	Undecorated	Total
6	1 fabric	3 fabric	-	-	-	-	-	-	2 plain	**6**
7	-	-	2 fabric	-	1 plain	-	3 cord	-	2 fabric, 1 cord	**9**
14	1 fabric	-	-	-	-	-	-	-	1 cord	**2**
17	-	-	-	-	-	-	-	2 cord	1 fabric	**3**
18	1 fabric	-	-	-	-	-	-	-	1 plain, 1 cord	**3**
20	3 fabric	-	-	-	-	-	-	-	3 fabric	**6**
22	2 fabric	-	-	-	-	-	-	-	1 fabric, 1 cord	**4**
23	-	1 fabric	-	-	-	1 plain	-	-	1 plain	**3**
28	-	-	-	-	-	-	-	-	3 cord	**3**
33	1 plain	-	-	-	-	-	-	-	-	**1**
37	1 plain	-	-	-	-	7 cord	-	1 plain	1 plain	**10**
51	-	-	-	-	-	3 fabric	-	-	1 plain	**4**
54	1 fabric	-	-	-	-	-	-	-	-	**1**

Table 8. Rim Sherd Attributes.

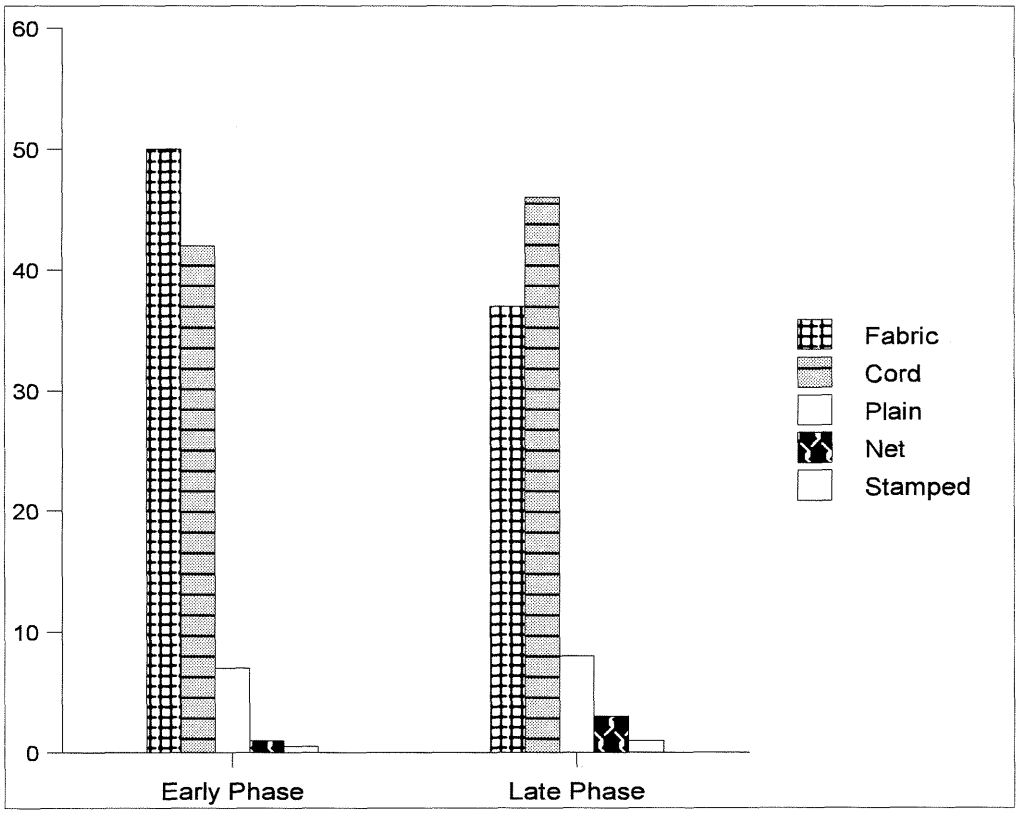

Figure 8. Surface Treatment Percentages by Settlement Phase

Slightly over half (50.8%) of the rims recovered from feature contexts at the site (n = 120) bore some form of decorative elaboration. The decorative motifs that appear on feature ceramics from the Partridge Creek site are typical for the interior portion of Virginia and are depicted on Figure 9. These include:

A – Cord-wrapped dowel impressions along lip;
B – Cord-wrapped dowel impressions on lip and on an applied rim strip approximately perpendicular to the lip;
C – Three incised lines on rim parallel to lip;
D – Cord-wrapped dowel impressions along lip plus 3 lines incised on rim parallel to lip;
E – Cord-wrapped dowel impressions along lip plus 3 narrow cord-wrapped dowel impressions parallel to lip;
F – Incised lines diagonal to the lip;
G – Incised chevron design on the rim;
H – Finger-nail impression on the constricted neck, running perpendicular to the lip.

All of these decorations appear on direct rims, with the exception of motif B, which appears on rims with applied strips (i.e., collared rims). Motif H represents neck decoration that appeared on several sherds which exhibited constricted necks.

Table 8 breaks down rim decorations by feature and includes surface treatment data. Forty percent (40.0%) of the rims from the earlier phase are decorated (n = 65); 63.6% of the rim sherds from the second settlement phase (n = 55) were decorated. A Late Woodland increase in the occurrence o f decoration is widespread in the region.

Despite the relatively small sample size of decorated rims, the Partridge Creek site data hint at some potential temporal trends in ceramic style. The presence of rim sherds with cord-wrapped dowel impressed lips occurs in features dated to both temporal phases but appears more frequently in the later phase. All but three of the later phase features which contained rim sherds (n = 13) included at least one rim sherd with a cord-wrapped dowel impression, raising the possibility that this

decorative motif is characteristic of Albemarle series pottery dated to the thirteenth century. Motif D appears only in features dated to the earlier mode, although it is actually a composite of two other motifs (A and C) which occur in the later phase as well. Motif E, which resembles decorative elaboration frequently found on Potomac Creek vessels (Egloff and Potter 1982:112), occurs only in the later settlement phase. Motif G, similar to decorative incising found on some Dan River series pottery (e.g., Gallivan 1997), occurred only within a feature dated to the later settlement phase. Several of the decorative motifs found on ceramics dated to the later phase are similar to those that occur in the Roanoke and Potomac river drainages. The shared stylistic elements suggest that Partridge Creek site inhabitants interacted with groups in these areas during the thirteenth century A.D. A more powerful analysis of stylistic variation in the form of rim decoration requires a multi-site data set covering a wider range of time. The rim decoration recorded at the Partridge Creek site provides an ideal data set for inclusion in such a study.

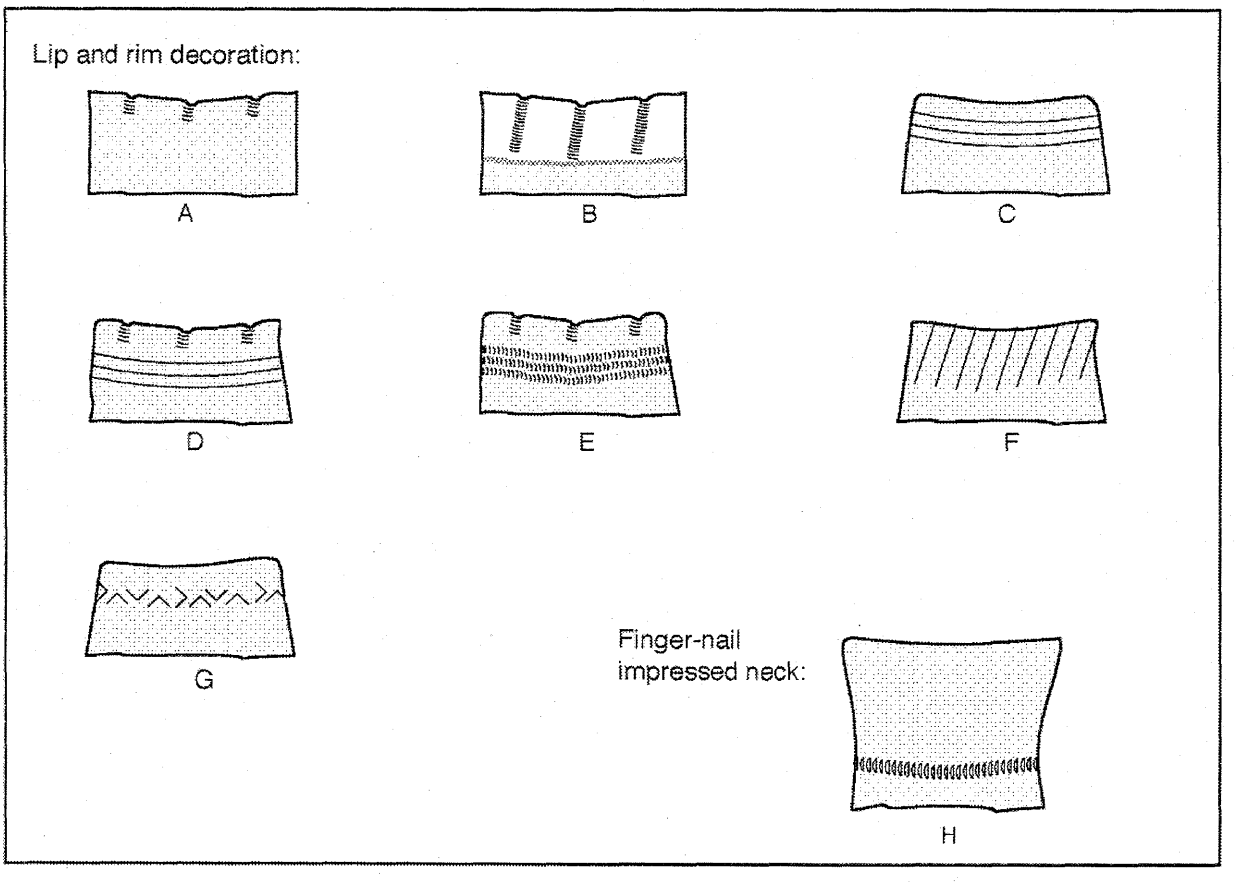

Figure 9. Pottery Decoration.

5 LITHIC ARTIFACT ANALYSIS

Lithic artifacts recovered from feature contexts are classified by type and raw material in tables 9 - 12. The following describes the categories used in this classification. In the subsequent section of this report I will interpret temporal patterning in the use of stone artifacts at the site.

DEBITAGE

Decortation Flakes. Decortation flakes, the product of the initial step in the stone tool production process, exhibit a striking platform, bulb of percussion, and cortex. This category includes primary and secondary decortation flakes. As listed in the tables, decortation flakes at the Partridge Creek site features were produced from quartz (n = 1,009), quartzite (n = 32), metavolcanic rock (n = 3), and jasper (n = 1).

Interior and Biface Thinning Flakes. Interior flakes are flat flakes lacking cortex that exhibit scars on the dorsal surface. Interior flakes recovered from Partridge Creek site features were predominantly quartz (n = 4,374), although quartzite (n = 88), metavolcanic (n = 21), chert (n = 15), jasper (n = 13), slate (n = 3) also occurred. Biface thinning flakes are small flakes that result from pressure flaking bifacial edges. These were generally quartz (n = 3,441) and also include quartzite (n = 31), chert (n = 5), jasper (n = 5), and rhyolite (n = 1).

Shatter. Shatter are angular pieces that are part of stone tool production, but difficult to categorize. Shatter recovered at the site were quartz (n = 2,675) and quartzite (n = 32).

Cores. Cores are stone cobbles from which flakes have been removed. At the Partridge Creek site quartz (n = 162) and quartzite (n = 2) cores were recovered.

Utilized Flakes. Utilized flakes exhibit retouched margins. Utilized flakes recovered from Partridge Creek site were produced from quartz (n = 119), quartzite (n = 6), and slate (n = 1).

PROJECTILE POINTS

Triangular projectile points. Triangular points dominated the projectile point assemblage (n = 142). Table 9 lists the principal attributes of these artifacts. Forms generally matched the medium-sized Madison type, although the larger Levanna type was also represented (Ritchie 1961). The points ranged from 1.75 - 3.25 cm. in length, 1.4 - 2.45 cm. in width, 0.35 - 1.05 cm. in thickness. Triangles from earlier phase features have a mean length of 1.96 cm (n = 30, s.d. = 0.375); those from the later phase have a mean length of 2.01 cm (n = 25, s.d. = 0.286). Widths for the early and later phase average to 2.38 cm. (n = 16, s.d. = 0.476) and 2.41 cm. (n = 17, s.d. = 0.4211) respectively. The differences between these means are not statistically significant. Materials included quartz (n = 115), chert (n = 5), slate (n = 1), and quartzite (n = 1).

Bare Island stemmed projectile point. One quartz Bare Island projectile point was recovered from feature 24. The point has asymmetrical shoulders with one edge that is more excurvate than the other, and a straight-sided stem (Ritchie 1961). This point type generally dates to the Late Archaic through Early Woodland periods.

Lamoka stemmed projectile point. One quartz Lamoka projectile point was recovered from feature 22. Lamoka points are generally dated to the Late Archaic Period. This point has sloping shoulders and a medial ridge on one side, as is typical of this type (Ritchie 1961).

Brewerton corner-notched projectile point. One quartz Brewerton corner-notched point was excavated from feature 25. This point has sharp corners, a flaring base, and dates to the Middle or Late Archaic period (Ritchie 1961).

Feat.	Material	Form	Base shape	Length (cm)	Width (cm)	Thickness (cm)	Comment
1	quartz	triangle	concave	-	2.35	0.65	
	quartz	triangle	concave	-	-	0.45	serrated edges
	quartz	triangle	-	-	-	-	count: 7
2	quartzite	triangle	straight	1.75	1.9	0.5	
	quartz	triangle	straight	-	2.15	0.5	
	quartz	triangle	concave	-	2.25	0.75	
	quartz	triangle	-	-	-	-	
3	quartz	triangle	straight	2.3	1.85	0.5	
	quartz	triangle	straight	2.2	2.1	0.65	
	quartz	triangle	concave	-	1.8	0.45	serrated edges
	quartz	triangle	concave	2.8	1.55	0.6	
	quartz	triangle	straight	-	2.15	0.65	
	quartz	triangle	straight	-	2.3	0.65	
	quartz	triangle	straight	-	1.4	0.45	
	quartz	triangle	straight	-	-	-	count: 4
4	quartz	triangle	-	-	-	-	serrated edges
6	quartz	triangle	-	-	-	-	
7	chert	triangle	straight	-	1.75	0.75	
	quartz	triangle	concave	2.1	2.2	0.5	
	quartz	triangle	convex	2.4	1.8	0.6	
	quartz	triangle	concave	2.2	1.8	0.5	
	quartz	triangle	straight	-	2.3	1.0	serrated edges
	quartz	triangle	straight	-	1.45	0.6	
	quartz	triangle	straight	2.5	2.15	0.7	
	quartz	triangle	straight	2.15	1.8	0.5	
	quartz	triangle	straight	-	2.1	0.65	
	quartz	triangle	straight	3.1	2.0	1.15	
	quartz	triangle	-	-	-	-	count: 8
	quartz	-	-	-	-	-	count: 2
8	quartzite	-	-	-	-	-	
	quartz	triangle	concave	3.25	-	0.8	
	quartz	triangle	straight	-	1.85	0.55	
	quartz	triangle	-	2.95	-	0.45	
	quartz	triangle	straight	-	-	0.6	serrated edges
	quartz	triangle	-	-	-	-	count: 4
10	quartz	-	-	-	-	-	
11	quartz	triangle	concave	1.8	1.8	0.45	
	quartz	triangle	concave	2.25	-	0.45	
	quartz	triangle	straight	-	1.9	0.45	
	quartz	triangle	-	-	-	-	
12	quartz	triangle	straight	-	2.45	0.7	
	quartz	triangle	straight	-	1.3	0.35	
	quartz	triangle	-	-	-	-	
14	quartz	-	-	-	-	-	count: 3
15	chert	triangle	straight	1.8	1.85	0.55	
	slate	triangle	straight	3.15	2.8	1.05	
	quartz	triangle	straight	2.45	2.1	0.85	
	quartz	triangle	concave	2.6	1.85	0.6	
	quartz	triangle	-	-	-	-	count: 3
17	chert	triangle	-	-	-	0.55	
	quartz	triangle	straight	-	2.35	0.7	

Table 9. Projectile Points (page 1).

Feat.	Material	Form	Base shape	Length (cm)	Width (cm)	Thickness (cm)	Comment
18	quartz	triangle	convex	2.5	-	0.9	
	quartz	triangle	straight	-	2.15	0.55	
	quartz	triangle	-	-	-	-	count: 3
19	quartz	triangle	straight	-	2.0	1.0	
	quartz	triangle	-	2.4	-	0.65	
	quartz	triangle	straight	-	2.7	-	
	quartz	triangle	-	-	-	-	count: 2
	quartz	-	-	-	-	-	count: 3
20	quartz	triangle	concave	2.55	1.95	0.8	
	quartz	triangle	concave	-	1.75	0.75	
	quartz	triangle	straight	-	2.35	0.7	
	quartz	triangle	-	-	2.45	0.55	
	quartz	triangle	-	-	2.15	0.65	count: 4
22	chert	triangle	straight	2.25	1.3	0.35	possible drill
	quartz	triangle	straight	-	2.25	0.60	
	quartz	triangle	straight	-	-	-	
	quartz	-	-	-	-	-	count: 2
	quartz	**stemmed**	concave	3.9	1.85	0.85	
23	quartz	triangle	-	-	-	-	count: 2
24	quartz	triangle	concave	2.3	1.5	0.55	
	quartz	triangle	-	-	-	-	count: 2
	quartz	**stemmed**	concave	4.05	2.00	0.9	
25	quartz	triangle	straight	-	1.8	0.6	serrated edges
	quartz	triangle	-	-	-	-	count: 2
	quartz	-	-	-	-	-	
	quartz	**corner-notched**	concave	-	2.45	0.6	
28	quartz	triangle	-	-	-	-	count: 3
33	quartz	triangle	concave	2.3	2.15	0.55	
	quartz	triangle	concave	2.0	2.1	0.45	
	quartz	triangle	straight	2.05	-	0.5	
	quartz	triangle	concave	2.0	2.1	0.45	
	quartz	triangle	-	-	-	-	
34	quartz	triangle	-	-	-	-	count: 2
37	quartz	triangle	concave	-	2.10	0.6	
	quartz	triangle	-	3.5	-	0.55	serrated edges
	quartz	triangle	-	-	-	-	count: 2
39	chert	triangle	concave	2.8	2.2	0.6	
	quartz	triangle	straight	2.1	1.65	0.45	
	quartz	triangle	-	-	-	-	
40	quartz	triangle	straight	-	2.5	0.55	
	quartz	triangle	straight	2.7	2.0	0.75	
	quartz	triangle	concave	-	1.75	0.55	
43	quartz	triangle	-	-	-	-	
44	quartz	triangle	convex	1.8	1.2	0.5	
	quartz	triangle	straight	-	1.8	0.55	
	quartz	triangle	straight	-	2.2	0.45	
47	quartz	triangle	straight	-	2.1	0.4	
48	quartz	triangle	concave	2.0	-	0.55	
53	quartz	-	-	-	-	0.55	
54	quartz	-	-	-	-	-	count: 3

Table 9. Projectile Points (page 2).

Table 10. Quartz Artifacts.

Early settlement phase:

Feature:	1	2	3	4	8	10	11	12	15	19	24	25	26	27	35	38	40	43	44	47	48	49	52	53
Decortation flakes:	5	42	47	30	41	10	18	11	44	19	15	32				15	90	9	29		3			2
Interior flakes:	137	119	325	30	187	50	41	123	159	43	103	97	3	5	15	102	236	33	57		8		4	28
Biface thinning flakes:	74	163	210	27	97	30	56	60	62	28	67	35	3	10	3	29	72		105				5	9
Cores:	6	3	15	6	3		3	13	8		4	3			1	2	6		27				1	
Shatter:	97	56	220	72	281	47	48	183	111	25	69	39	3	3	12	38	49	7	3				2	10
Utilized flakes:	12	5	14	3	8	1	3	3	8		1	2				2	2					1		1
Unifaces:	4	2	3		4		3	2	1		3					1	6		1			1		
Bifaces:	3	81	1		3	3	1	2		2	1					6	51	1				1		
Drills:	2	2																						
Preform:		1																						
Projectile points or point fragments:	9	3	11	1	8	1	4	3	5	8	4	5					3	1	3	1	1			1

Late settlement phase:

Feature:	6	7	9	14	17	18	20	22	23	28	33	34	37	39	50	51	54
Decortation flakes:	25	76	10	1	7	29	29	83	9	20	8	20	30	51	3	9	31
Interior flakes:	66	194	39	72	26	73	79	160	76	54	154	57	281	356	11	172	255
Biface thinning flakes:	80	633	15	94	15	171	176	96	140	108	83	173	92	198	4	74	40
Cores:	5	14	1	1	1	4		2			4	2	8			9	1
Shatter:	97	230	26	26	31	86	48	28	16	29	24	29	85	232		216	8
Utilized flakes:	1	1	1				3	7	3	2	3	5	11	8		4	
Unifaces:		2	3	1		2	3	3	2		3		5	1	1	3	
Bifaces:	1	4	1				1	3	1		5		10	3		1	
Drills:							1	1									
Preform:																	
Projectile points or point fragments:	1	19		3	1	5	8	5	2	3	5	2	4	2			3

Dating uncertain:

13	16	32
	1	
5	1	
3		
1		
1		1
	1	

Table 11. Quartzite Artifacts.

Early settlement phase:

Feature:	1	2	3	4	8	10	11	12	15	19	24	25	38	40	52	53
Decortation flakes:		1	4	1	1			1	3	3		2	1	2		
Interior flakes:	5	2	22		2	6	3	2		1	3	4		2		1
Biface thinning flakes:		3	7		2		1	1							1	
Cores:			1												1	
Shatter:	1		1													
Utilized flakes:			1	1										1		
Unifaces:		1			1											
Bifaces:														1		
Ground stone tool:												1				
Projectile points or point fragments:		1			1											

Late settlement phase:

Feature:	6	7	9	17	18	20	22	28	33	34	37	39	51
Decortation flakes:	1	1		1								2	8
Interior flakes:	1	6		12	3			1	2		3		6
Biface thinning flakes:	2	2	1	5	3	1							1
Cores:													
Shatter:		1										29	
Utilized flakes:		1										2	
Unifaces:													
Bifaces:		1					1			1			
Ground stone tool:		1								1			
Projectile points or point fragments:													

Uncertain dating:

13
1
1

Table 12. Artifacts Produced from Other Lithic Materials – Early Settlement Phase.

Feat.	Material	FCR	Decortat'n flakes	Interior flakes	Biface thinning flakes	Utilized flakes	Unifaces	Bifaces	Other flaked artifact (count)	Ground stone tool type (count)	Projectile points or fragments
1	sandstone	41								unidentified (1)	
	slate								net sinker (1)		
	jasper		1								
2	sandstone	14									
	chert			1	1						
3	sandstone	20								unidentified (1)	
	jasper				1						
	rhyolite				1						
	chert			1							
8	sandstone	10									
10	sandstone									unidentified (1)	
	slate								net sinker (2)	mano (1)	
	jasper				1						
11	sandstone									hammer stone (1)	
	jasper			1							
12	sandstone	26								hammer stone (1), mano (1), unident (1)	
	jasper			1							
	metavolcanic			3							
15	chert			3							1
19	sandstone									hammer stone (1)	
	slate								gorget (1)		
	schist								gorget (1)		
	jasper			2							
24	sandstone									abrader (1)	
	metavolcanic								axe (1)		
25	slate									unidentified (1)	
	metavolcanic			1							
35	chert			1							
40	sandstone	6								abrader (1)	
	schist								net sinker (1)		
	metavolcanic									hammer stone (2)	
43	metavolcanic			5							
44	sandstone	2									
	jasper			1							
47	metavolcanic		1								
48	metavolcanic			1							
53	metavolcanic									unidentified (1)	

Feat.	Material	FCR	Decortat'n flakes	Interior flakes	Biface thinning flakes	Utilized flakes	Unifaces	Bifaces	Other flaked artifact (count)	Ground stone tool type (count)	Projectile points or fragments
6	sandstone	3								unidentified (1)	
	slate								unidentified (2)		
7	sandstone	9								unidentified (1)	
	slate					1				hammer stone (1)	
	metavolcanic									mano (1)	
	chert			4	2			1			1
9	sandstone	2			1						
	chert			1							
	jasper			2							
17	chert										1
18	sandstone	1								abrader (1), unident. (1)	
	slate								gorget (1), hoe (1)		
	metavolcanic									mano (1)	
	jasper			1	2						
20	chert				1						
22	sandstone									abrader (1)	
	slate									mano (1)	
	metavolcanic			3			2	2			
	chert			3							1
23	metavolcanic			7							
	chert			2							
28	sandstone	1									
	slate									unidentified (1)	
	chert				1						
33	sandstone	1								unidentified (1)	
	metavolcanic						1				
	jasper			1							
	chert			1							
34	jasper			1							
37	sandstone	14								unidentified (1)	
	chert			1							
39	sandstone	3								unidentified (2)	
	schist								gorget (1)		
	jasper			2	1						
	chert										1
50	sandstone									unidentified (1)	
51	sandstone	3								unidentified (1)	
	slate						1	1	notched stone (1)		
	jasper			2							
	metavolcanic		2	1							
	feldspar									unidentified (2)	
54	sandstone									unidentified (1)	

Table 12. Artifacts Produced from Other Lithic Materials -- Late Settlement Phase.

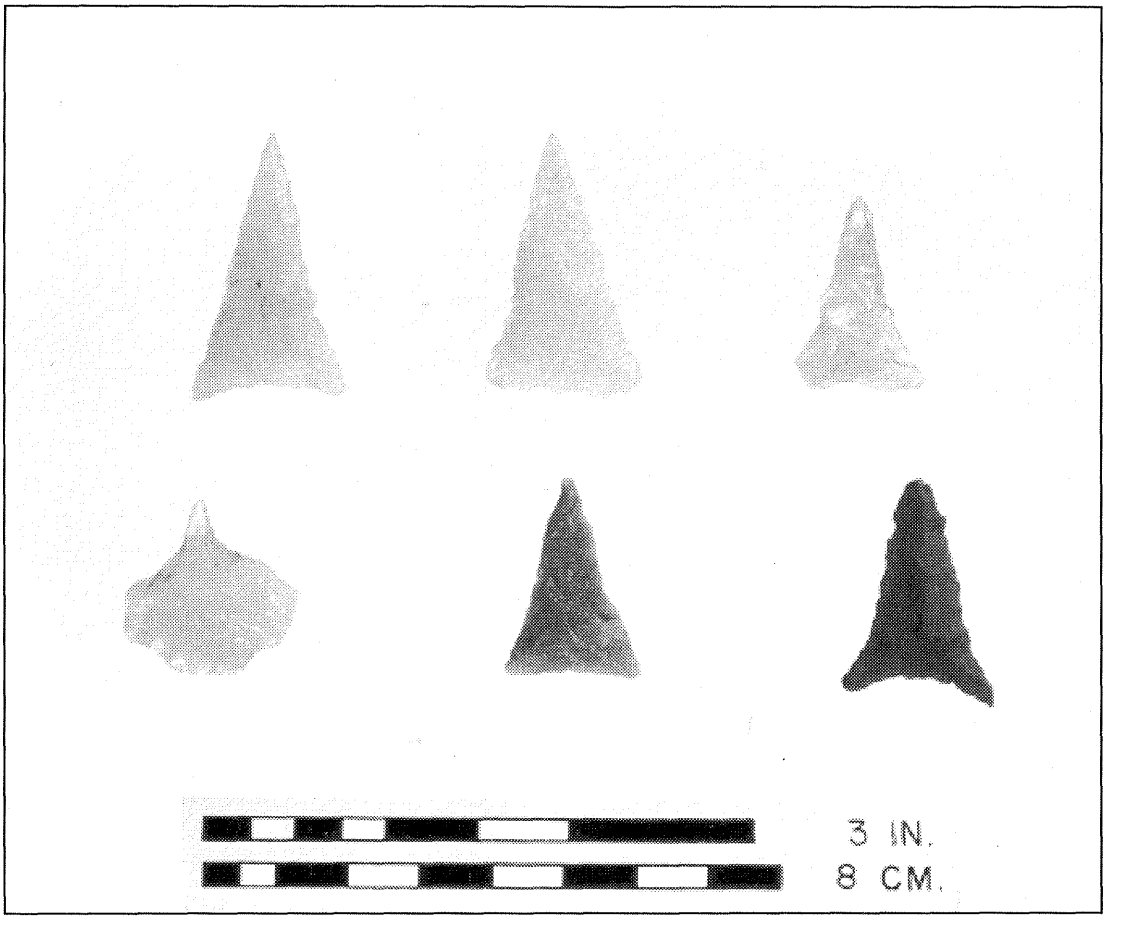

Figure 10. Triangular Projectile Points and Drill (Lower Left)

OTHER CHIPPED STONE ARTIFACTS

Bifaces/Unifaces. Bifaces are generalized stone tools or more formal tools abandoned during the reduction process. They are defined for this analysis as lithics showing flake scars on opposite surfaces. Bifaces recovered from the Partridge Creek site features were quartz (n = 243), quartzite (n = 4), metavolcanic rock (n = 2), chert (n = 1), and slate (n = 1). Unifaces, stone tools with flake scars on only one surface, included those fashioned from quartz (n = 60), quartzite (n = 2), metavolcanic rock (n = 2), and slate (n = 1)

Net Sinkers. Net sinkers are grooved stone weights that were tied to fishing nets. As recovered archaeologically, they are generally water-worn. Since the net sinkers recovered from the Partridge Creek site were all produced from a flat lithic material (slate or schist) notches (rather than grooves) are apparent on opposed (lateral) edges of the artifacts. Maximal dimensions ranged from 4.5 - 9.5 cm. In addition to the three net sinker specimens listed in Table 12, one notched slate artifact that resembles a net sinker in some respects occurred in feature 51. This artifact was not water smoothed and was only notched on one side. A fifth unprovenienced net sinker was recovered from the surface of the site.

Drill. Drills are bifacially-flaked tools with a sharp, rod-like projection for drilling holes. Six quartz drills were recovered from the site.

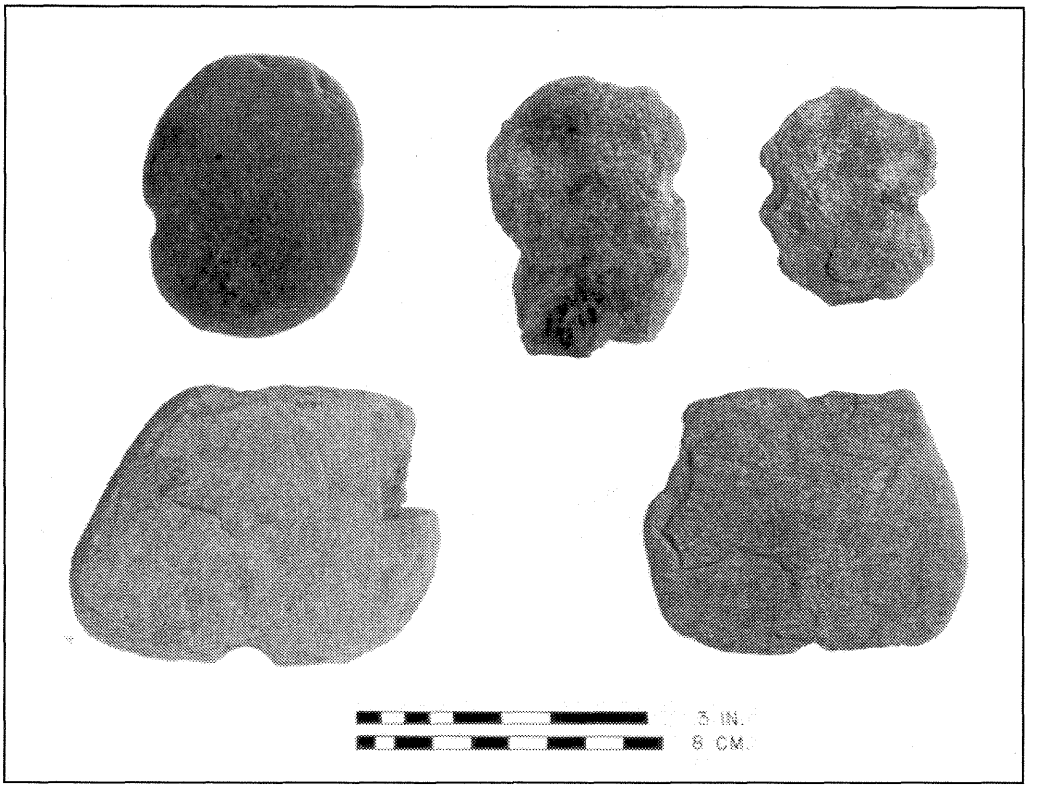

Figure 11. Net Sinkers.

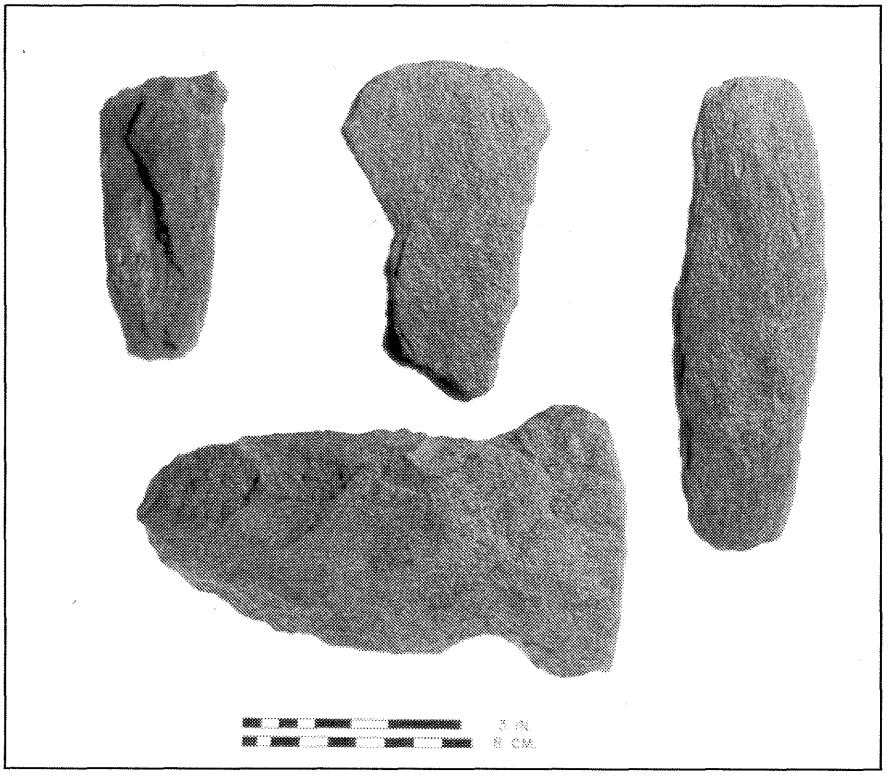

Figure 12. Large Chipped Stone Artifacts and Cobble Tools.

Axe. Axes are large bifaces used for chopping. The one metavolcanic axe recovered from feature 24 included shallow, chipped notches on opposing (lateral) edges.

Hoes. Hoes are large chipped artifacts that are rectilinear to triangular in shape that served as digging or horticultural tools. One slate hoe was recovered from feature 18.

GROUND STONE ARTIFACTS

Gorgets. Gorgets are ornaments made from shell or stone that were typically ground and drilled with a hole. These artifacts were presumably worn over the chest suspended on a cord. The four gorgets (or partial gorgets) recovered from the Partridge Creek site were made from slate and schist that was flaked and ground. A cracked, teardrop-shaped, slate gorget excavated from feature 18 has carefully-ground edges and drill holes on both sides that fail to meet. Feature 19 contained two specimens: a four-sided schist gorget with an L-shaped incision on one side and a slate gorget that was circular and marked by several incomplete drill holes. At 9 cm. in maximal diameter, this was the largest of the gorgets recovered from the Partridge Creek site. Feature 39 includes a broken fragment of what appears to have been a circular gorget.

Abraders. Abraders in the Chesapeake region are typically sandstone and were used to smooth or sharpen antler, bone, wood, and stone. One sandstone abrader from feature 18 is sub-triangular in shape and has a groove running the entire 6 cm length of one side. This artifact may have served as a shaft smoother. Another possible abrading stone was recovered from feature 24. It is a fire-reddened cobble that is battered on one end and grooved on the other.

Other Ground Stone Tools. As listed in Table 12, nineteen unidentified ground stone artifacts were also excavated from feature contexts.

Figure 13. Gorgets.

LARGE COBBLE TOOLS

Hammerstones / Manos. Hammerstones are generally spherical cobbles with battered edges used in stone tool production. Manos are similar implements that are often cylindrical in shape and are used to grind edible substances, typically corn, grains, and nut meats. The Partridge Creek site features yielded sandstone (n = 3), metavolcanic (n = 2), and slate (n = 1) hammerstones. Manos were produced from metavolcanic rock (n = 2), slate (n = 2), and sandstone (n = 1).

LITHIC ARTIFACT ANALYSIS

The assemblage of lithic artifacts recovered from the Partridge Creek site is fairly typical for the Late Woodland James River Piedmont. The predominance of quartz artifacts and the relatively low number of formal chipped stone tools beyond projectile points also reappears at several Late Woodland sites in the region, including Wood (44NE143) (Gallivan 1995), Spessard (44FV134) (Gallivan and Hantman n.d.), and Wingina (44NE4) (MacCord 1974). Nonetheless, the large sample of feature contexts excavated at the Partridge Creek site and the site chronology developed here allow the recognition of uncommon artifact classes and patterns related to settlement intensity and the use of non-local material.

Notable lithic artifacts at the Partridge Creek site include gorgets and net sinkers. Gorgets appeared in low frequencies within features dated to the early and late settlement phases at the site. The gorgets recovered archaeologically all lack complete drill holes, suggesting that none were actually worn. Since they appear to have been undecorated and were produced from a locally-abundant material, it seems unlikely that the gorgets served as highly valuable prestige items in the same way that carved shell gorgets did within Mississippian societies. The presence of gorget 'wasters' at the site that were abandoned during production raises the possibility that the Partridge Creek site served as a production location for these items. Assuming that the notched slate artifact recovered from feature 51 represents a net sinker, these artifacts occurred in both settlement phases as well. Net sinkers imply the importance of fishing in the subsistence regime of Late Woodland Indians in the western Piedmont.

Temporal patterning in the Partridge Creek site lithic assemblage may be explored by evaluating lithic density, lithic diversity, lithic assemblage composition, and the presence of chert projectile points. As noted in Table 13, the ratio of lithic artifacts to cubic meters of feature fill is greater in features dated to the later settlement phase. Debitage, including flakes and shatter, comprise most of the lithic artifacts recovered from features. Since stone tool production regularly produced a high volume of debitage that was swept, washed, or tossed into pit features, the density of artifacts such as lithic debitage likely serves as a rough proxy for the intensity of floodplain settlement (cf. Pauketat 1989, Warrick 1988).

Settlement phase	N	Mean lithic artifacts per cubic meter	Standard deviation	t	df	one-tail significance
Early	21	719.7	709.9	-1.924	36	.031
Late	17	1269.2	1046.0			

Table 13. Comparison of Lithic Artifact Density within Features

Settlement Phase	N	Mean lithic artifact richness (0 - 5)	Standard deviation	t	df	one-tail significance
Early	24	3.3	1.37	-1.882	39	.034
Late	17	4.0	.87			

Table 14. Comparison of Lithic Artifact Diversity (Richness) within Features

Variability in the length of residence in a location and the number of resident households at a settlement likely paralleled the density of lithic artifacts recovered from features. A t-test comparing the densities of lithic artifacts for early and late features from the site indicates that the increase is statistically significant, raising the possibility that settlement intensity increased during the opening Late Woodland centuries in the western Piedmont.

In addition to increases in the *density* of material used in a residential context, a greater *diversity* of material culture also generally accompanies increased sedentariness (Rafferty 1985:135, Lightfoot and Jewett 1982:25). The diversity of stone artifact types identified in an archaeological assemblage provides one measure of material culture diversity that parallels, to a large extent, the range of activities carried out in a location. Lithic artifact diversity measures have been used recently as a means of tracing the influence of European intervention in the economic systems of the North Carolina Piedmont (Eastman 1993:448). Lithic artifact diversity values at the Partridge Creek site may reflect the extent to which residents incorporated a generalized range of productive tasks and a longer floodplain presence.

Archaeologists frequently measure diversity in terms of 'richness' (Kintigh 1989:26). Richness is defined as the number of categories present in a case, such as the number of lithic artifact classes within a feature context. In order to measure the richness of lithic artifacts from the Partridge Creek site, the feature lithics were divided into five general categories: fire-cracked rock, debitage, chipped stone tools, projectile points, and ground stone tools. The purpose of this very general classification scheme is to provide a gauge of activities carried out in settlements rather than to assess lithic technology in detail. Since features provide the context with the highest level of chronological integrity at the site (and in the region generally), the single feature serves as the unit of analysis for this comparison. While some of the artifacts in this classification system are more closely related than others, the stone tool classes applied here provide mutually exclusive categories tied to different types of activities.

As noted in Table 14, the average richness of lithic artifacts recovered from feature contexts increased in a statistically significant manner. This result suggests that the diversity of tasks carried out within floodplain settlements increased during the period. Presumably, an increase in the diversity of lithic artifact classes paralleled increased sedentariness at the site.

A more specific consideration of the lithic assemblage revealed changes in the combination of tools used within the different occupations at the Partridge Creek site. Figure 14 depicts the composition of lithic tool types recovered from feature contexts dated to the early (n = 24) and late (n = 17) settlement phases. Lithic artifacts other than tools were excluded from this analysis. While the assemblage composition did not change radically between the two periods, the mean percentages of projectile points and ground stone tools does differ measurably between the early and late settlement phases at the site. The percentage of projectile points per feature declined during the late phase while the mean percentage of ground stone tools increased.

These data indicate that the Partridge Creek site's residents subtly changed the composition of their lithic assemblages such that ground stone tools became more prominent and projectile points became less prominent elements. This trend may correspond with changes in subsistence production in favor of horticulture. Ground stone tools were generally used in the processing of plant foods (though not solely domesticated ones), while triangular projectile points often served as hunting implements. In an effort to verify this pattern statistically, the Table 15 lists the frequencies of features from the two phases which contain ground stone tools. Fisher's Exact Test produces a one-tailed significance of 0.065 for these frequencies, pointing to a statistically-significant association between settlement phase and the presence/absence of ground stone tools in feature contexts at the 0.10 significance level. A shift toward the use of ground stone tools at the expense of projectile points is apparent.

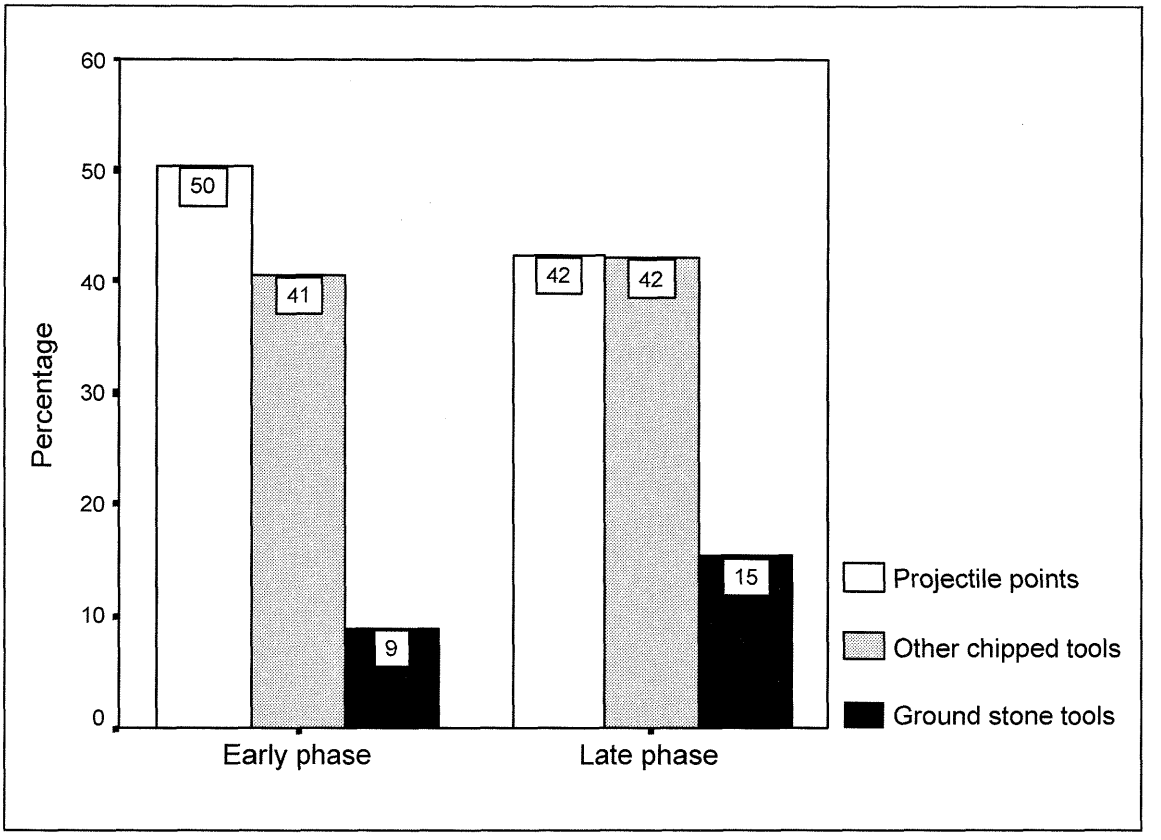

Figure 14. Composition of Lithic Tool Types.

Settlement Phase		Features with ground-stone tools: Present	Features with ground-stone tools: Absent	Total
Early	Count Expected	10 12.9	14 11.1	24
Late	Count Expected	12 9.1	5 7.9	17
Total		22	19	41

Table 15. Presence or Absence of Ground-stone Tools in Feature Contexts.

I also considered patterning in raw material usage at the Partridge Creek site. Chert appears relatively infrequently as a raw material in the James River Piedmont and more abundantly in the Ridge and Valley to the west. The alluvial transportation of "float chert" cobbles results in higher frequencies of these materials close to the Blue Ridge and decreasing amounts further downstream (Hantman 1987). Parker's (1989) study of Virginia Piedmont sites indicates that during the Late Woodland period, frequencies of projectile points made from chert increased over earlier periods. Parker's findings raise the possibility that chert triangular points moved from the Ridge and Valley to the Piedmont through more intensive exchange relations that developed after

A.D. 900 (Hantman and Klein 1992).

The Partridge Creek site lithic data allow Parker's findings to be tested using feature assemblages that have been dated on an absolute scale within the Late Woodland period. Since these features all occur in the same floodplain location of the Partridge Creek site, variability in the presence of chert projectile points cannot be explained in terms of differential access to float chert or other geographical differences. For this analysis I considered only those features containing projectile points. Of features dated to the early settlement phase (n = 19), only 5.3% included chert projectile points while 28.6% of features in the later settlement phase (n = 14) included chert points. The number of projectile points made from chert and recovered from feature contexts increased over the course of the two settlement phases at the Partridge Creek site, supporting Parker's analysis. Only one chert point appears in the nineteen features dated to the early settlement phase that contain projectile points, while four of the fourteen later settlement phase features with at least one projectile point included chert examples. The contingency table (Table 16) below indicates that the difference between these frequencies is statistically significant at the 0.10 level. For Table 16, Fisher's Exact Test produces a one-tailed probability of 0.089. This result supports the inference that the presence or absence of chert points at the Partridge Creek site is dependent upon its settlement phase.

On the whole, the Partridge Creek site lithic assemblage revealed striking patterns, several of which appear to be related. The density and diversity of lithic artifacts increased during the first half of the Late Woodland period at the site, while ground stone tools assumed a greater prominence. These patterns support the inference that a shift toward increased sedentariness and greater reliance on plant foods occurred. Concurrently, the use of chert projectile points at the site increased. Assuming that sedentariness did increase between the first and second settlement phases, the increased presence of chert artifacts within the later phase is likely a result of more intensive exchange, rather than greater direct procurement.

Settlement Phase		Features with chert points: Present	Features with chert points: Absent	Total
Early	Count	1	18	19
	Expected	2.9	16.1	
Late	Count	4	10	14
	Expected	2.1	11.9	
Total		5	28	33

Table 16. Presence or Absence of Chert Projectile Points by Period in Feature Contexts.

6 PALEOBOTANICAL AND FAUNAL ANALYSES

PALEOBOTANICAL ANALYSIS

Paleobotanical remains recovered from Partridge Creek site features provide an important data set reflecting early horticultural practices in the Virginia Piedmont. Analyzed by Justine Woodard McKnight (Appendix), the paleobotanical data suggest that Piedmont Indians raised maize, beans, and squash in substantial quantities during the early centuries of the Late Woodland period.

McKnight's results are not entirely unexpected since two previous bioarchaeological studies (Gold 1998; Trimble 1996) found that Late Woodland Indians in the Piedmont subsisted on a mixed diet that incorporated cultigens. Gold's (1998) analysis of Late Woodland skeletal remains from the Piedmont and Ridge and Valley identified patterning in dental caries, tooth wear, and enamel hypoplasia indicating that horticultural resources played an important role in a mixed subsistence regime combining cultivated and non-cultivated foods. Similarly, Trimble's (1996) stable isotope analysis of teeth and bones suggests that cultigens contributed substantially to diet throughout the Virginia interior. Trimble found that Piedmont consumption of C4 plants (which include maize) comprised somewhat less than 50% of the diet. Even with the minority status of maize in Piedmont diets, the dearth of macrobotanical evidence of cultigens within Late Woodland sites in the James River Piedmont has been puzzling. Mouer recovered carbonized maize from a feature at the Point of Fork site (44FV19) radiocarbon dated to 920 +/- 75 bp (Potter 1993:145). Carbonized cucurbit seeds and maize cupules were recovered from a Spessard site (44FV134) feature dated to 790 +/- 80 bp (Gallivan and Hantman n.d.).

Material from the Partridge Creek site expands this limited macrobotanical data base of horticultural evidence from the Piedmont considerably and, in fact, provides some of the clearest indications of the early use of domesticates in Virginia. McKnight recovered maize kernels or cupules from 44.4% of the features subjected to flotation analysis (n = 18), implying that corn-based horticulture was more than a sporadic occurrence at Partridge Creek. Combining the results of flotation and water screen analysis, cultigens appeared in 12 of the 31 features from the site that were analyzed for paleobotanical remains. Table 17 summarizes these data. Cultigens appeared in three of the radiocarbon-dated features at the site: features 10, 39, and 40.

Feature 10, radiocarbon-dated to 980 +/- 50 bp and interpreted as a roasting pit, contained carbonized evidence of corn, beans, and squash. Figure 17 depicts feature 10's plan and profile. Not only is the combination of cultigens recovered from feature 10 remarkable, but the feature provides the earliest date for evidenceof domesticates in the Virginia Piedmont. The *Cucurbita maxima* seed recovered from the Partridge Creek site's feature 10 was the only evidence of this cultigen found at the site. Bean fragments were recovered from features 10 and 54. Another early feature containing cultigens, feature 9 at the Reynolds-Alvis site (44HE470), included bean and squash seeds (Gleach 1987:174). The Reynolds-Alvis site is located in the James River basin's inner Coastal Plain. Dated to 1030+/- 75 bp, Reynolds-Alvis' feature 9 and feature 10 at the Partridge Creek site both suggest that maize, beans, and squash grew in concert east of the Blue Ridge by the outset of the Late Woodland period. The radiocarbon assay from Partridge Creek site's feature 10 has a two-sigma calibrated date range of A.D. 983 - 1180 and intercepts the calibration curve at A.D. 1028.

These results imply that the sequence whereby populations in central Virginia first adopted tropical domesticates parallels trends in the Southeast and the Eastern Woodlands interior more closely than those to the north. Hart and Scarry (1999) have recently concluded based on direct AMS dating of beans that evidence for maize-beans-squash intercropping post-dates A.D. 1300 in the Northeast (i.e. north of Maryland). Maize-bean-squash agriculture appears to have developed gradually in the Northeast as the three cultigens were adopted independently over a period

Table 17. Summary of Paleobotanical Data.

Feat.	Floated Soil Liters	Zea mays (corn) from flotation: Kernel fragments	Cupules or fragments	Grams	Phaseolus vulgaris (common bean) from flotation: Fragments	Grams	Cultigens from flotation: Grams per 100 liters	Nut remains from flotation: Grams	Grams per liter	Cultigens recovered during water screening
1*	1.950	0	6	0.04	0	0	2.05	1.51	77.44	0
2*	1.950	0	0	0	0	0	0	0	0	1 maize kernel
3*	1.650	0	1	0.01	0	0	0.61	0	0	0
4	1.650	0	0	0	0	0	0	0	0	0
6	-	-	-	-	-	-	-	-	-	0
7*	3.775	0	7	0.04	0	0	1.06	0	0	1 cupule with glume attached
8*	5.500	0	3	0.02	0	0	0.36	0.01	0.18	0
10*	3.250	1	0	-	3	-	0.92	0.34	10.46	1 cucurbit seed, 6 maize kernels
11	-	-	-	-	-	-	-	-	-	0
12	4.025	0	0	0	0	0	0	0	0	0
13	-	-	-	-	-	-	-	-	-	0
14	-	-	-	-	-	-	-	-	-	0
15*	2.000	0	1	0.01	0	0	0.50	0.01	0.50	1 maize cupule segment
17	2.000	0	0	0	0	0	0	0.01	0.50	[Not analyzed]
18	-	-	-	-	-	-	-	-	-	0
19	-	-	-	-	-	-	-	-	-	0
20*	-	-	-	-	-	-	-	-	-	6 kernel fragments
22	3.300	0	0	0	0	0	0	0.01	0.30	[Not analyzed]
24	2.100	0	0	0	0	0	0	0	0.00	0
25	-	-	-	-	-	-	-	-	-	0
33*	1.950	0	0	0	0	0	0	0.01	0.51	2 cupules, 1 cupule fragment
35	-	-	-	-	-	-	-	-	-	0
37	3.750	0	0	0	0	0	0	0	0	[Not analyzed]
38	2.150	0	0	0	0	0	0	0	0	0
39*	8.475	0	330	1.39	0	0	16.40	0.48	5.66	3 cupules
40*	4.350	1	0	0.01	0	0	0.23	0.58	13.33	1 kernel
44	-	-	-	-	-	-	-	-	-	0
51	2.050	0	0	0	0	0	0	2.43	118.54	[Not analyzed]
52	-	-	-	-	-	-	-	-	-	0
53	-	-	-	-	-	-	-	-	-	0
54*	-	-	-	-	-	-	-	-	-	2 bean fragments, 1 maize kernel, 1 maize kernel fragment

** Cultigens identified in feature.*

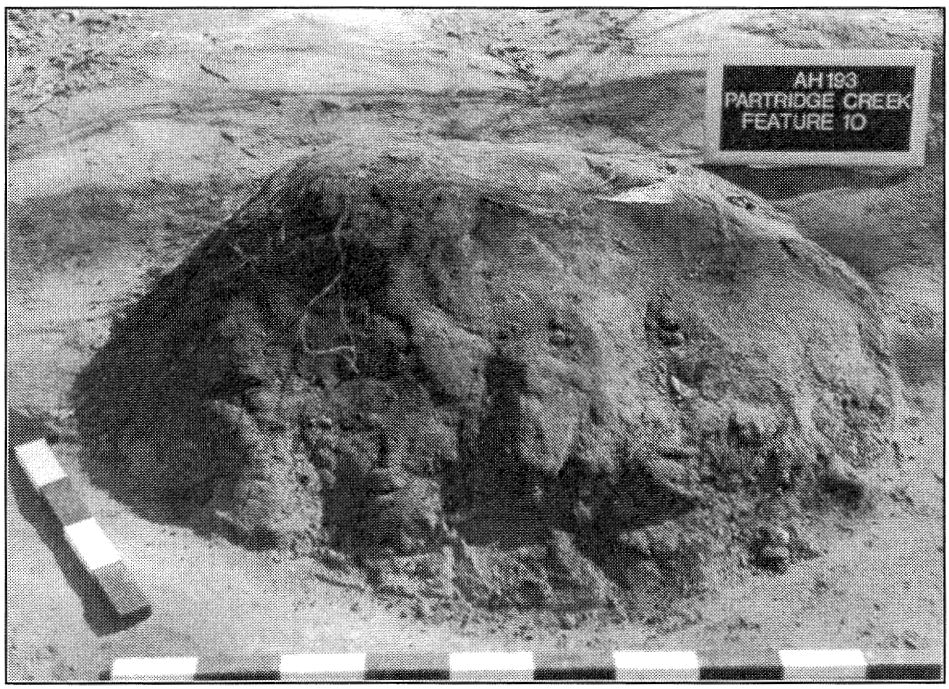

Figure 15. Feature 10 Prior to Excavation.

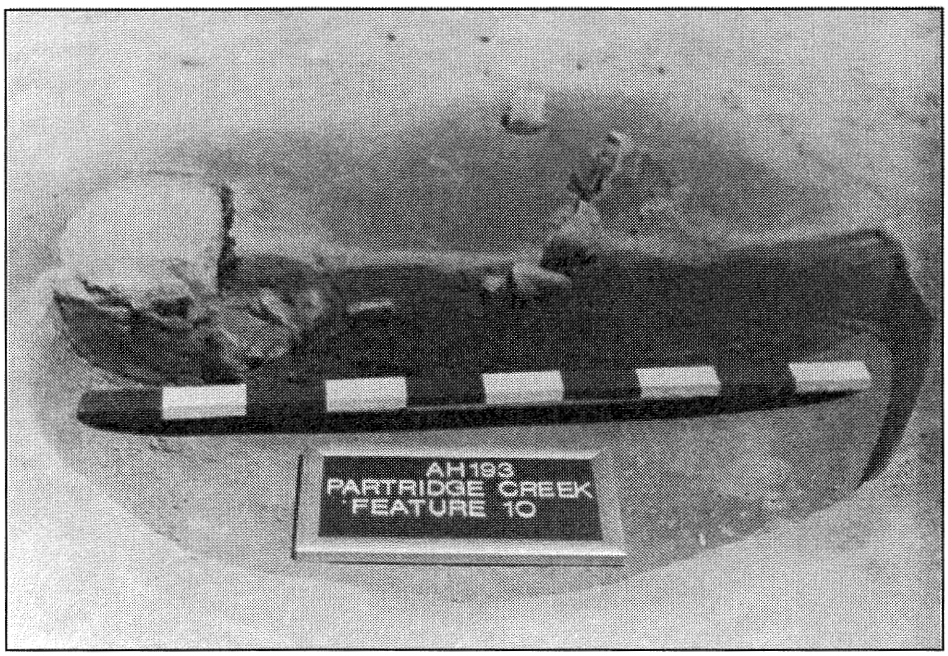

Figure 16. Feature 10, Partially Excavated.

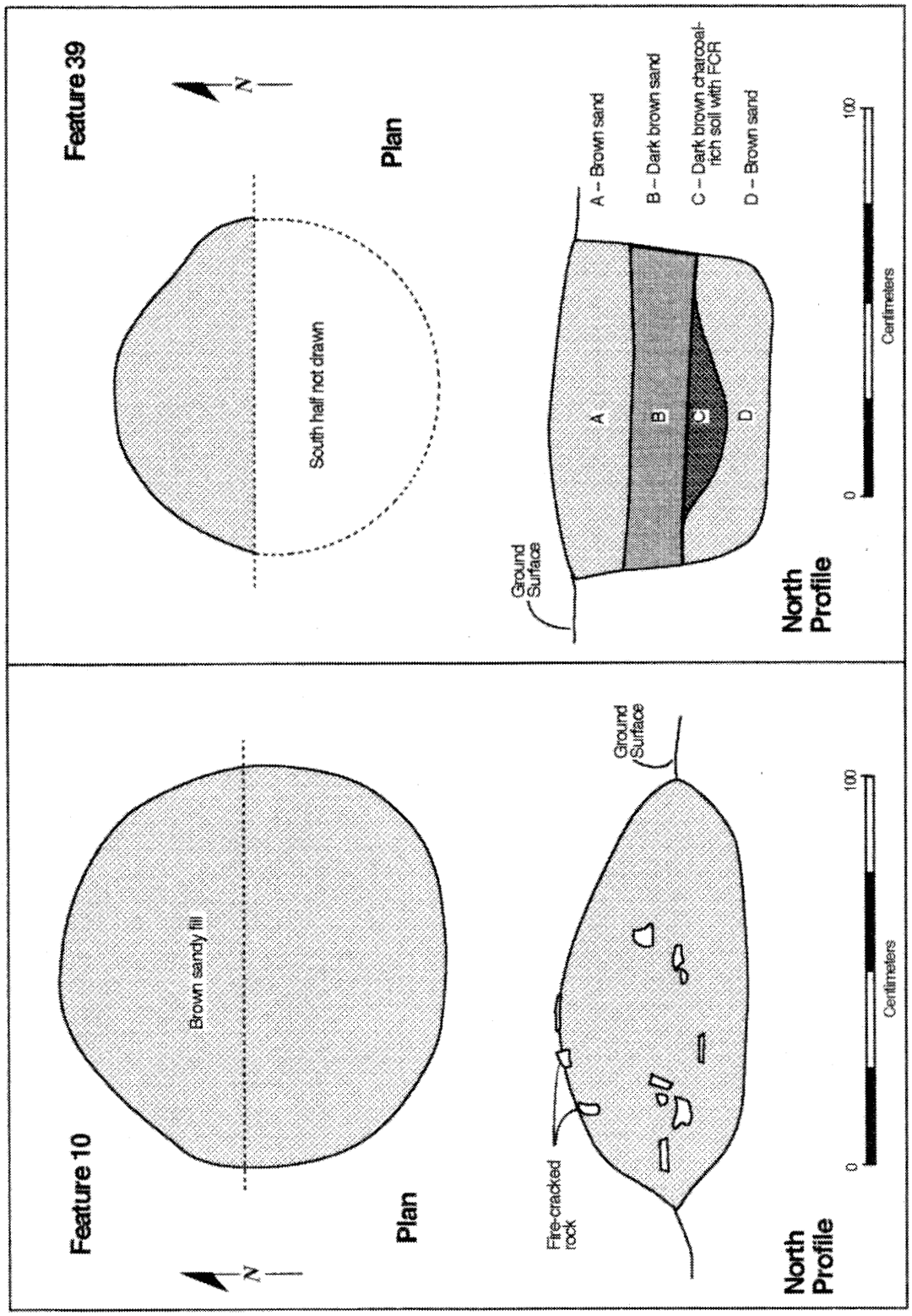

Figure 17. Plan and Profile of Features 10 and 39.

of more than 2,000 years. While the adoption of these domesticates may have been similarly gradual in the Southeast, maize, beans, and squash do occur together in southeastern archaeological contexts shortly after A.D. 1000 (Steponaitis 1986:388), roughly three centuries prior to the appearance of this combination in the Northeast. Fort Ancient assemblages in the Midwest similarly reflect a subsistence shift toward maize and beans circa A.D. 1000 (Fritz 1990:417). Closer to the Partridge Creek site, Piedmont sites from the Haw and Roanoke river drainages immediately south of the James River basin demonstrate the presence of maize-beans-squash horticulture from the early part of the Haw River Phase (A.D. 1000 - 1400) and the Dan River Phase (A.D. 1000 - 1450) (Ward and Davis 1993:408, 417).

Feature 39, interpreted above as a roasting pit feature, returned a radiocarbon date of 680 +/- 50 bp and included a high concentration of carbonized maize cupules (Figures 17 and 18). This feature contained the highest density of maize remains at the site with 330 cupules or cupule fragments. McKnight also identified over 1,000 fragments of monocot stem and leaf debris that are probably burned ears of corn. As McKnight notes, the deposit of burnt maize material may reflect unintentional burning or the purposeful roasting of corn. Jamestown colonist William Strachey (quoted in Swanton 1946:363) described Powhatan food preparation that periodically required unusual cooking facilities for special events:

> They use to rake up a great number of them in old leaves and ferne, and cover all with earth and sand, in the manner of a coal-pit; on each side they continue a great fier a daie and a night.

Feature 39 may represent similar practices in the Piedmont.

While cultigens appeared with some frequency in Partridge Creek site features, the paucity of macrobotanical evidence for domesticates within Late Woodland sites in Virginia contrasts sharply with Jamestown colonists' descriptions of intensive horticultural practices in contact period Tidewater. Given this contrast, it is likely that food production increased during the Late Woodland period. At the same time, the relative importance of wild foods, including nuts, likely declined. However, my consideration of the density of domesticates and of nut remains within features assigned a settlement phase using the absolute dating methods described earlier does not produce clear temporal patterning at the Partridge Creek site. The mean density of cultigen fragments measured as grams per 100 liters of floated soil increases from 0.4 grams per 100 liters for features dated to the earlier settlement phase (n = 11) to 2.5 grams per 100 liters for the later settlement phase (n = 7). Much of this increase, though, comes from one feature, feature 39, which contains an extremely high density of corn cupules. The difference between the mean densities for the two settlement phases is not statistically significant. The mean density of nut remains in features dated to the later settlement phase, 17.9 grams per 100 liters, is also higher than the mean density of nut remains in the earlier settlement phase: 9.3 grams per 100 liters. Once again, the difference is not statistically significant.

While not particularly informative about changes in the relative importance of domesticates during the early Late Woodland centuries, the site's paleobotanical data does require us to rewrite the history of horticultural practices in late prehistoric Virginia. Maize appears with beans and squash in a feature with a calibrated date range of A.D. 983 - 1180 and a calibration curve intercept at A.D. 1028. Domesticates appear in almost half of the pits at the site whose soils were floated. In the James River Piedmont, horticulture clearly played a vital role in early Late Woodland subsistence.

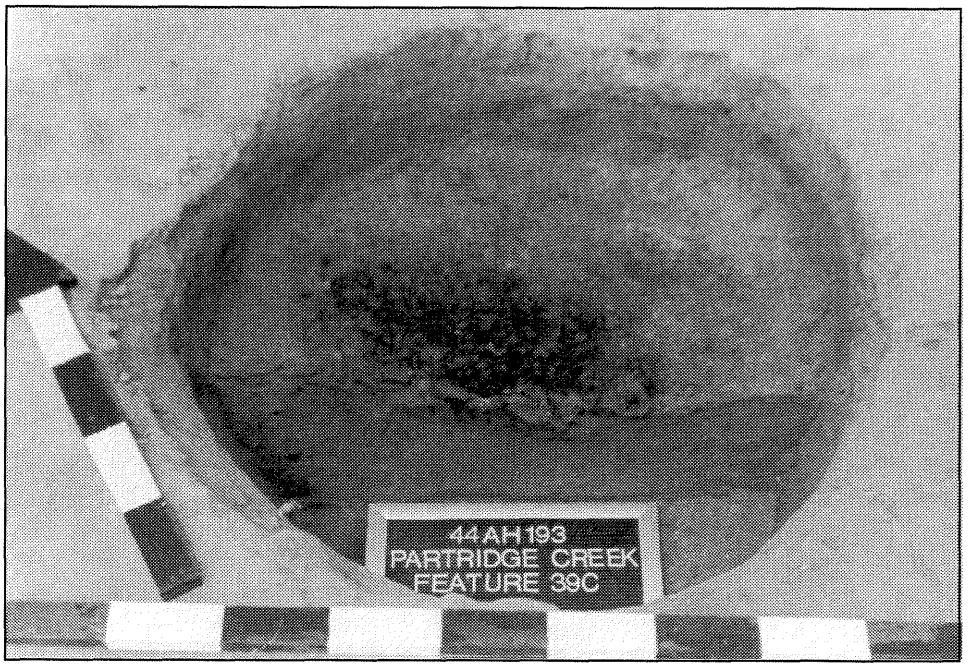

Figure 18. Partially Excavated Feature 39.

FAUNAL ANALYSIS

As analyzed by Michael Barber (1986), the Partridge Creek site faunal material consisted of 108 identified bones or bone fragments. These included the remains of deer, box turtle, gar, turkey, catfish, and squirrel, as listed in Table 18.

Barber (1986:4) suggests that the consumption of these species reflects a focus on the deciduous forest edge and the riverine environment. Although limited, the evidence for seasonality points also toward a warm weather occupation (1986:3).

Species	N	%
Mammals	**49**	**45.38**
Odocoileus virginianus (deer)	42	38.89
Castor canadensis (beaver)	2	1.85
Marmota monax (woodchuck)	1	0.93
Sciurus sp. (squirrel)	3	2.78
Sylvilagus floridana (rabbit)	1	0.93
Birds	**4**	**3.71**
Meleagris gallopavo (turkey)	3	2.78
passerine (song bird)	1	0.93

Species	N	%
Reptiles	**45**	**41.67**
Terrapene carolina (box turtle)	45	41.67
Amphibians	**1**	**0.93**
Rana sp. (frog)	1	0.93
Fish	**9**	**8.34**
Perca flavescens (perch)	1	0.93
Ictalurus sp. (catfish)	3	2.78
Lepistosteus sp. (gar)	5	4.63

Table 18. Faunal Remains (from Barber 1986:5).

7 COMMUNITY ORGANIZATION

The internal organization of floodplain settlements remains a critical issue for Late Woodland studies in Virginia. The features at the Partridge Creek site provide some insights into this topic as they appear to represent components of two settlement phases. Figures 19 and 20 depict the spatial distribution of features at the Partridge Creek site dating to the two phases of settlement. Early settlement phase features appear to be distributed somewhat randomly, with a dense cluster near the center of the scoured area. The late settlement phase features, by contrast, were concentrated near the mouth of Partridge Creek to a greater extent than the features of the early phase, with storage pits in that area arrayed in what appears to be a regularly-spaced distribution.

Nearest neighbor analysis (Whallon 1974) provides a quantitative means of evaluating these impressions. Nearest neighbor analysis characterizes the spatial distribution of items such as artifacts on a living surface or sites in a settlement system. For each item in a sample, the procedure involves measuring the distance to the item in closest proximity. From these values, nearest neighbor analysis characterizes spatial distributions as either random or non-random, with departures from randomness on two tails that equate with more clustered or more regularly-spaced distributions than one would expect if chance alone were operating. This approach was applied to Partridge Creek site features located in the flood-scoured area. Since features from the two different phases were most likely created over the course of more than simply two discrete occupations, this analysis does not characterize patterning in two distinct settlements. Nonetheless, nearest neighbor analysis does allow general spatial patterning of the two phases of settlement to be characterized systematically.

In order to lessen the 'boundary effect' created by items close to the edge of an excavation that may be nearest neighbors with an unidentified item outside the excavation area, only the features at the Partridge Creek site that are closer to another feature than to the boundary of the scoured area were included in the analysis. The approximately 500 square meter area in the northwest corner of the site was excluded due to its isolation from much of the scoured area.

The ratio of observed to expected average nearest neighbor distance is the nearest neighbor coefficient. Nearest neighbor coefficients less than 1.00 are relatively clustered, and those greater than 1.00 are relatively evenly spaced. The early settlement phase feature distribution produced a nearest neighbor coefficient of 0.79 ($n = 16$, $r_o = 5.57$, $r_e = 7.07$, area = 3000, $c = -1.62$), suggesting a relatively clustered distribution, but not one that departs significantly from randomness at the 0.05 or 0.10 levels. Later phase features resulted in a nearest neighbor coefficient of 1.11 ($n = 15$, $r_o = 8.10$, $r_e = 7.32$, area = 3000, $c = 0.079$), suggesting a distribution slightly more evenly-spaced than random, but (again) not one that departs significantly from random at the 0.05 or 0.10 levels.

Unfortunately, these results do not allow the spatial pattern to be characterized definitively. Nevertheless, they do provide limited quantitative evidence in support of the qualitative impressions described above. The regular spacing of later phase features, particularly those near Partridge Creek's mouth, raises the possibility that some of these features derive from a single, thirteenth-century community with a roughly semi-circular pattern of storage pits.

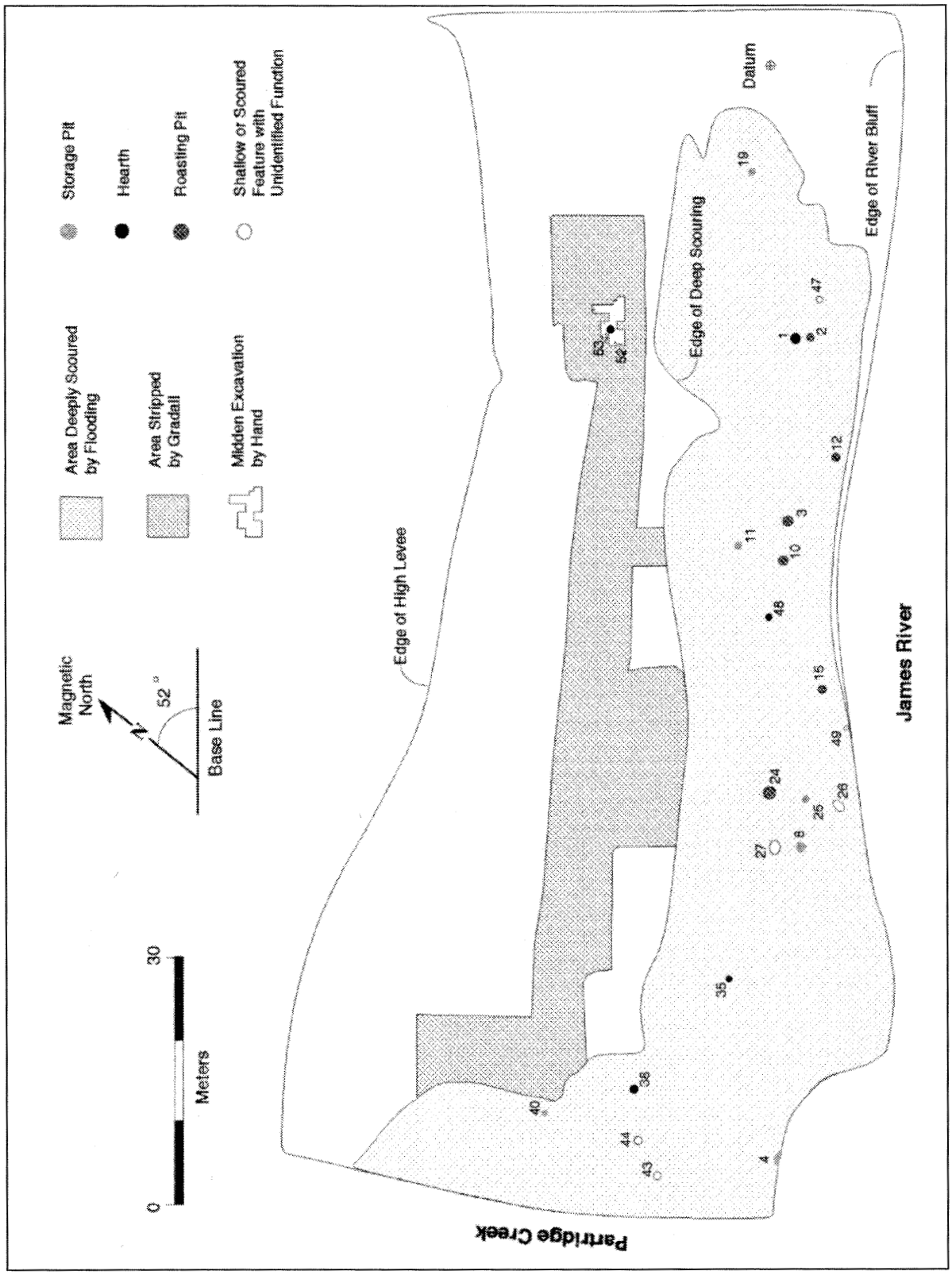

Figure 19. Early Settlement Phase Features at the Partridge Creek Site.

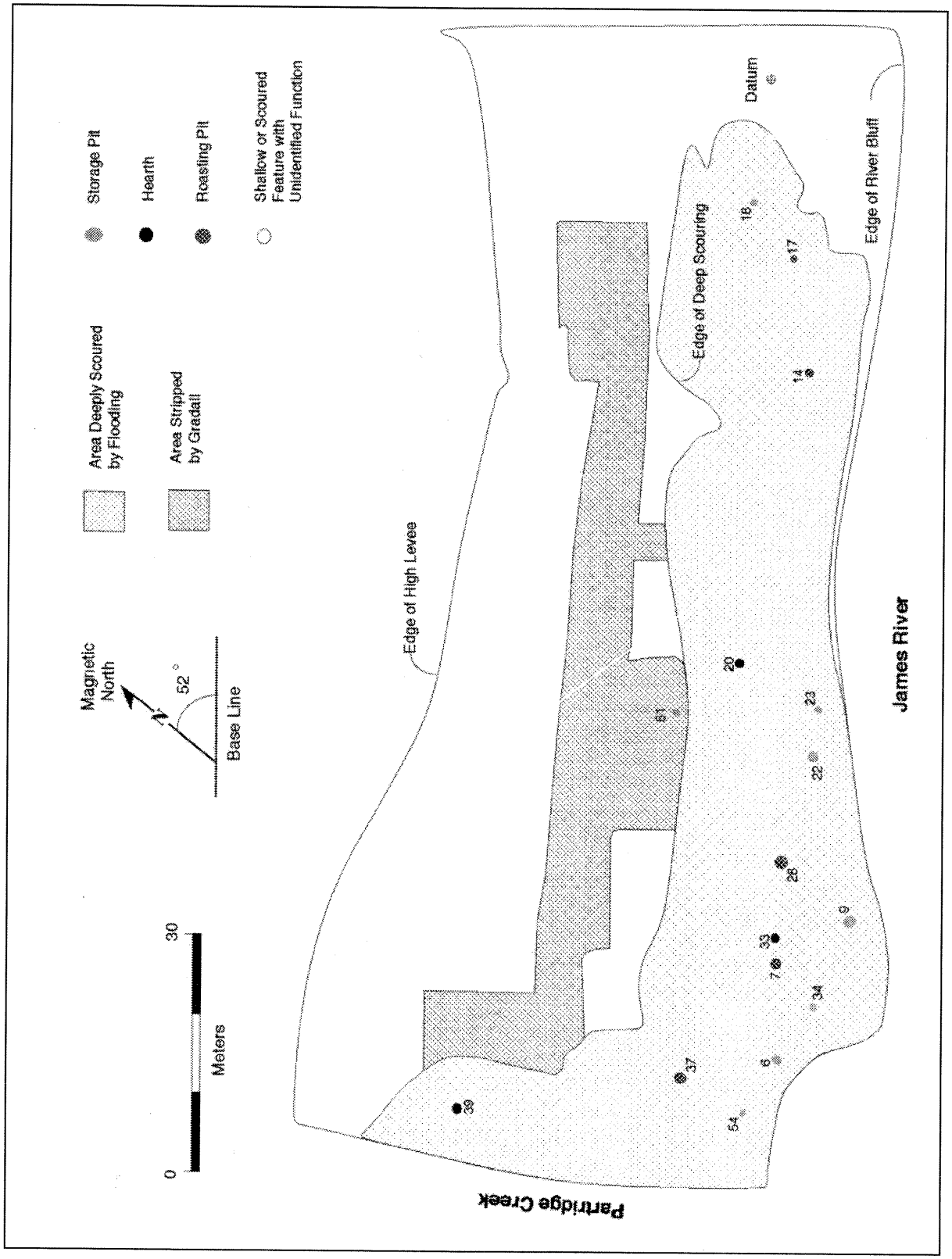

Figure 20. Late Settlement Phase Features at the Partridge Creek Site.

8 CONCLUSION

The Partridge Creek site represents the largest set of prehistoric feature data excavated in the James River Piedmont. Despite the destructive flooding that led to its discovery, the site provides information fundamental to late prehistoric settlement organization, material culture, and subsistence. These topics may be addressed through data from the Partridge Creek site due largely to the careful excavation of Partridge Creek site features directed by Tourtellotte. Additionally, Klein's (1994) absolute seriation approach to ceramic analysis provided the chronological tool that proved critical to developing an occupational history of the site.

Patterning in the pit features excavated at the site indicates that Piedmont communities increased their use of storage pit features during the early centuries of the Late Woodland period. Concurrently, increases in the density and diversity of lithic artifacts imply an increased intensity of floodplain settlement.

The material culture recovered from Partridge Creek site features is critical to understanding artifact style and patterns of tool use in the region. The Albemarle ceramics from the site suggest that Piedmont Indians decorated roughly half of the vessels they produced. Similarities between these ceramics and Shepard or Dan River wares indicates that Indians of the James River Piedmont shared decorative motifs with groups residing in the Piedmont portions of the Potomac and Roanoke River drainages. The increased presence of chert projectile points by the later settlement phase at the site raises the possibility that Indians of the James River Piedmont established greater ties with residents of the Ridge and Valley to the west as well.

Paleobotanical remains from the site reflect the presence of maize, beans, and squash quite early during the Late Woodland period. Based on feature 10's radiocarbon date, Piedmont groups may, in fact, have practiced maize-beans-squash intercropping as early as the eleventh century A.D. This evidence suggests parallels with the subsistence patterns of contemporary groups to the south and the west, rather than to the north. The increased presence of ground stone implements raises the possibility that plant food processing may have assumed greater importance by the thirteenth century A.D. However, no clear evidence of increased use of domesticates is evident in the paleobotanical data from the site.

In the context of the James River Piedmont, it is apparent that the Partridge Creek site shares elements with three other sites from the early centuries of the Late Woodland period: Wingina (44NE4), Wood (44NE143), and Spessard (44FV134). Similarities include: 1) the predominance of Albemarle pottery with direct rims decorated with simple decorative motifs; 2) a site structure that entails a linear scatter of features along the floodplain interspersed with small, compact clusters of features; and 3) the frequent appearance of relatively deep, cylindrical or bell-shaped storage pits. Ironically, Partridge Creek site's exposure by flooding allows some behavioral changes to be explored in greater detail than is possible at sites excavated in a more controlled, yet spatially-limited, fashion.

Beyond the James River Piedmont, the Partridge Creek site provides an ideal data set for evaluating ceramic stylistic patterning at a broad, regional scale. Decorative attributes found on rim sherds at the site imply social connections between Partridge Creek site residents and Indians in the Piedmont to the north and the south. An analysis of these similarities and their implications for Piedmont social interaction represents a research topic that may be explored with a data set that includes the Partridge Creek site.

The Partridge Creek site also reflects Late Woodland social changes apparent at the scale of the Chesapeake Region. In a recent quantitative analysis of settlements in the Coastal Plain, Piedmont, and Ridge and Valley provinces, I found evidence of dramatic Late Woodland alterations in the internal organization of floodplain communities (Gallivan 1999). Within the James River basin as a whole, settlement populations increased in size and become more sedentary over the course of the Late Woodland. During the final three centuries of the Late Woodland period, the suite of features

associated with domestic structures and the community as a whole changed amidst the first appearance of village settlements.

Patterning apparent at the Partridge Creek site reflects the beginnigs of these transformations, including those related to settlement intensity and feature construction. The addition of food production to the Late Woodland subsistence economy undoubtedly played a fundamental role in such developments. However, the presence of maize, beans, and squash within features dated to the early settlement phase at the Partridge Creek site implies that Indians in the Piedmont had mastered horticultural practices centuries before the appearance of villages marked by changes at the household, community and regional social scales. Rather than a direct result of a new subsistence regime, the appearance of villages during the final prehistoric centuries likely followed upon social developments that occurred on the floodplain between A.D. 900 and A.D. 1200. The Partridge Creek site offers significant insights into this context.

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Appendix:
Botanical Remains

by Justine Woodard McKnight

Recent synthesis of archaeological work at the Partridge Creek site (44AH193) included the analysis of plant macro-remains recovered through water screening and soil flotation. Archeobotanical research was undertaken in an effort to better understand prehistoric subsistence and the nature of the local landscape at the Partridge Creek site during the Late Woodland period. Thirty one features were analyzed for botanical remains. Twelve of these (39%) contained plant domesticates, including maize, bean, and cucurbit from a feature radiocarbon-dated to the tenth century A.D.

Twenty-nine flotation samples were analyzed from 18 distinct cultural features (features 1, 2, 3, 4, 7, 8, 10, 12, 15, 17, 22, 24, 33, 37, 38, 39, 40, and 51). Fifty-six separate samples of water screen-recovered plant remains from 27 cultural features (features 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 18, 19, 20, 24, 25, 33, 35, 38, 39, 40, 44, 52, 53, and 54) were also analyzed.

METHODS

FLOTATION SAMPLES

All carbonized plant remains recovered through flotation were passed through a two millimeter geological sieve, yielding fractions of two different sizes for analysis. Weights and sample descriptions of the resulting greater than or equal to two mm. and the less than two mm. fractions were recorded. Charcoal specimens greater than or equal to two mm. were examined under low magnification (10X to 30X) and sorted into general categories of material (i.e., wood, nutshell, seeds, corn, etc.). Description, count, and weight were taken for each category of the greater than or equal to two mm. material. The less than two mm. size fractions were examined under low magnification, their general composition recorded, and all seed and cultivated plant remains were removed for identification.

Identifications were routinely attempted on all seed, nut, cultigen, and miscellaneous plant remains recovered, and on a sub-sample of twenty randomly-selected wood fragments from each flotation sample containing *more* than twenty specimens, in accordance with standard practice (Pearsall 1989). Identifications of all classes of botanical remains were made to the genus level when possible, to the family level when limited diagnostic morphology 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 assemblages include *'ring porous'*, where specimens exhibited differences between early and late wood growth; *'diffuse porous'*, where no difference between early and late wood was apparent; *'deciduous taxa'*, where specimens could be identified as having a porous vessel arrangement reflecting deciduous trees rather than a trachid arrangement indicative of coniferous taxa; *'coniferous taxa'* where specimens exhibited a trachid structure rather than a porous one; 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 carbonized remains which lacked any identifiable characteristics.

In order to establish the recovery rate of macro-botanical remains from the Partridge Creek site using the Shell Mound Archaeological Project (SMAP)-type flotation system, the standard 'poppy seed test' (Wagner 1982) was applied. Measured lots of 50 poppy seeds *(Papaver somniferum)* were added to 6 of the 29 analyzed flotation samples prior to processing. Recovery rates averaged 80%. Some contamination between samples was observed; two samples which were not augmented with poppy seeds contained a single poppy seed each. No damage to any poppy seeds was noted.

WATER SCREEN-RECOVERED SAMPLES

Carbonized plant materials recovered through water screening were examined and weighed, then separated into general classes of material, as described above. Wood charcoal was weighed, and the total number of fragments counted. Identification of 100% of the water screen-recovered nutshells, seeds, cultivated plants, and miscellaneous plant materials was attempted.

All identifications were made under low magnification (10X to 30X) with the aid of standard

texts (Martin and Barkely 1961; Panshin and de Zeeuw 1980), and checked against plant specimens from a modern comparative collection representative of the flora of Amherst County, Virginia. Specimens were weighed using an electronic balance accurate to 0.01 grams.

ANALYSIS RESULTS

The archeobotanical assemblage from the Partridge Creek site contained abundant carbonized remains, including deciduous and coniferous wood charcoal, nutshells, seeds, the cultivated triad of corn, beans, and squash, and miscellaneous plant materials such as amorphous carbon, unidentifiable rind fragments, a gall, monocot tissue, and fungal fructifications. In addition to carbonized plant remains, a small quantity and diversity of non-carbonized weed seeds were also recovered. The results of flotation-recovered and water screen-recovered plant materials are discussed separately below.

FLOTATION RESULTS

Flotation processing of 55.875 liters of soil resulted in the recovery of 52.87 grams of charcoal, or an average of 0.95 grams of charcoal per liter of feature fill. This analysis included material from 19 features divided into 29 soil samples. Tables A and B present an inventory of flotation-recovered plant remains from the Partridge Creek site.

Wood Charcoal

Wood charcoal was the most abundant plant macro-remain type present. A total of 2,847 carbonized wood fragments weighing 35.94 grams was recovered. Of this total, a subset of 549 fragments was identified (a maximum of 20 fragments randomly selected from each sample). The identified wood sub-sample revealed the presence (in order of abundance) of white oak *(Quercus sp.) (LEUCOBALANUS group)*, pine *(Pinus spp.)* belonging to the southern or hard pine group, hickory *(Carya sp.)*, red oak *(Quercus sp.) (ERYTHROBALANUS group)*, American chestnut *(Castanea dentata)*, ash species *(Fraxinus sp.)*, unspecified oak *(Quercus sp.)*, black walnut *(Juglans nigra)*, black locust *(Robinia pseudoacacia)*, eastern red cedar *(Juniperus virginiana)*, red mulberry *(Morus rubra)*, maple *(Acer sp.)*, elm species *(Ulmus sp.)*, honey locust *(Gymnocladus dioica)*, and osage orange *(Maclura pomifera)*. Sixty two wood fragments were identified as *'ring porous'* taxa, five as *'diffuse porous'*, one as *'coniferous taxa'*, and 58 as *'deciduous taxa'*. Eighty one fragments were *'unidentifiable'*.

Nutshell

Burned nutshell fragments of three native tree species were identified within the Partridge Creek assemblage. A total of 230 nutshell fragments weighing 5.37 grams was recovered. Two hundred and three pieces of thick-walled hickory nutshell *(Carya sp.)*, 25 fragments of black walnut *(Juglans nigra)*, and a single acorn *(Quercus sp.)* shell fragment were identified. Another (1) nutshell fragment was unidentifiable.

Carbonized Seeds

Carbonized seeds were recovered from 34% of the analyzed samples, with a total of 12 carbonized seeds weighing 0.02 grams. Taxa identified included goosefoot *(Chenopodium sp.)* (two seeds), poke *(Phytolacca americana)* (two seeds), pinkweed *(Polygonum pensylvanicum)* (one seed), cordgrass *(Spartina sp.)* (two seeds), grape *(Vitis sp.)* (one seed). In addition, one seed was unknown to the analyst, and thirteen others were not taxonomically identifiable.

Non-carbonized Seeds

A total of 32 non-carbonized seeds were encountered within this flotation assemblage. These specimens were recovered from 34% of the analyzed samples. The presence of non-carbonized seed remains within flotation samples from open-site environments is usually considered evidence of modern seed contamination (Minnis 1981; Keepax 1977; Smith 1985). Modern seed intrusion can be attributed to isolated post-depositional disturbances such as rodent burrowing, the action of root growth, down washing, or by some combination of these factors (Hastorf and Popper 1988; Pearsall 1989). Although non-carbonized archeobotanical remains can persist in rare contexts such as consistently dry or wet environments, such conditions do not characterize the Partridge Creek project area. The

Field Sample Number		75	34	11	none	17	31	10	4	16	41	42	19	24	30	27	none	none	40	51	37	39	5	2	54	55	56	57	58	61	Totals
Feature Designation		1B	2B	3B	4	7	7B	8B	8C	8D	10B	10B	12D	12E	15B	17D	22C	22B	24C	33B	37B	37C	38B	39B	39B	39C	39D	40B	40C	51B	
Soil Sample Volume (liters)		1.95	1.95	1.65	1.65	1.8	1.975	1.95	1.85	1.7	1.9	1.35	2.05	1.975	2	2	1.65	1.65	2.1	1.95	2.1	1.65	2.15	2.35	2	2.15	1.975	2.25	2.1	2.05	55.88
Total Charcoal Weight (grams)		4.58	1.02	0.07	2.94	1.03	1.39	1.77	2.11	0.1	1.34	0.71	0.92	4.65	0.85	0.05	0.05	1.5	0.58	3.88	0.88	0.17	3.16	2.24	3.66	5.49	0.08	2.52	0.34	4.79	52.87
WOOD CHARCOAL (carbonized)	count	211	74	13	218	92	107	145	162	18	69	51	110	208	80	2	20	102	37	247	90	23	205	119	61	14	19	129	41	180	2847
	grams	2.89	0.98	0.04	2.88	0.96	1.26	1.67	1.4	0.08	0.83	0.32	0.87	4.47	0.74	0.04	0.03	1.31	0.43	3.82	0.82	0.17	2.8	1.49	1.37	0.08	0.07	1.79	0.29	2.04	35.94
Acer sp. (maple)						2														3											5
Carya sp. (hickory)		5					1							17				2		3	1									7	36
Castanea dentata (American chestnut)			3		16	1			1										1			1	1	1						1	26
Fraxinus americana (white ash)		2											3																		5
Fraxinus sp. (ash)			1		4																		1		1		1				8
Gymnocladus dioica (honey locust)											1																				1
Juglans nigra (black walnut)		3							1			2					1											2			9
Juniperus virginiana (eastern red cedar)									5		1												2								8
Maclura pomifera (osage orange)																							1								1
Morus rubra (red mulberry)		1									1					1					1						4				8
Pinus spp. (so. pine group)			3					3	6				14	3	8				15			2		1	1		5	13			74
Quercus sp. (red group)						3			5			2						10			2			3	5						30
Quercus sp. (white group)		5	10			8	5	17			8							6	1	7	10			2	7	3			8	6	103
Quercus sp. (unspecified)							5						2		1				1			1	3		5						18
Robinia pseudoacacia (black locust)						1			1						3					3											8
Ulmus americana (American elm)						1																									1
Ulmus sp. (elm)									1																						1
ring porous			2			2	5			10	4	6	1		3				1		5	1	5		1	6			7	3	62
diffuse porous																								5							5
coniferous taxa																			1												1
deciduous taxa		4		10			2				5	9						2		4		10	7	1			1	3			58
unidentifiable			1	3		2	2			10		1			5	1	19				1	5		7		5	9	2	5	3	81
total identified fragments		20	20	13	20	20	20	20	20	20	20	20	20	20	20	2	20	20	20	20	20	20	20	20	20	14	20	20	20	20	549
NUT REMAINS	count	86	0	0	0	0	0	0	1	1	5	15	0	0	1	1	0	1	0	1	0	0	0	11	4	0	0	10	0	93	230
	grams	1.51	0	0	0	0	0	0	<0.01	<0.01	0.09	0.25	0	0	0.01	0.01	0	<0.01	0	0.01	0	0	0	0.4	0.08	0	0	0.58	0	2.43	5.37
Carya sp. (thick-walled hickory)		86							1		5	11			1	1				1				11	3			9		74	203
Juglans nigra (black walnut)												4													1			1		19	25
Quercus sp. (acorn)										1																					1
unidentifiable																		1													1

Table A. Flotation-recovered Plant Remains from the Partridge Creek Site (44AH193).

Field Sample Number		75	34	11	none	17	31	10	4	16	41	42	19	24	30	27	none	none	40	51	37	39	5	2	54	55	56	57	58	61	Totals
Feature Designation		1B	2B	3B	4	7	7B	8B	8C	8D	10B	10B	12D	12E	15B	17D	22C	22B	24C	33B	37B	37C	38B	39B	39B	39C	39D	40B	40C	51B	
Soil Sample Volume (liters)		1.95	1.95	1.65	1.65	1.8	1.975	1.95	1.85	1.7	1.9	1.35	2.05	1.975	2	2	1.65	1.65	2.1	1.95	2.1	1.65	2.15	2.35	2	2.15	1.975	2.25	2.1	2.05	55.88
SEED REMAINS (carbonized)	count	1	0	1	1	0	0	0	2	0	1	0	0	2	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	1	12
	grams	<0.01	0	<0.01	<0.01	0	0	0	<0.01	0	<0.01	0	0	0.01	0	0	0	0	<0.01	0	<0.01	0	0	0	0	0	<0.01	0	0	0.01	0.02
Chenopodium sp. (goosefoot)					1																1										2
Phytolacca americana (poke)		1																	1												2
Polygonum penslyvanicum (pinkweed)									1																						1
Spartina sp. (cordgrass)				1										1																	2
Vitis sp. (grape)																														1	1
unknown seed														1																	1
unidentifiable seed									1		1																1				3
SEED REMAINS (non-carbonized)	count	1	1	1	0	0	0	0	0	0	2	0	0	0	0	3	0	0	8	0	2	0	0	9	4	0	1	0	0	0	32
Amaranthus sp. (pigweed)																1															1
Eleusine indica (goosegrass)			1																					3	1						5
Euphorbia sp. (spurge)		1		1																											2
Mollugo verticillata (carpetweed)											1					2					1			5	3						12
Polygonum penslyvanicum (pinkweed)																			4												4
Sambucus canadensis (elderberry)																					1										1
Stellaria media (chickweed)																								1							1
POACEAE (grass family)																			1								1				2
SOLANACEAE (nightshade family)											1																				1
unidentifiable seed																			1												1
FIELD CROPS	count	6	0	1	0	4	3	1	2	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	45	285	0	1	0	0	353
	grams	0.04	0	0.01	0	0.03	0.01	0.01	0.01	0	0.03		0	0	0.01	0	0	0	0	0	0	0	0	0	0.15	1.24	0	<0.01	0	0	1.54
Phaseolus vulgaris (common bean)	fragments										3																				3
Zea mays (corn)		6		1		4	3	1	2		1				1										45	285		1			350
	fragments										1																	1			2
	cupule	3				1		1	1																11	54					71
	cupule fragments	3		1		3	3		1						1										34	228					274
	cupule segments																									3					3
OTHER PLANT REMAINS	count	18	5	3	8	5	7	21	52	3	25	24	13	13	17	0	4	10	13	8	8	0	43	33	480	565	2	21	6	34	1441
	grams	0.14	0.04	0.02	0.06	0.04	0.12	0.09	0.7	0.02	0.39	0.14	0.05	0.17	0.09	0	0.02	0.19	0.15	0.05	0.06	0	0.36	0.35	2.06	4.17	0.01	0.15	0.05	0.31	10
amorphous carbon		18	5	3	8	5	7	21	52	3	25	24	13	13	17		3	10	13	8	8		43	33			2	21	6	34	395
monocot debris - probable corn remains																									480	565					1045
unidentifiable rind fragment																	1														1
RECOVERY TEST RESULTS																															
Papaver somniferum (poppy)		na	na	na	na	44	na	42	na	47	na	29	na	na	na	na	na	na	na	na	1	na	na	41	na	na	1	na	38	na	243

Table B. Flotation-recovered Plant Remains from the Partridge Creek Site (44AH193).

non-carbonized seeds of both native and non-native herbaceous and woody plants were recovered. All identified seeds represent plants common to disturbed environments and agricultural settings, and two species identified are European in origin, evidencing their introduction to North America no earlier than the colonial period. Table C presents the native or exotic status of non-carbonized seeds recovered through flotation. Species represented include pigweed *(Amaranthus sp.)* (one seed), goosegrass *(Eleusine indica)* (five seeds), spurge *(Euphorbia sp.)* (two seeds), carpetweed *(Mollugo verticillata)*, pinkweed *(Polygonum pennsylvanicum)* (four seeds), elderberry *(Sambucus canadensis)* (one seed), chickweed *(Stellaria media)* (one seed), members of the grass family *(POACEAE)* (two seeds), and nightshade family *(SOLANACEAE)*. A single seed was unidentifiable.

Cultivated Plants

The remains of cultivated plants were well represented within the Partridge Creek flotation samples. Corn *(Zea mays)* was present in 38% of the analyzed soil samples (n = 29). A total of 305 specimens of corn, consisting of kernels (2), cupule segments or clusters (3), cupules (71) and cupule fragments (274). Corn was concentrated within feature 39, which contained 94% of the flotation-recovered corn. Bean *(Phaseolus vulgaris)* remains recovered during flotation were confined to three cotyledon fragments from feature 10.

Miscellaneous Material

Miscellaneous plant-related materials recovered include one unidentifiable rind fragment, 395 fragments of amorphous carbon, and 1,045 pieces of monocot debris which probably represent corn stalk and leaf remains. Almost all of the flotation samples analyzed contained abundant sphere-shaped carbon residue. This material is produced during the burning of plant materials which are high in silica. To the naked eye, this residue often resembles small seeds. This material possesses no diagnostic features which might aid in identifying its taxonomic affiliation or origin.

Common name	*Scientific name*	Status
pigweed	*Amaranthus sp.*	native/non-native
goosegrass	*Eleusine indica*	non-native
spurge	*Euphorbia sp.*	native/non-native
carpetweed	*Mollugo verticillata*	native ?
pinkweed	*Polygonum pennsylvanicum*	native
elderberry	*Sambucus canadensis*	native
chickweed	*Stellaria media*	non-native
POACEAE	*grass family*	native/non-native
SOLANACEAE	*nightshade family*	native/non-native

Table C. Status of non-carbonized seeds recovered from flotation samples.

WATER SCREEN RESULTS

Carbonized plant remains from 27 features divided into 56 discrete water screen samples were analyzed. Table D presents a catalog of all plant remains recovered through water screening.

Wood Charcoal

Wood charcoal was the most abundant class of plant material recovered, being present in 48% of the analyzed samples. A total of 1,533 wood fragments weighing 47.85 grams was recovered. Species identification of these water screen-recovered specimens was not attempted.

Nutshell

Nutshells representing three native species were recovered in abundance. A total of 732 nutshell fragments weighing 42.71 grams was identified. Thick-walled hickory *(Carya sp.)* nutshell dominated the assemblage, with 503 fragments. Black walnut *(Juglans nigra)* was represented by 227 specimens, and butternut *(Juglans cinerea)* by one specimen. A single acorn *(Quercus sp.)* fragment was recovered from feature 1.

Field Sample Number		1A	75	61	2A	2B	34	1	4	none	6B	7A	17	31	7B	8A	14	8	9	10A	10B	36	11A	12	12A	20	24	12E	13A	14A
Feature Designation		1A S1/2	1B	1B	2A	2B	2B	3B	4	4	6B	7A	7	7B	7B	8A	8B	8B	8C	10A	10B	10B	11A	12	12A	12D	12E	12E	13A	14A
Total Charcoal Weight (grams)		2.61	2.13	3.64	0	0.03	0.81	0.89	0.13	5.44	1.15	6.38	0.09	0.61	0.05	0.54	1.36	1.55	2.84	1.54	3.63	2.9	0.68	1.21	0.47	0.41	8.48	0.26	0.25	0.28
WOOD CHARCOAL (carbonized)	count	56	131	98	0	0	31	42	0	365	2	6	10	26	0	0	67	159	33	0	0	48	0	5	0	2	41	0	0	0
	grams	0.99	0.91	1.24	0	0	0.48	0.87	0	5.43	0.3	0.41	0.09	0.52	0	0	1.27	1.4	2.52	0	0	1.35	0	0.28	0	0.01	8.36	0	0	0
NUT REMAINS	count	44	102	100	0	0	1	0	1	0	7	85	0	0	0	4	4	0	0	13	48	22	19	3	3	0	0	0	8	2
	grams	1.62	1.22	2.29	0	0	0.33	0	0.13	0	0.84	5.92	0	0	0	0.54	0.06	0	0	1.37	3.63	1.48	0.58	0.93	0.47	0	0	0	0.25	0.28
Carya sp. (thick-walled hickory)			101	95			1		1		1	15				4	4			10	42	20	18						8	2
Juglans cinerea (butternut)																														
Juglans nigra (black walnut)		44		5							6	70								3	6	2	1	3	3					
Quercus sp. (acorn)			1																											
SEED REMAINS (carbonized)	count	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
	grams	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0	<0.01	0.1	0	0	0	0	0	0	0
Phytolacca americana (poke)																						1								
Prunus sp. (cherry/plum)																							1							
Viburnum prunifolium (black haw)															2															
Viburnum sp. (viburnum)																														
Vitis sp. (grape)				1																										
SEED REMAINS (non-carbonized)	count	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	grams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
unidentifiable, crushed specimen																														
FIELD CROPS	count	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	0
	grams	0	0	0	0	0.03	0	0	0	0	0	0.03	0	0	0	0	0	0	0	0.17	0	0.02	0	0	0	0	0	0	0	0
Cucurbita maxima (squash)	seed																					1								
Phaseolus vulgaris	cotyledon fragments																													
Zea mays (corn)						1						1								5		1								
	kernels																			5		1								
	kernel fragments					1																								
	cupules																													
	cupules with glume attached											1																		
	cupule fragments																													
	cupule segments																													
OTHER PLANT REMAINS	count	0	1	4	0	0	0	3	0	2	1	2	0	3	0	1	3	5	5	0	0	2	0	0	0	6	5	1	0	0
	grams	0	<0.01	0.1	0	0	0	0.02	0	0.01	0.01	0.02	0	0.09	0	<0.01	0.03	0.15	0.32	0	0	0.05	0	0	0	0.4	0.12	0.26	0	0
amorphous carbon				4				3		2		2		3		1	3	5	5			2				6	5	1		
gall																														
monocot stem																														
rind fragment																														
unidentifiable spherical carbon residue											1																			
fungal fructification			1																											

Table D. Water-screened recovered plant remains from the Partridge Creek Site (page 1).

Field Sample Number		14B	15B	30	18A	18B	19A	20	20A	20B	24A	25A	21	35A	5	39	39B	54	39C	55	40A	40B	58	44B	52	53	54A	54C	Totals
Feature Designation		14B	15B	15B	18A	18B	19A	20	20A	20B N1/2	24A	25A SE1/4	33B	35A S1/2	38B	39	39B N1/2	39B	39C	39C	40A	40B	40C	44B	52	53	54A S1/2	54C N1/2	n = 56
Total Charcoal Weight (grams)		0.03	0.12	0.3	0.07	0.02	0	3.06	1.27	3.61	0.12	0.44	2.09	0.37	2.16	0.22	0.63	0.06	0.04	17.07	0.07	0.78	0.09	3.67	0.26	0.22	6.43	0.01	93.57
WOOD CHARCOAL (carbonized)	count	1	0	8	0	1	0	3	0	0	0	10	153	0	205	0	0	1	0	28	1	0	0	0	0	0	0	0	1533
	grams	0.01	0	0.27	0	0.02	0	0.04	0	0	0	0.44	1.68	0	1.92	0	0	0.02	0	17	0.02	0	0	0	0	0	0	0	47.85
NUT REMAINS	count	0	10	0	0	0	0	73	38	31	1	0	6	7	0	1	1	0	1	0	1	1	0	30	1	4	60	0	732
	grams	0	0.12	0	0	0	0	2.9	1.27	3.61	0.12	0	0.15	0.37	0	0.22	0.63	0	0.02	0	0.04	0.78	0	3.67	0.26	0.21	6.4	0	42.71
Carya sp. (thick-walled hickory)								71	38	31	1		6			1					1			5	1	4	22		503
Juglans cinerea (butternut)																	1												1
Juglans nigra (black walnut)			10					2						7					1			1		25			38		227
Quercus sp. (acorn)																													1
SEED REMAINS (carbonized)	count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	8
	grams	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0.01	0.2
Phytolacca americana (poke)																													1
Prunus sp. (cherry/plum)																													1
Viburnum prunifolium (black haw)																													2
Viburnum sp. (viburnum)																												1	1
Vitis sp. (grape)		1																								1			3
SEED REMAINS (non-carbonized)	count	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	grams	0	0	0	0	0	<0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<0.01
unidentifiable, crushed specimen							1																						1
FIELD CROPS	count	0	0	1	0	0	0	6	0	0	0	0	3	0	0	0	0	1	2	0	1	0	0	0	0	0	5	0	28
	grams	0	0	0.02	0	0	0	0.12	0	0	0	0	0.01	0	0	0	0	0.01	0.01	0	0.01	0	0	0	0	0	0.03	0	0.46
Cucurbita maxima (squash)	seed																												1
Phaseolus vulgaris (common bean)	cotyledon fragments																										2		2
Zea mays (corn)				1				6					3					1	2		1						3		25
	kernel																				1						1		8
	kernel fragments							6																			2		9
	cupules												2					1	2										5
	cupules with glume attached																												1
	cupule fragments												1																1
	cupule segments			1																									1
OTHER PLANT REMAINS	count	0	0	1	1	0	0	0	0	0	0	0	25	0	12	0	0	1	2	8	0	0	2	0	0	0	0	0	96
	grams	0	0	0.01	0.07	0	0	0	0	0	0	0	0.25	0	0.24	0	0	0.03	0.01	0.07	0	0	0.09	0	0	0	0	0	2.35
amorphous carbon				1									25		12				2	8									90
gall					1																								1
monocot stem																							2						2
rind fragment																		1											1
unidentifiable spherical carbon residue																													1
fungal fructification																													1

Table D. Water-screened recovered plant remains from the Partridge Creek Site (page 2).

Carbonized Seeds

Eight carbonized seeds were recovered from the water screen samples. A single poke *(Phytolacca americana)* seed was identified from feature 10, a single plum *(Prunus sp.)* pit was identified from feature 11, 2 black haw *(Viburnum prunifolium)* seeds were recovered from feature 7, one viburnum seed *(Viburnum sp.)* was found in feature 54, and 3 grape *(Vitis sp.)* seeds were recovered (features 1, 14, and 53).

Non-Carbonized Seeds

A single non-carbonized seed was recovered from feature 19. This specimen was severely crushed which prohibited identification.

Cultivated Plants

The remains of corn *(Zea mays)*, beans *(Phaseolus vulgaris)* and squash *(Cucurbita maxima)* were recovered through water-screening. A total of 25 specimens of corn (eight kernels, nine kernel fragments, five cupules, one cupule with glume attached, one cupule fragment, and one cupule segment), two bean cotyledon fragments, and one squash seed were identified. Cultivated plant remains were found within features 2, 7, 10, 15, 20, 33, 39, 40, and 54.

Miscellaneous Materials

A variety of miscellaneous plant materials were observed within the water screen-recovered samples. These totaled 96 specimens weighing 2.35 grams, and included amorphous carbon (90 fragments), a gall (one), monocot stem (two fragments), rind fabric (one fragment), fungal fructifications (one fragment), and unidentifiable spherical carbon residue. This residue is produced during the burning of plant materials which are high in silica. This material possesses no diagnostic features which might aid in identifying its taxonomic affiliation or origin.

DISCUSSION

PRESERVATION ISSUES

When assessing archeobotanical assemblages, it is necessary to keep in mind the biases inherent in quantifying largely biodegradable artifacts: The great majority of plant remains deposited prehistorically decompose quickly, leaving a limited and grossly prejudiced sample of the original vegetative material deposited. This bias is due both to the cultural factors involved in deposition (where folks threw their garbage), and to the physical factors governing the differential preservation of plant remains deposited (biodegredation of organic remains).

Overall, the archeobotanical remains recovered from the Partridge Creek site were well preserved, and only minimally fragmented or abraded. Wood charcoal was found to be in good condition and was largely identifiable (62% of the sub-sample selected for identification were minimally identifiable to the genus level).

The recovery of non-carbonized and non-native seeds from intact cultural features at the Partridge Creek site is troubling as it is highly unlikely that the recovered specimens were interred concurrent with period artifacts and carbonized macro-botanical remains. Their presence signals that some degree of disturbance has occurred within the sampled features, perhaps as a result of insect or rodent burrowing activities.

DISTRIBUTION OF PLANT MACRO-REMAINS

Few clear patterns are revealed in the distribution of the different classes of macro-botanical remains recovered from the Partridge Creek site. Wood charcoal was present in 100% of the flotation samples and 48% of the water screened samples. Nutshells of regionally common types were well represented, with three types recovered from the flotation samples and four types from the water screened samples. Nutshell occurred in 45% of the flotation samples and 59% of the water screened samples. Carbonized seeds were present but scant throughout the macro-botanical assemblage, occurring in 35% of the flotation samples and 13% of the water screened samples. Cultivated plant remains were present in 38% of the flotation samples and 20% of the water screened samples. When consolidated by feature (rather than by soil sample), domesticates occurred in 39% of the 31 features considered. Cultivated plant remains were recovered from features 1, 2, 3, 7, 8, 10, 15, 20, 33, 39, 40, and 54. Squash occurred in association with corn and beans in feature 10. Corn appeared with beans in feature 54.

SUBSISTENCE

The floral assemblage from the Partridge Creek site offers abundant evidence of a dual subsistence strategy where corn agriculture (with beans and squash) was seasonally supplemented by wild-gathered plant foods such as mast and wild fruits.

Nutshells recovered from more than half of the analyzed features documents the regular use of hickory nuts and black walnuts, and perhaps butternut and acorns. Other wild edible plants identified include poke, plum, grape, viburnum, elderberry, pigweed and pineweed. While these species were not abundant within the analyzed samples, they may represent potentially important dietary elements. Corn, beans, and squash recovered through flotation and water screening document the importance of horticulture to residents of the Partridge Creek site. Features 10 and 39 yielded particularly interesting and definitive cultivated plant remains. Bean, squash, and corn were represented in concert within feature 10, a basin-shaped feature possibly associated with food-roasting activities. Carbonized plant material from feature 10 was radiocarbon dated at 980 +/- 50 bp.

Concentrations of corn cupules were recovered from feature 39 in association with copious quantities of unidentifiable monocot stem and leaf debris (probably corn). Feature 39 was a cylindrical in profile, and contained fire-reddened charcoal or fire-cracked rock. A radiocarbon date of 680 +/- 50 bp was returned on charcoal submitted from feature 39. This deposit may represent entire ears of corn burned accidentally (as in the roasting of green corn in the ashes), or purposefully (i.e., ritually or ceremonially).

SEASONALITY

Although the seasonality of prehistoric deposits can sometimes be established based on the analysis of recovered macro-floral remains, no *definitive* patterns of seasonal resource utilization are evident based on the vegetative remains recovered from the Partridge Creek site. The presence of abundant nutshells and corn indicate fall-ripening resources. However, both corn and nuts constitute readily stored foods which could have provided dietary staples year-round. Early ethnographic accounts mention that stored nutmeats were heavily relied upon during the spring months when other foodstuffs were scarce (Smith 1986:I:152; Lawson 1952:101). Different varieties of beans and squash ripen disparately, spanning mid-summer through late autumn. However, early historic accounts of the natives of Virginia mention the widespread practice of drying and storing of both of these crops (Lawson 1952:13,220). The seed remains recovered also suggest summer or fall occupation. Again, these resources could have been easily stored for use during other times of the year.

SITE ENVIRONMENT

The non-carbonized seeds recovered from Partridge Creek's flotation samples are indicative of disturbed, open environments, and field and forest edges. It is unlikely that these specimens date to the period of site occupation, and are probably recent introductions. Many of the non-carbonized seeds recovered belong to fleshy fruits (i.e., elderberry, nightshade) or from herbaceous weeds sporting heavy-bearing, high-carbohydrate seeds (i.e., pigweed, pinkweed, carpetweed) which are favored foods of field and suburban rodents. It is probable that the non-carbonized seeds recovered were a result of food-stashing by burrowing rodents during recent times and their presence is emblematic of modern environmental conditions.

Based on this archeobotanical assemblage and our knowledge of paleo-environmental conditions during the Late Woodland period (Brush 1986), the landscape surrounding the project area probably consisted of agricultural fields surrounded by a mixed forest dominated by loblolly pines *(Pinus taeda)*, various oak *(Quercus sp.)* species, mockernut hickory *(Carya tomentosa)*, American chestnut *(Castanea dentata)*, sweet gum *(Liquidambar styraciflua)*, and tulip poplar *(Liriodendron tulipifera)* with an under story of American holly *(Ilex opaca)*, sassafras *(Sassafras albidum)*, viburnums *(Viburnum sp.)*, and dogwood *(Cornus florida)*. All woods identified within the archeobotanical assemblage are entirely consistent with the forest cover type of the area (Brown et al. 1986; Brush 1986) and concur with the pattern of wood selection established at other Late Woodland sites in the region. The overwhelming dominance of oak, pine, and hickory species within the

Partridge Creek assemblage indicates the intentional selection of high-calorie, efficient fuel woods (Graves 1919) which were probably used domestically for heat and cooking. All wood species identified archaeologically would have been common to the mixed forest native to Virginia's Ridge and Valley and Piedmont provinces (Eyre 1980).

Agricultural pursuits in the vicinity of the project area are indicated by the recovery of corn, bean, and squash remains. While the form that cultivated lands took during prehistoric times is uncertain, factors such as soil fertility, openness, protection from animal predation, proximity to fresh water sources, and convenience to processing and storage areas all played a defining role in the placement and arrangement of aboriginal gardens and agricultural fields.

Captain John Smith describes the arrangement of Indian settlements in the Virginia landscape circa 1600.

> *"Their houses are in the midst of their fields or gardens which are smal plots of ground. Some 20, some 40. some 100. some 200. some more, some lesse, some times from 2 to 100 of those houses togither, or but little separated by groves of trees. Neare their habitations is little small wood or old trees on the ground by reason of their burning of them for fire. So that a man may gallop a horse amongst these woods any waie, but where the creekes or Rivers shall hinder." (Smith 1986:I-162)*

Aboriginal fields were usually located on nearly level floodplain areas which are naturally fertile and well suited to the growing of food. The Partridge Creek site would have been ideally located for the combination of horticulture on gently sloping floodplain areas of the James River and the regular exploitation of wild food resources from nearby forests.

SUMMARY

The Partridge Creek site yielded a representative sample of durable, vegetative macro-remains recovered through soil flotation and water screening. These remains derived from a variety of temporally and functionally distinct cultural features which reflect a range of human / plant interactions at the site. This analysis produced data significant to the interpretation of prehistoric landscape conditions, wild plant use, and horticultural pursuits in the James River Piedmont during the Late Woodland period.

The paleobotanical data generally imply the importance of wild plant resources (especially nuts) and a reliance on corn, beans, and squash. The assemblage also reveals aspects of local forest composition during the period of occupation and implies a dependence on locally available, high-calorie fuel resources.

Maize-based horticulture had become a part of the subsistence base of Late Woodland peoples in the Shenandoah Valley and in the Virginia Piedmont by A.D. 1000 (Kavanagh 1982:70; Gardner and Carbone n.d.; Gardner 1986:77; Potter 1993:101; Gleach 1987:221,223). Overall, the botanical assemblage from the Partridge Creek site conforms to our understanding of Piedmont floodplain settlements during the Late Woodland period. These settlements incorporated a mixed economy of maize-based horticulture and wild plant gathering that supported small groups on a seasonal basis. This pattern was later replaced by larger, more sedentary village communities with an increased reliance on the storable starchy products of corn agriculture.

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