SECTION 20.0 MATERIAL CULTURE COMPARISONS

Material culture (artifacts) provides the physical specimens to gather data and evidence from which inferences may be drawn about cultural behaviors of site inhabitants. The nature of site preservation is such that the vast majority of artifacts that remain are the more durable lithic artifacts, including finished tools and by-product debitage, and ceramics. Interestingly, although these two classes of artifacts, lithics and ceramics, comprise about 90-95% of any archaeological assemblage, some estimates have been made that at the time of site occupations, they may have only comprised approximately 5-10% of the everyday items employed by the site inhabitants (Geier 1990b). Other items were manufactured from organic materials such as hide, fibers, and animal bone/shell, which have a low probability of preservation and recovery within the archaeological record of a site. Some ecofacts and evidence of organic materials were recovered at Hickory Bluff, and although they represent only a small assemblage, these items were important as indicators of possible subsistence practices. With the materials that were left behind, approximations about site activities, behaviors, and strategies can be inferred.

The data gathered from the lithic and ceramic assemblages of Hickory Bluff may be compared to several other key sites along the St. Jones River watershed to examine the degree to which there are related and/or different site functions. The sites that will be specifically compared in this analysis included the Carey Farm and Island Farm sites located just south of Hickory Bluff, also along the St. Jones River. Although some differences observed between these assemblages may be the result of postdepositional factors or methodological considerations, they do provide summary indications of differences and similarities between the sites attributable to cultural behavior, which may guide more in depth intersite syntheses in the future.

The lithic artifact assemblage of Hickory Bluff was vast and provided a wide array of data. The differences noted in material type frequencies were summarized as an indication of the frequency of local versus non-local procurement and the resultant implications for site practices. Macroscopic tool edge and use wear studies were conducted on the different classes of lithic tools, to suggest general activities, tool function, and the variability of tool use within the assemblage, recognizing that specific tasks are not definitively determined in this type of analysis. These generalized results were then compared to data available from the nearby sites.

Hickory Bluff provided one of the largest ceramic assemblages in the Mid-Atlantic region, adding important information to the growing database. The assemblage was examined to identify the type and number of vessels, to place the site within the regional chronological sequence, to evaluate its relationship to other sites, and to test how well the assemblage fit with current models and typological definitions. In addition, the data gathered from surface treatments and cordage twist (S and Z) was evaluated with information from the nearby sites and the wider Delmarva region to place the Hickory Bluff ceramic assemblage within a wider context and explore the social implications suggested by the data.

The sum of the archaeobotanical remains recovered from the site was limited. Recovery from flotation samples, primarily from feature contexts, provided the bulk of the organic remains from the site. Additional information on the use of organics was obtained from organic residue analysis on selected lithic tools (unifaces) and from adherent residue on two ceramic sherds.

These findings were examined for subsistence related implications and compared to the results of nearby sites. Although the poor preservation characteristics of the site contributed to the overall low recovery of organic materials, functional differences at the site related to subsistence and overall site use may exist.

LITHIC TECHNOLOGY

The chipped stone assemblage at Hickory Bluff provided evidence for use of both local and nonlocal raw material types and differential lithic reduction strategies. The Hickory Bluff lithic material sources were identified through a lithic mineralogy study of selected formal tools and a comparative study with local Columbia Formation gravel sources (Section 13.0). While a certain percentage of non-Delmarva materials were likely obtained from their common geological sources, it is also important to note the presence of typically non-local material as a transported clast within Delmarva gravels.

Lithic mineralogy for selected projectile points, bifaces and unifaces indicated source locations from 19 different geological formations in eight states (Section 13.0). Over 61 percent of the 271 artifacts in this study were identified from local Delmarva and Coastal Plain sources (Table 20.1). The frequencies obtained indicate that projectile points as an artifact class had the highest percentage manufactured from local Delmarva materials, with unifaces having the lowest percentage manufactured from locally derived materials. This result was curious and somewhat contradictory to what might be expected, given that projectile points are considered highly worked and curated artifacts, while uniface tools are typically considered expedient and less carefully manufactured. However, this difference may be less an indication of how these artifacts may have functioned for the site inhabitants, but more reflective of material clast size, as uniface tools could be manufactured on smaller pebble clasts that may have been more likely to include transported non-Delmarva materials or was due to a difference in sample size (i.e., n=207 versus n=26).

Table 20.1 Percentage of Selected Hickory Bluff Artifacts and Raw Material Source Location

Artifact Type	Frequency	Percentage of Delmarva Materials	Percentage of Non-Delmarva Materials
Projectile Points	207	69.6	30.4
Bifaces	38	36.8	63.2
Unifaces	26	34.6	65.4
Total	271	61.6	38.4

The Columbia Formation gravels located along the St. Jones River provided an immediate source of lithic materials for Hickory Bluff. A gravel study identified the type and size of materials available (Table 13.3); these included quartz, quartzite, sandstone and jasper. The presence of cobble cortex on most chipped stone artifacts at Hickory Bluff illustrated use of this local resource. Cultural selection preference of chert and jasper cobbles is indicated by the difference in percentages of these materials within local gravel samples (14.5 percent) compared to bifaces (58.3 percent) and cores (66.5 percent). In addition to selection from the local gravel sources, it is likely that these higher percentages for bifaces and cores include some transported lithic materials quarried from adjacent areas.

Assemblages from Carey Farm and Island Farm, south of Hickory Bluff, also demonstrated use of the Columbia Formation gravels (Custer et al. 1995b). A trend toward the use of local pebble and cobble sources during the Woodland I period was also noted at the Snapp site, where similar artifact assemblages were recovered (Custer and Silber 1995). The emergent pattern from the comparison of these sites is one of a Delmarva focus and local expression, with exotic non-Delmarva lithic materials having a less immediate role.

Raw Materials and Reduction Techniques

The predominant lithic materials used at Hickory Bluff were jasper, quartz and chert (Table 12.6). The variation in the materials used for the different artifact types, directly reflected the specialized nature of the tool manufacturing activities conducted at Hickory Bluff: primary reduction of cores, production of flake tools, final shaping and finishing, and tool maintenance. The selection of higher quality cryptocrystalline materials for tool manufacture and rejuvenation, as evidenced by higher frequency within the assemblage, suggested that these materials were used to the fullest extant possible. This contention was observed also within the point and biface assemblages, which showed edge rejuvenation and reuse on many of the high quality lithic tools.

Primary reduction of jasper and quartz materials is evidenced by the high percentage of cores and debitage (Table 20.2) of these materials and the high percentage of cortex present on both the cores and debitage (Table 20.3). Cortex percentages for chert and quartzite were also high (ranging from 24.5 to 33.8 percent) and may indicate no substantial differences in the use of primary versus secondary sources (i.e. surface outcrops/quarry locations versus lag deposits/ Pleistocene gravels/outwash from formations upstream). The primary reduction of cores produced both cobble/pebble tools and flakes for immediate use. Cobble cortex was specifically identified on 16 percent of all bifaces (Table 20.3) with 27 percent of the early stage bifaces exhibiting cobble surfaces (Section 12.0). About 40 percent of all unifaces also demonstrated cobble cortex. Cobble cortex was present on both retouched (41 percent) and utilized (30 percent) flake tools indicating flake production from cobble reduction and immediate use.

There was evidence to show that the Hickory Bluff inhabitants selected small clasts, including pebbles, to obtain sharp edges for tools, using either the pebble or the flake byproducts. Pebbles and cobbles are common in the Hickory Bluff vicinity, especially along streams and in the Columbia Formation soils forming the basal sediments of the site. Given the small size of these clasts, it might have been difficult to fracture the pieces using freehand percussion. An easier and more efficient way was through the use of the bipolar technique. Additional information was gleaned from a comparison of debitage and core sizes with reduction technique. Most of the identifiable debitage from Hickory Bluff consisted of flakes and chips less than 2 cm in maximum length (Table 20.4). These flakes represent both primary and secondary reduction from small local cobble cores, as well as small bifacial thinning and finishing debris. Examination of selected flakes and cores demonstrated that bipolar techniques were used in the reduction of jasper and chert cores, which were usually smaller and harder to work with, and required maximization of the material (Section 13.0). On the other hand, quartz and quartzite cores were usually larger and more abundant within the local gravels and were modified using both bipolar and multidirectional reduction techniques.

Table 20.2 Hickory Bluff Chipped Stone Artifact Assemblage - Raw Material Percentage by Artifact Types

Artifact Type	Andesite	Argillite	Chalcedony	Chert	Ironstone	Jasper	Quartz	Quartzite	Rhyolite	Sandstone	Schist	Siltstone	Steatite
Projectile Points	0	12.17	0.32	15.70	1.28	44.55	12.17	6.08	7.69	0	0	0	0
Bifaces	0	7.62	0.89	13.00	1.34	45.29	19.73	7.17	4.93	0	0	0	0
Unifaces	0	0	0	14.58	0	79.16	2.08	4.16	0	0	0	0	0
Retouched Flake Tools	0	0	0	16.36	0	60.00	10.90	12.72	0	0	0	0	0
Utilized Flake Tools	0	0	0.68	14.38	0	73.28	6.16	4.10	1.36	0	0	0	0
Cores	0	0.34	0	16.49	0	50.00	25.85	6.97	0	0	0	0.34	
Debitage	0.006	1.91	1.13	11.95	1.98	50.81	21.63	3.62	6.60	0.04	0.009	0.23	0.01

Table 20.3 Hickory Bluff Chipped Stone Artifact Assemblage - Cortex Percentage by Artifact Types

Artifact Type	Argillite	Chalcedony	Chert	Ironstone	Jasper	Quartz	Quartzite	Rhyolite	Sandstone	Schist	Siltstone	Total
Projectile Points	2.63	100.0	14.28	50.00	18.70	13.15	15.78	0	0	0	0	14.42
Bifaces	0	0	10.34	0	21.78	20.45	12.5	0	0	0	0	16.14
Unifaces	0	0	14.28	0	44.73	100.00	0	0	0	0	0	39.58
Retouched Flake Tools	0	0	22.22	0	36.36	83.33	57.14	0	0	0	0	41.81
Utilized Flake Tools	0	0	23.80	0	29.90	44.44	50.00	0	0	0	0	30.13
Cores	0	0	63.91	0	57.82	57.89	53.65	0	0	0	50.0	58.33
Debitage	0.81	19.72	23.83	34.00	33.61	24.89	33.07	0.51	46.66	33.33	16.88	27.53
Total	0.89	19.78	24.55	33.95	33.84	25.58	33.38	0.50	46.66	33.33	17.72	27.92

Table 20.4 Percentage of Hickory Bluff Flake Size by Raw Material Type

Material Type	<1 cm	1-2 cm	2-3 cm	3-4 cm	4-5 cm	>5 cm	Total
Andesite	0.00	0.00	0.00	50.00	0.00	50.00	100
Argillite	21.93	57.12	12.27	4.09	2.95	1.64	100
Chalcedony	25.49	63.59	10.08	0.56	0.28	0.00	100
Chert	25.36	59.60	12.22	2.10	0.61	0.11	100
Ironstone	19.28	69.44	10.66	0.63	0.00	0.00	100
Jasper	24.89	61.30	11.22	2.10	0.40	0.09	100
Quartz	22.86	61.17	12.09	2.70	0.75	0.42	100
Quartzite	13.58	54.05	18.44	6.83	3.87	3.24	100
Rhyolite	18.81	69.52	10.16	1.51	0.00	0.00	100
Sandstone	6.67	53.33	6.67	13.33	6.67	13.33	100
Schist	0.00	50.00	0.00	50.00	0.00	0.00	100
Siltstone	4.11	69.86	16.44	4.11	1.37	4.11	100

The sizes of debitage and cores were consistent with, and further supported the notion of, a local gravel procurement strategy. There was also evidence throughout the assemblage for the testing and rejection of pebbles and cobbles of poor quality material.

Transport of argillite and rhyolite in finished artifact forms was demonstrated by a smaller percentage of remnant cortex on the debitage (Table 20.3). Activities involving argillite and rhyolite at Hickory Bluff were most likely confined to tool finishing and tool maintenance such as edge rejuvenation and resharpening. Similar to Carey Farm and Island Farm, argillite and rhyolite comprised only a small percentage of the total lithic assemblage, suggesting limited access to, or extensive curation of, these materials on the middle reaches of the St. Jones River.

Information from Hickory Bluff reinforced inferences developed from other regional locations about material economics in the Early to Middle Woodland periods, by demonstrating the use of a wide range of stone sources for tool manufacture, but a general concentration on locally collected pebbles and cobbles. The lack of debitage of raw materials with sources located extra-locally suggested that artifacts of these materials were carefully curated. Using a site ranking system previously established at the Carey Farm and Island Farm sites (Custer et al. 1995b: 272), the Hickory Bluff assemblage exhibited an overall cortex percentage of 27.92 percent and a cryptocrystalline ranking at 64 percent (quartz/quartzite ranking was 25.2 percent). These percentages placed Hickory Bluff within the high cortex and medium cryptocrystalline rankings indicating continuity along the St. Jones River of Native American occupations utilizing locally available Columbia Formation gravels. Furthermore, it suggested that the available lithic resources at the site may have had bearing on the sight selection preferences for the Early to Middle Woodland period occupations at Hickory Bluff and that broad-based trade and exchange may have been employed to procure lithic materials from more distant sources.

Stone Tool Artifact Types

The Hickory Bluff tool assemblage consisted of 784 chipped stone tools (Table 12.6: projectile points, bifaces, unifaces, and flake tools) and 123 cobble tools (Table 12.22: hammerstones, abraders, pitted stones, pestles, a mortar, and an anvil). These descriptive categories are useful constructs for the presentation of basic data and help to illustrate the range of activities and behaviors that may have utilized these morphologically different tool types.

The tool edge analysis was conducted (Section 13.0) to identify possible tool function and to address the variability of tool use. Over 200 tools exhibited more than one edge or surface with use wear (Table 20.5). Multiple tool edges may indicate extensive single task use (e.g., hammerstones with multiple battered edges, Figure 12.30), multiple uses associated with a single task (e.g., the triangular double pitted stones with three battered points and three abraded edges, Figure 12.33), or multiple tasks (e.g., concave scraper/graver/multipurpose flake tool, Figure 13.54). Multiple tool edges also suggested a conservation of raw material or indicate reuse of older artifacts for new functions leaving different use wear patterns.

Table 20.5 Tool Edges/Surfaces based on the Presence of Use Wear

Artifact Type	Single Edge/Surface	Multiple Edges/Surfaces
Bifaces	4	21
Unifaces	6	42
Retouched Flake Tools	27	28
Utilized Flake Tools	94	35
Hammerstones	26	53
Abraders	4	14
Pitted Stones	8	13
Pestles	1	2
Mortar	1	0
Ulu	1	0
Total	172	209

Based on use wear analysis, over 700 specific tool edges were defined (Table 20.6). Identification of specialized edges or surfaces expanded the functional interpretation of the Hickory Bluff tool assemblage and included tool edges and use wear characteristic of awls and punches (Figure 13.52), choppers (Figure 13.53), concave scrapers (Figure 13.54), drills (Figure 13.55 and Figure 13.56), and gravers (Figure 13.57). Pitted stones displayed both pecked and ground recesses suggesting variation in use between pounding/battering tools and small hand-held grinding stones or mortars used for small quantities of plant materials or pigments.

Although macroscopic tool edge and use wear studies were not definitive in determining specific behaviors and tasks, general activities may be suggested (Table 20.7). The Hickory Bluff tool assemblage indicated activities associated with tool production (flint knapping),

subsistence activities (chopping, cutting/scraping, pounding, and processing vegetal remains), production of perishable items (hide working, incising, piercing, and wood working), and ritual behavior (grinding plants/pigments). The range of behaviors suggested by the macroscopic use wear analysis illustrated a more varied and complete set of lifestyle practices than the simple morphological descriptions of tool types.

Table 20.6 Functional Categories based on Tool Edge and Use Wear Analysis

Function	Tool Edge Frequency	Artifact Frequency
Bifaces	30	25
Scrapers	82	48
Retouched Flake Tools	69	49
Utilized Flake Tools	169	131
Awl/punches	9	9
Celts	2	2
Choppers	7	5
Concave scrapers	6	6
Drills	5	7
Gravers	16	15
Hammerstones	170	92
Abraders	70	26
Pitted Stones	59	44
Pestles	5	3
Mortar	1	1
Ulu	1	1
Total	701	464

The Hickory Bluff tool assemblage was similar to assemblages from the adjacent Carey Farm and Island Farm sites (Custer et al. 1995b) (Table 20.8). Artifact tool counts presented here for the Carey Farm and Island Farm sites were based on the summary catalog tables (Custer et al. 1995b); detailed tool type tables did not provide comparable information applicable to the Hickory Bluff categories, and the detailed tool type frequencies varied from the summary catalog tables. To examine occupational variation across the landscape, the five areas of Carey Farm are delineated in the following discussion.

Major tool types were identified at all three sites; however, the relative percentages varied across the landscape. These variations may represent actual site use or reflect postdepositional processes such as heavy recreational surface collecting at Carey Farm. Hickory Bluff yielded the highest percentage of projectile points at 34 percent (Table 20.8), while the projectile point percentages from the five areas of Carey Farm and Island Farm ranged between 5 and 14 percent. Biface production and discard were highest at Hickory Bluff, Carey Farm South

Table 20.7 Hickory Bluff Artifact Types and Cultural Behavior Based on Tool Edge and Use Wear Analysis

Artifact Type	Boring hard materials	Chopping hard materials	Flint knapping	General Cutting / Scraping	Grinding: plants pigments	Hide working	Incising: bone shell wood	Piercing soft materials (hides)	Pounding hard materials (nuts/lithics)	Processing: vegetal remains; splitting plant fibers	Wood working
Bifaces				X		X				X	X
Scrapers				X		X				X	X
Retouched Flake Tools				X		X				X	X
Utilized Flake Tools				X		X				X	X
Awl/punches								X			
Celts									X		X
Choppers		X									
Concave scrapers											X
Drills	X										
Gravers							X			X	
Hammerstones			X						X		
Abraders			X								X
Pitted Stones					X				X		
Pestles					X				X		
Mortar									X		
Ulu				X							

Table 20.8 Percentage of General Tool Types for St. Jones Sites

Artifact Type	Hickory Bluff	Carey Farm-South[a]	Carey Farm- South Central[b]	Carey Farm-North Central[c]	Carey Farm-North[d]	Carey Farm-Woods[e]	Carey Farm- Total	Island Farm[f]
Projectile Points	34.40	5.67	10.55	7.79	7.79	14.36	8.33	7.67
Bifaces	24.59	17.28	27.72	18.61	16.85	28.19	20.66	15.65
Miscellaneous tools (includes unifaces, scrapers, and drills)	5.29	4.53	5.51	7.65	4.71	6.38	5.70	3.83
Flake tools (both retouched and utilized)	22.16	71.53	55.28	65.22	68.84	45.74	63.95	70.93
Groundstone (includes pitted stone, mortars, pestles and abraders)	4.85	0.00	0.00	0.29	0.72	0.53	0.25	0.64
Hammerstones	8.71	0.99	0.94	0.43	1.09	4.79	1.12	1.28
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

a. Based on Table 8 Summary Catalog, Carey Farm, South Area (Custer et al. 1995b:78)
b. Based on Table 32 Summary Catalog, Carey Farm, South Central Area (Custer et al. 1995b:127)
c. Based on Table 62 Summary Catalog, Carey Farm, North Central Area (Custer et al. 1995b:192)
d. Based on Table 74 Summary Catalog, Carey Farm, North Area (Custer et al. 1995b: 206)
e. Based on Table 86 Summary Catalog, Carey Farm, Woods Area (Custer et al. 1995b: 224)
f. Based on Table 95 Summary Catalog, Island Farm (Custer et al. 1995b: 236)

Central, and Carey Farm Woods with percentages between 24 and 28 percent. On the other hand, the percentage of miscellaneous tools was consistent across all three sites, with slightly higher percentages evident at Carey Farm North Central and Carey Farm Woods. A wide disparity between Hickory Bluff and the other two sites was observed in the presence of flake tools: at Hickory Bluff, they comprised 22 percent of the tool assemblage, whereas at Carey Farm and Island Farm, the percentages ranged from 45 percent to 71 percent. Groundstone and hammerstone percentages also varied between the sites, with higher percentages of both occurring at Hickory Bluff and extremely low percentages at Carey Farm and Island Farm.

The variations in the tool assemblage across the three sites on the east side of the St. Jones River may suggest differences in site use, behaviors, and occupation sequences between the sites. The general lack of groundstone artifacts and hammerstones at Carey Farm and Island Farm may reflect less processing of vegetal remains at the site, perhaps indicative of differing site function or the season when the site was occupied, or may indicate postdepositional collecting and removal of these types of recognizable artifacts. The high percentage of flake tools at Carey Farm and Island Farm may indicate that more generalized cutting activities, such as preparing game or hide working, was occurring at these sites. The high percentage of projectile points at Hickory Bluff may reflect its focus as a hunting camp, given its wide viewshed of the St. Jones River and its location on a prominent topographic feature. However, the lack of projectile points at Carey Farm and Island Farm may be the result of postdepositional collecting. All of these variations may suggest different site use behaviors or seasonality of occupation. However, they may also be reflective of the notion of dispersed settlement across the landscape, and the segregation of activities not within the sites, but rather between the sites. Given the problems of establishing contemporaneous occupations, especially at Hickory Bluff with its high degree of reuse, such a definitive conclusion may not be drawn, but suggests an alternative of land use over site use that warrants future consideration.

CERAMIC ASSEMBLAGE

The Hickory Bluff ceramic assemblage consisted of 7,628 sherds, of which 1,591 were larger than 2 cm and appropriate for detailed analysis. Using a lot based analysis, 86 individual vessel lots were identified (Table 20.9). The majority of the ceramic vessel lots recovered from Hickory Bluff was Clay Tempered Wares (both cord marked and net impressed types), Marcey Creek, and Mockley. Many vessel lots within the assemblage demonstrated variability within and between known ceramic types, while others displayed attributes considered typical for the established regional ware types.

As the largest sample, in both number of sherds and vessel lots, the Clay Tempered Ware provided an excellent opportunity to examine the variability in manufacturing attributes and social signatures. The group displayed a wide range in the temper materials used and the types of inclusions within the paste. The variation between vessels may relate to the preferences of the manufacturers or the intended vessel function, however the fragmentary nature of the assemblage did not allow for such conclusions to be drawn. The identified temper materials for these ceramics included rounded clay pieces, grog, and combinations of clay with grog; a small number also lacked added temper (n=6). The amount and type of secondary inclusions within the

vessel paste varied between vessels, and consisted of sand, grit, iron oxide, quartz pebbles, and fiber casts.

Table 20.9 St. Jones Ceramic Type Percentages (based on Vessel Lot Counts)

Ceramic Type	Hickory Bluff	Carey Farm and Island Farm (Custer et al. 1995b: Table 126)
Marcey Creek	13.95	0.0
Dames Quarter	2.33	0.0
Wolfe Neck	6.98	12.96
Accokeek	0.0	1.37
Popes Creek	2.33	0.0
Clay Tempered	47.67	9.22
Mockley	10.47	57.34
Hell Island	4.65	13.65
Townsend	4.65	3.75
Minguannan	1.16	0.34
Killens	0.0	1.37
Untyped	5.81	0.0
Total	100.00	100.00

The analysis of the clay matrices of selected Clay Tempered vessel lots resulted in clustering, and consistency with a locally procured experimental test tile. These results suggested the local manufacture of at least some of the vessels. The Clay Tempered Wares were a common feature of the Delmarva (Custer 1994) and rare in the northern areas of the Middle Atlantic. While showing variations of temper material and paste inclusions, the Hickory Bluff Clay Tempered Wares showed similarity with forms and construction techniques (i.e., conoidal shapes and coil construction) found in the eastern portions of Maryland and Virginia, and those found in the southeast, particularly in the Coastal Plain drainages of the Chesapeake Bay in Virginia (Croakers Landing) and North Carolina. The production of Clay Tempered Wares was probably a sign of local, household manufacture and expression within the wider regional tradition of the ware, indicative of an endemic Delmarva economy and social organization.

Among the earliest wares of the Early Woodland, the Marcey Creek vessels of Hickory Bluff generally fell within the range of variation found in styles identified across the Mid-Atlantic region. The vessel lots at Hickory Bluff were mostly flat bottomed although Vessel Lot MA02 may have had a conoidal shape. The temper material used throughout the Marcey Creek ceramics was fairly consistent, including a combination of steatite and schist. Many of the vessels also contained iron oxides and sand as secondary inclusions within the paste, which was consistent with the range of inclusions observed in the ware at the type-site. In form, the Marcey Creek vessel lots appeared to mimic earlier soapstone bowls, and the use of steatite as temper implied continuity with the earlier soapstone bowls, suggesting some degree of social cohesion and tradition (Stewart 1998a). The construction of the vessel lots were mostly coiled either in wide or narrow bands, contrary to the more commonly assumed hand-molded or modeled

technique. Marcey Creek Vessel Lot MA01 illustrated a combination of techniques, whereby the base was a hand-molded slab and the side walls were coiled.

The identification of Marcey Creek vessels was a clear sign of the rapid and widespread adoption of a new technology, and increased communication between social/cultural groups. The thin section analysis of the clay matrix demonstrated that 6 of the 8 vessel lots were discrete and clustered together. Furthermore, the matrices of these vessel lots were not similar to any of the locally procured sources. The use of Piedmont derived steatite temper also suggested that most of the Marcey Creek vessel lots were produced elsewhere and transported to Hickory Bluff, either directly or through group exchange. While adoption of this technology implied a more limited mobility (which has its roots in the Late Archaic), the lack of steatite containers at Hickory Bluff (and along the St Jones River) suggested ceramic technology was a marker of economic and social change. With the manufacturers of the pottery at some distant source, there is a clear demarcation of a novel economy. If pots were being manufactured elsewhere and imported onto the Delmarva, it implied that vessels were not being made individually at the household level, but were the product of specialists (Stewart 1998a). If this assumption is accurate, then pottery manufacturers may have gained a degree of social prestige, thereby suggesting incipient social divergence.

Marcey Creek Vessel Lot MA02 represented an anomaly within the Hickory Bluff assemblage and was divergent from traditional Marcey Creek vessels in form and constituents. The vessel had thin-coiled walls and a probable conoidal base. Its paste matrix also was dissimilar to the typical Marcey Creek vessels found onsite and the temper included a mix of steatite and clay. The clay matrix of Vessel Lot MA02 also showed similarity to the clay matrix of Dames Quarter Vessel Lot D1, and to one of the test tiles procured from local sources. Vessel Lot MA02 may represent a transitional ware that combined elements of both Marcey Creek manufacture (steatite temper) with later ware attributes, specifically narrow coiled techniques and conoidal base, such as seen on Selden Island wares. A division in pottery manufacture appears to be recorded at Hickory Bluff in vessels that were considered to be contemporaneous or slightly younger in age as Marcey Creek. Wares such as the Dames Quarter and Wolfe Neck types, were likely manufactured locally, as suggested by their clay and tempering agents, and their more geographically bounded styles. The variability in these Early Woodland ceramic wares indicated some degree of local experimentation and a degree of social autonomy from neighboring groups. This local evidence stands in contrast to the Marcey Creek spatial evidence, and if pottery was made at the household level for the Dames Quarter and Wolfe Neck wares, it is probable that no special social status would be ascribed to the potters.

The Mockley ware vessel lots found at Hickory Bluff showed similarity to the net-impressed, shell-tempered wares found throughout the Mid-Atlantic and the Chesapeake Bay region, taken as a sign of social and/or cultural integration (Stewart 1998b). At Hickory Bluff, the presence of the geographically ubiquitous Mockley wares contrasted with the earlier and more geographically confined Clay Tempered Wares. While the presence of Mockley wares may indicate inter-group integration, the Delmarva ceramics varied from the decorated ceramics found in the Delaware River Valley and those found in coastal Virginia (Stewart 1998b). Mockley ceramics at Hickory Bluff contained variations in additional paste inclusions such as clay, iron oxide, sand, and fiber casts. The clay and iron oxide inclusions were similar to

inclusions more commonly associated with the Clay Tempered Wares. In addition, several of the Mockley vessel lots from Hickory Bluff were thinner than typically associated with the type. Although, this variance may have to do with the location on the vessel the sherds were from, these thinner vessel lots exhibited criss-crossed interior surface treatments, also more typically associated with Clay Tempered Wares. Only one Mockley sherd was submitted for thin section analysis and its clay matrix did not resemble any of the locally procured clay tiles. However, as only one example, the results do not necessarily point to non-local manufacture. The variation observed in the Hickory Bluff Mockley ware vessel lots implied some degree of social distance between other Middle Woodland groups.

The majority of vessel lots at the Carey Farm and Island Farm sites were Mockley ware, followed by Hell Island and Wolfe Neck wares (Table 20.9). The variation in these vessel lot percentages implies differences in the occupation intensity between these sites and Hickory Bluff, which had a preponderance of earlier wares. The pattern that was suggested is of Early Woodland groups utilizing Hickory Bluff more frequently until the late Early Woodland, when Wolfe Neck ware becomes established and the frequencies are higher at Carey Farm and Island Farm. Occupational focus for the late Early Woodland-early Middle Woodland period, or Delmarva Adena phase, shifts back to Hickory Bluff, where Clay Tempered Wares dominated the assemblage and were found with more frequency than at the other two sites. The changes in occupational focus within the St. Jones River basin could be indicative of slight changes in selection preferences, the availability of certain resources due to micro-environmental shifts, such as plant and tree species availability, or convenient gravel outcrops or bars along the river.

The large number and implied size of the Mockley vessels, including large vessels in storage features at Carey Farm, may indicate sharing of meals by groups (or specialized social or ceremonial use). Large Middle Woodland vessels are often connected with productive wetland and riverine environments (Stewart 1998b), thus their presence along the St Jones River was a sign that peoples were either more permanent in their mobility or they were caching vessels in anticipation of coalescence during seasonal rounds. The Carey Farm and Island Farm sites had a much higher percentage of Middle Woodland vessels, both Mockley and Hell Island wares, than Hickory Bluff, suggesting a real shift in use of the landform.

A profound change is indicated at Hickory Bluff and the rest of the St. Jones River landscape with the onset of the Late Woodland. A dramatic decline is observed in the material record of Hickory Bluff with few ceramics attributable to this period. The archaeological record, in general, of the St. Jones River decreased substantially, and both Carey Farm and Island Farm contained similarly low frequencies of Late Woodland ceramic vessels. This decline in material culture was likely a consequence of changes in social and economic organization and the establishment of semi-permanent settlements towards the coastal zone. The low density Late Woodland record of the St. Jones River showed that groups were conducting temporary forays, but not utilizing the landform with the intensity evidenced in earlier time periods.

Ceramic Attributes

A number of ceramic attributes may provide information on various social signatures that are not obvious within discussions of ware type (Section 14.0). Differences in manufacturing attributes, surface treatment, and cordage twist within a particular, or between, ware types may

be symbolic of group cohesiveness, family/clan identity, personal preference, or ritual behavior. Cordage twist in particular has been used to assess the relatedness of both sites and ceramic styles (Hurley 1979). The continuation of this type of analysis for the Delmarva Peninsula and the Mid-Atlantic region will be enhanced with the data gathered from the Hickory Bluff ceramic assemblage. Although fragmentary, the assemblage contained a wealth of data on both surface treatment and cordage twist for the different wares of the Woodland period and will be discussed for the site and in comparison with the data from the nearby Carey Farm and Island Farm sites.

Within the Early Woodland period ceramic types at Hickory Bluff, a variation in surface treatments from other sites in the region was observed. The Marcey Creek ceramics generally had smoothed exterior surfaces, typical of the ware. There was a tendency for cord-marked exterior surface treatments within the Dames Quarter and Wolfe Neck vessel lots. Although the total number of vessel lots was small (n=8 combined), it hinted at possible continuity of attributes or a level of group cohesiveness (Table 20.10). Interestingly, within the Hickory Bluff

Wolfe Neck vessel lots, there were no examples of net-impressed exterior surfaces, which were common for the type. At Carey Farm and Island Farm, of the 38 Wolfe Neck vessels, four displayed net-impressed exterior surface treatments, still an overall small number but implied some degree of difference (Custer et al. 1995b). Variation was also observed within the cordage twist of the Wolfe Neck vessel lots. At Hickory Bluff, only one Wolfe Neck vessel lot exhibited a Z-twist, while the combined Carey Farm and Island Farm data determined five Z-twists and 26 S-twists for the type. The small minority of Z-twist cordage at both sites suggested variability that may reflect family identity, personal preference, or individual idiosyncrasy.

Variations in surface treatments increase at Hickory Bluff with the addition of net-impressed varieties for Popes Creek, Clay Tempered Wares, and Mockley vessel lots (Table 20.10). This treatment outnumbered the cord-marked treatment for each of these wares at the site, with a combined frequency of 60 percent. At Carey Farm and Island Farm, these same wares (minus Popes Creek) showed the inverse surface treatment preference, as 85 percent were cord-marked. In terms of cordage twist, both the Clay Tempered Wares and Mockley vessel lots at Hickory Bluff had a preference for S-twist (95 percent of vessels with identifiable twist). These wares at Carey Farm and Island Farm showed a similar tendency for S-twist cordage (78 percent of vessels with identifiable twist). Therefore comparison of cordage twist data suggested more relatedness between the vessel lots of the different sites than comparison of surface treatment data. The observed differences in surface treatment may be indicative of functional differences intended for the vessels at these sites.

At Hickory Bluff, the late Middle Woodland and Late Woodland periods were represented by only a small number of vessel lots: four Hell Island, four Townsend, and one Minguannan (Table 20.10). Surface treatments were either cord or fabric impressed.

In terms of cordage twist, more variation was present within the late Middle Woodland and Late Woodland period wares. At Hickory Bluff, two vessel lots exhibited S-twist cordage and one vessel lot contained Z-twist cordage, of the three where cordage was identifiable in Hell Island. At Carey Farm and Island Farm, this same type exhibited S-twist on eight vessel lots and Z-twist on 12 vessel lots, from the 20 where cordage twist was identifiable. The Late Woodland

Table 20.10 Hickory Bluff Ceramic Vessel Data

Ceramic Type	Vessel Lot Frequency	Identified Surface Treatment				Identified Cordage Twist					
		Smooth	Cord-Marked	Net-Impressed	Fabric-Impressed	Cord-S	Cord-Z	Net-S	Net-Z	Fabric-S	Fabric-Z
Marcey Creek	12	11	0	0	0	0	0	0	0	0	0
Dames Quarter	2	1	1	0	0	1	0	0	0	0	0
Wolfe Neck	6	0	6	0	0	4	1	0	0	0	0
Popes Creek	2	0	0	2	0	0	0	0	0	0	0
Clay Tempered	41	0	17	24	0	15	2	14	0	0	0
Mockley	9	0	4	5	0	4	0	3	0	0	0
Hell Island	4	0	3	0	1	2	1	0	0	0	0
Townsend	4	0	0	0	4	0	0	0	0	0	2
Minguannan	1	0	1 (decoration)	0	0	0	1	0	0	0	0
Untyped	5	2	1	1	1	1	0	1	0	0	1
Total	**86**	**14**	**33**	**32**	**6**	**27**	**5**	**18**	**0**	**0**	**3**

Townsend and Minguannan vessel lots from Hickory Bluff displayed Z-twist cordage on the three vessel lots where twist was identifiable. At Carey Farm and Island Farm, only three Late Woodland vessel lots, all Townsend type, had identifiable cordage twist one S-twist and two Z-twist. Twist was not identified on any of the Minguannan or Killens vessel lots. The variation within the cordage twist noted at these sites may suggest family identity, personal preference, or ritual behavior and use, although the sample size was too small to draw definitive conclusions. Interestingly, in these later ware types, the surface treatments displayed more uniformity while more variety was contained within the cordage twist data, which was the inverse relationship of that noted for the earlier Early and Middle Woodland period ceramics. A tendency for Z-twist cordage is hinted at within the Late Woodland ceramics, although with the small sample size, was by no means definitive. It did, however, correlate with that trend noted in the wider Mid-Atlantic region and may indicate a degree of social cohesion and consistency in manufacturing.

When examined in conjunction, patterning of surface treatment and cordage twist varied in the site assemblages along the eastern bank of the St. Jones River. At Hickory Bluff, cordage twist was predominantly S-twist for both cord-marked and net-impressed vessel lots; Z-twist was associated with cord-marked and fabric-impressed examples (Table 20.11). However, within the Carey Farm and Island Farm assemblages, S-twist was associated mostly with cord-marked ceramics and Z-twist occurred with cord-, net-, and fabric-impressed types (Custer et al. 1995b). This variation corresponded to the differences in the occupational intensity at each site area. Hickory Bluff was characterized by earlier occupations associated with Clay Tempered Wares (Table 20.12) whereas Carey Farm and Island Farm were associated predominantly with later Middle Woodland Mockley ceramics that displayed a greater frequency of Z-twist cordage.

Table 20.11 Comparison of Surface Treatment and Cordage Twist Direction
(Based on Vessel Lot Counts)

Surface Treatment	Hickory Bluff		Carey Farm and Island Farm (Custer et al. 1995b)	
	S-Twist	Z-Twist	S-Twist	Z-Twist
Cord-Impressed	27	5	130	26
Net-Impressed	18	0	8	18
Fabric-Impressed	0	3	2	4

The differences in the patterning of surface treatment at the three sites may relate to functional or behavioral differences at the sites. Within the lithic assemblage, differences were observed in the frequency of tool types recovered, which suggested different activity emphasis between the sites. The differences noted within the ceramic assemblage could be related to those activity differences as well. Additionally, the differences in the ceramic assemblages could be indicative of localized expression within the wider regional ceramic manufacturing traditions.

The overall pattern within the cordage twist comprehensive data for Delaware sites correlated with the trends noted in the wider Mid-Atlantic region. In the Early Woodland, there was a preference for S-twist cordage represented by its frequency of occurrence. A change to the use of both S-twist and Z-twist cordage was observed in the late Early Woodland and Middle

Woodland (Table 20.12), although S-twist cordage remained more frequent. In the late Middle Woodland and Late Woodland periods, ceramics began exhibiting a greater frequency of Z-twist cordage, although S-twist was still employed. Sites seldom display a single cordage twist during any given period and anomalies are often thought to represent specialized vessels or idiosyncratic behaviors of individuals (Section 14.0). The more important pattern is looking at preference changes within an assemblage. This change is often considered to signal new outside influence or population movements, as cordage twist techniques appear to be generally static within a population, tending to change with less frequency than other attributes such as decoration or surface treatments (Section 14.0).

Table 20.12 Cordage Twist Data (Based on Vessel Lot Counts)

Ceramic Type	Hickory Bluff		Carey Farm and Island Farm (Custer et al. 1995b)		Comprehensive Delaware Data (Custer et al. 1995b; including Hickory Bluff)	
	S-Twist	Z-Twist	S-Twist	Z-Twist	S-Twist	Z-Twist
Dames Quarter	1	0	0	0	2	0
Wolfe Neck	4	1	26	5	32	6
Accokeek	0	0	2	0	2	0
Clay Tempered	29	2	11	8	134	24
Mockley	7	0	92	21	100	22
Hell Island	2	1	8	12	14	14
Townsend	0	2	1	2	3	4
Minguannan	0	1	0	0	2	10
Killens	0	0	0	0	7	9
Untyped	2	1	0	0	2	1
Total	45	8	140	48	298	90

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The pattern of cordage twist within the Hickory Bluff assemblage was consistent with the comprehensive data from Delaware and the wider Mid-Atlantic region. This recurrent pattern of cordage twist preference changing near the end of the Middle Woodland and into the Late Woodland periods was suggestive of cultural change in the region. Within the St. Jones River valley, the Late Woodland period coincided with a generally low density of material culture. The implication being that groups had different resource emphasis, dependent on mixed economies of horticulture, wild plant food processing, and marine exploitation, with more permanent villages located near the coast. These changes were subsequently evident in the differences observed in the material culture, expressed in both the types of artifacts and in the details of their form, including cordage construction.

SUBSISTENCE DATA

Within the St. Jones River valley, relative environmental consistency was achieved when forest habitats stabilized and oak/hickory forests became dominant after 6000 years B.P. (Kellogg and Custer 1994). While climatic conditions certainly influenced the local environment during the second half of the Holocene, the greatest ecological changes during this time frame were brought on by sea level rise. An intertidal estuarine zone was established along the St. Jones River some time after 3500 years B.P. (Section 4.0). Archaeological remains from Hickory Bluff indicated the use of the different environmental zones within the site vicinity by the presence of carbonized wood (tree species), carbonized nut shells, and calcined bone.

The identifiable carbonized wood recovered from Hickory Bluff was dominated by hickory (*Carya sp.*), followed by white oak (*Quercus sp.*). Other species identified include black walnut (*Juglans nigra*), American chestnut (*Castanea denta*) and cherry (*Prunus serotina*). Procurement of a particular wood species for burning may be related to subsistence oriented activities, such as for cooking or smoking foods. All of the wood species identified would have been common to the mixed hardwood forest native to Delaware's coastal plain (Eyre 1980; Tatnall 1946).

The potential subsistence related floral remains recovered from Hickory Bluff consisted of hickory nutshells (*Carya sp.*) and two black walnut shell (*Juglans nigra*) fragments. At Carey Farm and Island Farm, three nut types -- hickory, butternut, and acorn -- were identified within bulk charcoal samples collected for, and analyzed prior to, radiocarbon dating. Flotation analysis of feature fills from Hickory Bluff recovered only uncarbonized seeds, which are not of archaeological age. In contrast, at Carey Farm and Island Farm, although preservation was considered poor, a total of 19 native species were identified as charred seeds within flotation samples (Custer et al. 1995b). In addition, four varieties of European seeds were recovered from the same flotation samples indicating some postdepositional disturbances (Custer et al. 1995b). The seed assemblage from Carey Farm and Island Farm was similar to the seed assemblages recovered from both the Pollack and Leipsic sites (Custer et al. 1995b), indicating some of the

same problems with preservation and postdepositional disturbance. The differences in the seed and nut data between Hickory Bluff, Carey Farm, and Island Farm may be related to preservation characteristics at the sites, but could also indicate functional or seasonality differences at the sites. Therefore, the data differences would imply that perhaps the low recovery of seeds and nuts at Hickory Bluff was a result of the site not being primarily concerned with regular subsistence activities, at least not with these sources, which could indicate seasonal availability during site occupations.

The preservation of bone at Hickory Bluff was poor. Only two species were identified from the limited assemblage of calcined bone recovered from the site: box turtle (*Terrapene carolina*) and white tail deer (*Odocoileus virginianus*). Both of these species were common components of faunal assemblages from eastern Woodland sites. The faunal evidence, though limited, suggested the exploitation of terrestrial and riverine animal species. Interestingly, differences were noted when compared to the Carey Farm and Island Farm sites, which exhibited no calcined faunal bone. This lack might be attributed to preservation characteristics of the sites, but that interpretation is undermined by the recovery of intact human skeletal remains at the Carey Farm site (Custer et al. 1995b) and again may be more indicative of differing site functions.

Clear subsistence data was absent from the Hickory Bluff assemblage and aside from hickory nuts, no domesticatable taxa were recovered. Wild plant foods were under-represented and no evidence of plant cultivation was identified at Hickory Bluff. Evidence for horticultural development in the Mid-Atlantic is sparse and there is no evidence for concerted plant cultivation on the coastal plain much before A.D. 800, with the adoption of maize horticulture. The coastal plain of Delaware is particularly lacking in clear chronology for plant cultivation and much of what is known has been inferred from tool studies, rather than archaeobotanical data.

At Hickory Bluff, additional subsistence data was gleaned from the study of adherent residues on ceramics and selected lithic tools. A total of 19 ceramic sherds were identified that contained adherent organic residue. Only two of these ceramic sherds contained residue on the interior side (more indicative of direct vessel function than exterior residues), in quantities/condition that allowed for identification. The residue showed evidence for vascular tissue in association with paraenchyma (storage) cells. This association suggested that the residual tissue represented a vegetative storage organ, such as a root or tuber. Although no data for tuber and/or root use was available from Carey Farm or Island Farm, the use of these items within Native American diets has been noted in the Mid-Atlantic region from ethnographic sources (McKnight 1999; Rountree and Davidson 1997).

The use of roots and/or tubers at the site was further corroborated by the microwear and residue analysis undertaken on a set of 50 uniface tools. Results indicated use to scrape and cut hide as well as starchy plants and bone/antler. Sixteen out of the 50 artifacts exhibited residues including eight (16%) with skin (hide) tissue, three (6%) with bone or antler residue, and five (10%) with plant remains. One specimen, positive for plant remains, exhibited starch grains on the working edge suggesting use in the processing of a starchy organ, such as a root or tuber. Blade wear patterns were examined and the results were used in tandem with the residue tests to determine a specific tool use. Results of the multiple analytical techniques proved to compliment

each other and demonstrated that uniface tools were used in a variety of subsistence related activities at Hickory Bluff. At Carey Farm and Island Farm, a total of 727 blood residue tests were undertaken, with only three potentially positive results (Custer et al. 1995b). Information on the type of tests, the tools selected, and the results were lacking and the lack of residues was interpreted as a preservation issue. However, these results again could signal site functional differences between Hickory Bluff, Carey Farm, and Island Farm.

Other macroscopic use wear analyses on lithic tools at Hickory Bluff provided some additional implications for subsistence activities. The large numbers of projectile points recovered at the site suggested the importance of hunting. Results of blade wear and edge damage analysis of the projectile points suggested their use not only for hunting, but also for game and plant food processing. Examination of the pitted stones at the site suggested multiple functions including both nut processing and bipolar lithic reduction.

In general, the evidence for subsistence at Hickory Bluff and nearby sites was slight, which suggested poor preservation for organic materials at these sites. Even when taking this lack of preservation into consideration, the differences that were apparent between Hickory Bluff and the nearby Carey Farm and Island Farm sites were noteworthy and suggestive of some differences in subsistence focus between the sites. Unfortunately, much of the subsistence data from Hickory Bluff was unable to be isolated for a particular chronological occupation, which would allow for a more meaningful comparison with the other site assemblages. However, in conjunction with the other differences noted in the lithic tool and ceramic assemblages, the notion of difference between the sites is strengthened. These differences may relate to chronological focus of the site occupations, seasonality of site occupations, and/or the site function. Additionally, these differences could reflect the notion of dispersed settlement and the segregation of activities over the wider landform, and not just within site boundaries as delineated by project boundaries.