

8.0 SUMMARY OF INVESTIGATIONS AND SYNTHESIS

8.1 Summary

Previous archaeological investigations at Site 7K-F-11 (the prehistoric Grey Farm Site) and Site 7K-F-169 (the historic Soulie Grey Farm Site), including Phase I and II archaeological surveys, were performed for the SR 1 North Grade Separated Intersection Project by ADM. Phase I survey covered a large area encompassing the intersection project and its immediate vicinity, while Phase II survey performed by ADM covered an APE developed for a conceptual alignment alternative developed in 2005. Based on Phase I and II survey, the portion of Site 7K-F-11 within the APE was determined to be eligible for inclusion in the National Register, and portions of Site 7K-F-169 were found to be potentially eligible.

In 2009, A&HC performed additional Phase II survey within Site 7K-F-169 as well as Phase III survey within Site 7K-F-11 within the project's APE as then defined. Additional Phase II survey by A&HC within Site 7K-F-169 indicated that historic period resources that were related to the Soulie Grey Farm were not eligible for inclusion in the National Register, and no further work was performed in this portion of the project's APE. However, additional Phase II survey in the portion of Site 7K-F-169 that was adjacent to Site 7K-F-11 indicated that potentially significant prehistoric resources associated with Site 7K-F-11 were present there. Subsequent Phase III survey was therefore expanded to include this latter portion of Site 7K-F-169, as well as the entirety of Site 7K-F-11 within the APE. For simplicity of presentation, the portions of the two sites where data recovery was performed were subsequently referred to as Site 7K-F-11/169.

Phase III data recovery excavations were performed in three stages. The first stage involved excavation of test units on grid, the second consisted of excavation of test units in blocks at localities within the overall site that were of interest based on Stage I excavations, and the third stage involved mechanical removal of the Ap horizon from large areas of the APE, termed trenches, to identify subsurface anomalies, a subset of which were subsequently excavated.

In all, 38,123 artifacts were recovered during the additional Phase II and the Phase III excavations. Collectively, the excavation of test units on grid, block excavations, and mechanical stripping identified 437 subsurface anomalies, of which 245 were partially or completely excavated and 65 were closely examined to confirm that they were of non-cultural origin. After post field work analysis, 81 anomalies were determined to be of cultural origin, including Areas of Intense Activity (AIAs, likely representing floors of semi-subterranean structures), basins, pits, cylindrical pits, FCR concentrations, and stains.

Spatial analysis of artifact and feature concentrations identified what were termed site components consisting of spatially discrete areas where artifacts and features appeared to date principally to one or another period of site occupation or use. Included were an

early Woodland I occupational component, a middle Woodland I occupational component, and a smaller Woodland II component. An early Woodland I activity area component and two middle Woodland I activity area components were also delineated, for a total of five spatially discrete prehistoric site components. Archaeological remains dating to the late Woodland I period, as well as those predating the early Woodland I period, were too sparse to indicate the presence of discrete site components.

Unexpectedly large numbers of historic artifacts were also recovered during the excavations, leading to the identification of a historic site component in addition to the five prehistoric components.

In addition to feature classification and spatial analysis, specialized studies included projectile point and ceramic typology, lithic technology, lithic tool microwear analysis, macrobotanical analysis, starch grain and phytolith analysis, protein residue analysis, geomorphology, and statistical tests of significance. Radiocarbon and OSL dating was also performed, as were typological and functional analyses of the historic artifacts recovered from the site.

The results indicated that the early Woodland I occupational component contained the highest concentration of artifacts and features at the site. Numerous features were large pits and cylindrical pits suggesting relatively intensive resource procurement and processing activities. Macrobotanical analysis along with starch grain and phytolith analysis indicated that hickory mast, wild grass seeds, and the seeds of other seed bearing plants were being harvested. A distinctive complex of tools and other materials also characterized the component, including narrow bladed stemmed projectile points, microtools, grooved abraders, and utilized flakes along with exotic lithic raw materials including argillite, rhyolite, and quartzite, a local lithic raw material, and hematite, perhaps used in the production of red ochre. Radiocarbon dates suggested that occupation occurred primarily during the later half of the early Woodland I period, from approximately 2200-1500 BC.

Features in the early Woodland I occupational component were closely spaced and frequently intersected one another, indicating several distinct episodes of occupation. Features were also differentially distributed within the component, with AIAs and relatively shallow features such as FCR concentrations and basins in one area with large, deep processing/storage pits concentrated in another.

The early Woodland I activity area component was more restricted spatially than the early Woodland I occupational component, and contained only two cultural features, a large pit and a small pit. Macrobotanical analysis indicated that hickory mast was again being processed, and that microtools were important in the tool assemblage. The component also exhibited exceptionally high densities of jasper debitage, which contrasted with the early Woodland I occupational component and suggested that the Woodland I activity area component might have been occupied at an earlier date.

The middle Woodland I occupational component was similar in size to the early Woodland I occupational component, but contained a lower density of features, and features there were in general shallower than those of the early Woodland I component. In addition, artifact densities were lower, and there was no clear evidence for inter-related sets of tools and other associated materials. Collectively, these characteristics suggested that occupations were less frequent and of shorter duration, and perhaps by smaller groups. Radiocarbon dates and diagnostic ceramics indicated that the component was occupied intermittently from approximately 1600 BC to perhaps as late as c. AD 100.

The component also contrasted with the early Woodland I occupational component in lacking evidence of hickory mast procurement and processing. However, starch grains and phytoliths indicated that along with wild grasses, the roots, tubers, and shoots of wetland plants such as bulrushes and Indian potato were being procured and processed.

Interpretation of the two middle Woodland I activity area components at the site was problematic. Both were spatially small and contained few artifacts, making behavioral inferences difficult. One contained a single basin feature and a tree throw, the other a tree throw only. Whether these small period-specific concentrations of middle Woodland I artifacts represented special purpose task areas away from larger site occupations, or alternatively, were themselves separate, short term ephemeral episodes of site occupation that happened to be outside the primary occupational area, could not be reliably determined from the available evidence.

Late Woodland I period occupations at Site 7K-F-11/169 were ephemeral in comparison to the preceding two periods. The component was represented by low frequencies of Mockley and Hell Island ceramics and a Jacks Reef projectile point. So few Mockley ceramics were recovered that clustering among them was not discernable. Two limited concentrations of Hell Island ceramics were noted during the ceramic analysis, but associated feature clusters and/or artifact concentrations were not present, and no spatially discrete late Woodland I occupational or activity area components could be discerned. It was unclear whether the lack of substantial evidence for late Woodland I occupations at the site was related to sampling factors or to changing local site selection preferences.

As compared to the early Woodland I and middle Woodland I occupational components, the Woodland II component at Site 7K-F-11/169 encompassed a smaller area and correspondingly fewer features. The component was centered around an AIA that was penetrated by a cylindrical pit, surrounded by several FCR features, basins, and pits. Like the early Woodland I occupational component, the Woodland II component appeared to be spatially organized, with FCR and basin features clustered around an AIA and with larger and deeper pit features at a greater distance. The cylindrical pit, which penetrated the AIA, presumably represented a subsequent occupational episode.

A high density of charred hickory nut hulls in the cylindrical pit suggested that a principal activity of the Woodland II site occupants was the collection and processing of hickory mast. Additionally, large numbers of starch grains and starch grain clusters on

Woodland II ceramics were exclusively of wild grasses and perhaps maize, suggesting the collection and processing of wild grass seeds was a prevalent activity at the site, and that the cultivation and processing of maize may have been as well. The data clearly suggested a focused and specialized food gathering/producing strategy in which collection and processing of wild grasses and hickory mast were important, and were perhaps associated with maize horticulture.

Archival research indicated that the historic component at the site dated to c.1810-1852, and that the parcel that encompassed the component was referred to in deeds as “the bridge lot,” suggesting that the historic occupation may have been associated with a bridge tender's house. The historical artifact assemblage was consistent with the occupation period indicated by the research, although no evidence of a dwelling was found. Analysis indicated that the occupants of the property could afford mid-range and occasionally more expensive ceramics, but not the most expensive wares.

8.2 Synthesis

8.2.1 The Prehistoric Component

Subsistence and Seasonality of Occupation

Direct evidence of subsistence and seasonality of occupations at Site 7K-F-11/169 was to some extent limited due to poor preservation of faunal and botanical remains. Bone was especially poorly preserved, with only very small fragments found in feature excavations. Marine shell was also poorly preserved and relatively scarce. It was only common in one feature, a cylindrical pit associated with the Woodland II occupation. Radiocarbon dating results showed that one sample of marine shell was of historic origin. In contrast, starch grains were found to be present on ground stone artifacts as well as ceramic and steatite sherds, and charred nut hulls were a prevalent constituent of feature fill. Collectively, these latter data provided important insights into subsistence behavior and seasonality of site utilization.

Carbonized botanical remains in prehistoric features consisted primarily of wood charcoal and hickory nut fragments. Within the early Woodland I occupational component, relatively high frequencies of hickory nut hulls were identified in seven flotation samples and the nuts were noted in the excavation of an eighth (un-floated) feature. A ninth feature with a relatively high frequency of nut hulls was located in the outlying early Woodland I activity area component. Together, these findings suggested considerable reliance on mast resources during the period, focused specifically on hickory mast to the exclusion of other nut bearing species. These nut-rich features were all deep pits or cylindrical pits, in which the nuts could have been stored for later use. This would indicate occupation of the site during fall, when the nuts ripened, followed either by continuous occupation extending into winter and perhaps early spring, or by re-occupation of the site in winter/early spring, when plant foods were scarce and stored foods would be needed to supplement game and fish.

Although charred hickory nuts were common in a subset of features, only one item in the artifact assemblage was specifically identified as a nutting stone, which would appear to suggest that cracking nuts to extract the meat was not a common practice at the site. However, items identified as hammerstones were quite common at the site; only microtools, utilized flakes, and grooved abraders were more prevalent. Cracking nuts on a stone anvil with another stone and then pulverizing the meats might be expected to produce damage to the “hammer” stone similar to that which would occur during stone tool knapping, and the prevalence of hammerstones in the assemblage might thus reflect both of these activities. Messner (2011) provided several ethnohistoric accounts of how Native Americans in the eastern woodlands generally and the mid-Atlantic specifically smashed hickory nuts and/or walnuts and mixed them with water to create a “milk,” explaining that this process extracted the high fat content of hickory nuts.

They likewise prepared a kind of liquor like milk by gathering a large quantity of hickory and black walnuts, dried and crushed them. They took out the kernels, pounded them as fine as flour, and mixed this with water so that it looked like milk and was almost as sweet (quoted in Messner 2011:14)

The analysis of starch grain and phytolith traces provided additional evidence for subsistence and seasonality of occupation during the early Woodland I occupation of the site. Starch grains and phytoliths found on early Woodland I artifacts suggested that a variety of plant foods were commonly collected by the site occupants, including wild grasses, bristlegrass (a wild millet) in particular, and seeds, including those of the Asteraceae, the sunflower/marsh elder family. Considering the small size of the sample of artifacts examined and in conjunction with evidence for hickory nut exploitation, these results would suggest a generalized approach to the collection of wild plant resources in the vicinity of the site.

The results of the starch grain and phytolith analysis also had implications for seasonality of site use during the early Woodland I site occupation. Sunflower seeds ripen in late summer/early fall, before most mast producing trees lose their nuts. Marsh elder seeds also ripen in the fall. In contrast, bristlegrass ripens quickly and can support several generations in a growing season. It could thus potentially have been collected as early as late spring, throughout the summer, and into the fall. Other wild grasses have similar ripening schedules, and might also have been harvested by early Woodland I site occupants.

In the middle Woodland I occupation and activity areas, none of the associated features showed evidence of a reliance on mast resources, suggesting that this resource had become less important in the diet, or that the site was not occupied in the fall season during this period, but was used during other seasons for other resource procurement purposes.

Starch grain and phytolith evidence from middle Woodland I artifacts again suggested use of a variety of wild plant foods for subsistence, including wild grasses, not only

bristlegrass but also wild barley and perhaps other varieties. Wetland plants including bulrush and wapato or indian potato were also being collected. Research has shown that tubers such as Indian potato contain high levels of starch if harvested in late summer and fall, but low levels if harvested out of season (Messner 2011). Bulrush shoots are also edible, and can be harvested in early spring, and bulrush rhizomes can be harvested throughout much of the growing season. As indicated above, bristle grass could have been collected during the late spring, summer, and early fall.

The wild plants harvested by early and middle Woodland I people at the site could thus have been collected during extended or repeated episodes of site occupation lasting from late spring through late fall, or alternatively, could all have been collected during a much shorter portion of the year lasting from late summer/early fall through late fall.

It is intriguing that wetland adapted plants figured prominently in the middle Woodland I starch grain and phytolith assemblage, but were absent from the early Woodland I assemblage. Although perhaps attributable to small sample sizes, the difference may instead reflect ongoing ecological changes in the site vicinity. According to Custer (1989), until c. 1000 BC, sea level rise along the eastern coast of North America was too rapid to permit the full development of stable tidal marsh plant communities in estuarine environments, but that after that they became prominent along the margins of tidally influenced waterways, such as those that extended along the Murderkill River and Spring Creek in the vicinity of the site. The result was a band of terrain along such streams that was rich in fish, shell fish, waterfowl, terrestrial game, and wetland plant food resources.

As indicated above, the majority of radiocarbon dates associated with the early Woodland I occupational component at Site 7K-F-11/169 fell between roughly 2200-1600 BC, which would predate the full development of tidal marsh environments in the site vicinity. Presumably, the early Woodland I site occupants pursued a wild plant food gathering strategy focused primarily on non-wetland resources, including hickory mast, wild grasses, other dry-land seed bearing plants, etc. The gradually encroaching extent of newly flooded land may also have brought the site location within easy access of first fresh water and then marine animal resources, especially fish and shellfish. Although no direct evidence of fishing was identified at the site, such evidence has been elusive in general except where blood residue analysis has been positive for fish, as for example at Puncheon Run (LeeDecker et al. 2005). The people of the Delaware Valley used fish weirs to collect fish from rivers and streams, an activity that leaves little material evidence (Schindler 2006).

Dating from approximately 1600 BC to as late as AD 100, the middle Woodland I occupation presumably encompassed the period of full development of tidal marsh communities within the immediate site vicinity, with a corresponding restructuring of subsistence strategies and seasonality of site occupation. At least at the location of the site, wetland plants such as bulrushes and Indian potato became more important subsistence resources and mast much less so.

The evidence for exploitation of wild plant foods during the early and middle Woodland I periods at the site raised more general issues about the nature of pre-Woodland II Native American plant use for subsistence purposes. In the midwest during the Late Archaic period, intensive dependence on primarily native varieties of incipiently cultivated plant foods has been termed the Eastern Agricultural Complex. The plants in question included chenopods, marsh elder, squash, and sunflower (Smith 1992). For example, Smith and Yarnell (2009) document intensive use (termed cultivation) of the complex at the Riverton Site in Illinois by 1800 BC. Plants in evidence there were bottle gourd and little barley. Other plants utilized intensively in the Late Archaic of the Midwest included knotweed and maygrass (Asch and Asch 1985). The utilization of these plants included managed harvesting and storage of seed stock.

The Eastern Agricultural Complex is thought to have diffused to the northeast from the midwest (Smith 1992), and Custer (1996) has termed the Late Archaic period in the Delaware Valley the Intensive Gathering Formative Period I, with groups adapted to new resources in riverine and estuarine environments. However, apart from nutshell fragments, little direct evidence has been found regionally to document this pattern of varied plant exploitation, or possible incipient plant cultivation.

The presence of starch grains and phytoliths of several varieties of wild grass (the Poaceae family), of members of the sunflower/marsh elder family (the Asteraceae), and of wetland plants such as Indian potato and bulrush, on artifacts from Site 7K-F-11/169 suggests that these plants may have been significant foods for pre-Woodland II groups along Spring Creek and the Murderkill River. That some of these plants were among those involved in the Eastern Agricultural Complex might further suggest that they were being manipulated by site occupants to increase yield amounts and reliability.

In the Woodland II occupational component, the central, cylindrical pit feature contained relatively high frequencies of hickory nuts, suggesting a return to reliance on this resource. The presence of hickory nuts in a cylindrical pit also suggested a pattern of occupation similar to that of the early Woodland I period, with a fall period of site occupation for gathering nuts, followed by storage for their use during winter.

Starch grain and phytolith evidence from Woodland II artifacts consisted entirely of wild grasses and perhaps maize. As indicated, bristlegrass and maize starch grains are similar in size and morphology, making distinction of starch grains from the two plants problematic in the absence of other corroborating evidence for the cultivation of maize. Thus the Site 7K-F-11/169 results were ambiguous as to whether the Woodland II site occupants were cultivating crops of maize. Additionally, the Woodland II starch grain and phytolith results from the site appeared to reflect a decrease in the use of wetland plants in favor of an increased concentration on grasses. Considering the lack of evidence of Native American maize cultivation in the lower Delaware Valley, and especially in Delaware, it may be that the combination of estuarine resources (fish, shellfish, and terrestrial game) with intensified wild grass seed harvesting made adoption of maize there neither necessary nor desirable.

During the Woodland II occupation, harvesting of wild grasses could have occurred during late spring, summer, and fall, while if it occurred, harvesting maize would have occurred in late summer or fall. Like other plant resources, wild grass seeds and/or maize may have been stored on-site for use throughout the winter and early spring. If maize was cultivated in fields nearby, the site may have been occupied during the spring and summer for planting and cultivation of the crop. Woodland II occupations may thus have included long-term occupations of the site throughout the growing season, or alternatively perhaps repeated short term visits during the growing season for crop maintenance. It was also possible, although perhaps unlikely, that if maize was grown, this was pursued elsewhere and harvested maize was brought to the site for storage and winter use.

For all three of the principal periods of site occupation, the question of whether the site was occupied to take advantage of seasonal runs of anadromous fish was problematic. No fish protein was identified on prehistoric artifacts from Site 7K-F-11/169. Since only salmon antisera was tested and Atlantic salmon did not extend as far south as Delaware, the negative results did not necessarily indicate that seasonal fish runs were not being harvested there. There were no netsinkers at the site, but the microtools so prevalent at the site could have been employed in some way that was related to fishing, as either harpoon barbs or filleting tools to process fish. The microtools were strongly associated with the early Woodland I occupational site component as well as the early Woodland I activity area component, suggesting that fish may have been an important resource during this period. Additionally as indicated above, the narrow bladed stemmed early Woodland I projectile points from the Puncheon Run Metate Block excavation were interpreted as perhaps adapted for spear fishing (LeeDecker et al. 2005), and the early Woodland I point assemblage from Site 7K-F-11/169 was remarkably similar.

Fishing, especially that associated with runs of anadromous fish, has been identified as a spring activity. Schindler, however, has pointed out that anadromous fish resources would be available almost continuously from spring through fall, because of the various runs and returns of different species of fish (Schindler 2008). Only in fall would it be necessary to process and store fish for winter use. It was therefore unclear at what season of the year the site may have been occupied for fishing.

Permanence of Site Occupation

Permanence of occupation can be inferred from the efforts invested in a site, as well as the seasons of occupation. Investments of labor and materials are reflected in the construction of housing and storage facilities.

At Site 7K-F-11/169, evidence of greater amounts of labor and material investment was reflected in the features associated with the early Woodland I occupational component and to a lesser extent the Woodland II component. Because prehistoric post molds were not preserved in the sandy soils of the site, the presence of residential structures could not be established with certainty. However, AIAs were shallow cultural features that were interpreted as living surfaces. Because they were preserved below the plowzone, they

may have been the floors of pit houses or some other type of semi-subterranean structure. AIAs were associated with both the early Woodland I occupational component and the Woodland II component, and these may therefore have been periods of longer term occupation at the site, during which efforts were invested in the construction of more durable structures. In contrast, no AIA features were associated with the middle Woodland I occupational component or with the outlying activity area components of the early and middle Woodland I periods.

Although the site may have supported structures, it does not appear to have been a permanent settlement. Especially within the early Woodland I occupational component, many of the cultural features overlapped. As indicated above (Section 6.3), the northern portion of this component was dominated by AIAs in close proximity, five of which were directly adjacent or overlapped. Spatially associated with the AIAs were two FCR features, a pit, and a basin. To the south within the component was a second distinct cluster of features, in this case consisting mostly of pits, cylindrical pits, and basins. A single AIA was also present there. Again, many of the features in this area overlapped or were directly adjacent to other features.

The patterning of features within the early Woodland I component clearly reflected repeated episodes of site occupation, but also suggested that despite the fact that multiple occupation episodes were present, the area occupied was organized in a similar fashion, with an area for what might have been a residential structure or structures and associated facilities (perhaps for cooking) that was separate from a second area for resource processing and storage.

Although not directly comparable, artifact and feature distributions at Puncheon Run and Hickory Bluff (Petraglia et al. 2002, LeeDecker et al. 2005) suggested spatial organization perhaps similar to the patterning discernable in the early Woodland I component at Site 7K-F-11/169. At Hickory Bluff, for example, artifact concentrations appeared to cluster around FCR features, while in the early Woodland I occupational component at Site 7K-F-11/169, FCR features were concentrated near possible dwellings within a generalized but more dispersed concentration of artifacts and features. Similarly, at Puncheon Run, hearth features (perhaps equivalent to FCR features at Site 7K-F-11/169 and to FCR concentrations at Hickory Bluff), were interpreted as the focal points of individual episodes of site occupation, with pit features (and presumably, artifact concentrations) dispersed around them.

In the area encompassed by the middle Woodland I occupational component at Site 7K-F-11/169, features were further apart and overlapped less frequently. There were no AIAs and patterning among features was not readily apparent. This suggested that visits to the site were more intermittent and of shorter duration than during the early Woodland I period.

The Woodland II component encompassed a single large AIA with four FCR features in its vicinity. Also present at slightly greater distance were five pits and five basins. A single cylindrical pit appeared to have been excavated through the AIA, suggesting at

least two distinct episodes of occupation. Although perhaps indicative of fewer site visits by smaller groups, the Woodland II component exhibited organizational characteristics reminiscent of Puncheon Run and Hickory Bluff, as well as the early Woodland I occupational component at Site 7K-F-11/169, with a possible residential structure associated with FCR features that might have been food preparation facilities, and with processing and storage facilities farther away.

The outlying activity area components did not contain sufficient numbers of features to support conclusions relating to density of feature clustering or degree of feature overlap.

Site Function

Site 7K-F-11/169 appears to have been a domestic site, occupied more or less heavily during different periods. The early Woodland I occupational component was characterized by intensive use of storage pits and the possible construction of pit houses. This suggested that the site was more than a transient camp and could have experienced lengthy occupations. The assemblage from the component contained numerous projectile points and relatively high densities of lithic debitage, indicative of hunting and stone tool manufacture/maintenance activities, while microwear on scrapers indicated hide processing. Thus, the site was the focus of multiple tasks, associated with different resource extraction and processing activities. It thus appears to have functioned as a base camp, to which groups returned during the lean season to subsist at least partially on stored resources. Plant remains indicated that it was also occupied at least briefly during other seasons, to gather and store these resources for later use. Among these resources, hickory mast was relatively important, and may have been stored in the large cylindrical pits so prevalent within this component. Wild grass seeds and the seeds of other plants such as marsh elder may also have been important, and could also have been stored for latter use.

Although characteristics of the early Woodland I occupational component were indicative of multiple activities, other evidence suggested subsistence specialization. Narrow bladed stemmed projectile points as well as microtools, grooved abraders, and utilized flakes were concentrated in the early Woodland I component, and exhibited a strong tendency to occur together in features, suggesting a special functional relationship among this set of tools. It was notable that microtools and grooved abraders in particular occur at other sites in the region, but in contrast to Site 7K-F-11/169, are relatively minor assemblage constituents. The prominence of these tools at the site suggested that it was occupied during the early Woodland I period for some distinctive, and thus presumably specialized, resource procurement and processing activity that set it apart from other sites in the region. Specialized terrestrial hunting of some kind and maintenance of hunting tools, or fishing, fish processing, and the maintenance of fishing tools were two possibilities among many. Collectively, the evidence suggested that the early Woodland I occupational component at the site combined features of both a small repeatedly occupied base camp and a specialized resource procurement locality. This would suggest that as suggested for Puncheon Run, the early Woodland I component was occupied for different purposes during different seasons of the year.

During the middle Woodland I period, the occupation of the site was more widespread but less intensive. There were few deep storage pits and no evidence of pit houses. There were more shallow basins, suggesting activities such as food preparation rather than food storage. The use of artifacts indicative of hunting and hide processing continued, but not the use of the microtool/ abrader tool set. Thus the site may have been occupied intermittently for different resource procurement activities, or perhaps by entirely different groups at different times. It could be characterized as a seasonal resource procurement camp, occupied for short periods by small groups focused on specific resource extraction activities. Again, among the resources collected were wild plant foods, including at least wild grass seeds and the shoots/roots/tubers of wetland plants.

During the Woodland II period, the occupation of the site was of relatively limited spatial extent. As indicated the Woodland II occupation was associated with a few pits and basins, suggesting both food preparation and storage activities. Woodland II ceramics were relatively abundant, providing further evidence of food processing and storage activities, possibly involving both hickory mast and maize or wild grasses. The artifact assemblage included debitage indicative of tool manufacture and maintenance, but included few projectile points or other tools indicative of specific activities. The site does not appear to have been a base camp that was occupied during the growing season or throughout the year. Instead, it may be characterized as a seasonal camp, similar to its function during the middle Woodland I period. However, there apparently was a distinct shift in subsistence from a generalized strategy focused on a variety of wild plant foods to a specific focus on wild grasses, hickory mast, and perhaps maize.

Regional Settlement System

Settlement during the Woodland I period was characterized by Custer (1989) as consisting of macro-band base camps, from which groups relocated to micro-band base camps and made periodic forays to procurement sites. According to Custer's model, large base camps were situated on major streams near the fresh water/salt water interface, with smaller sites both up and down stream having a more limited range of functions. Initially, data for Delaware appeared to support this basic typology. For example, large, dense concentrations of artifacts and features dating to the Woodland I at Carey and Island Field (Custer et al. 1995), Leipsic (Custer et al. 1996a), and Snapp (Custer and Silber 1995) were initially interpreted as representing large settlements at which groups resided for several months or more, while small ephemeral sites in upland settings along low order streams apparently represented micro-band base camps or occupations by special purpose task groups. However, more recent research has called Custer's initial formulation, at least as applied to archaeological resources in Delaware, into question. For example, excavations at Hickory Bluff (Petraglia et al. 2002) and Puncheon Run (LeeDecker et al. 2005) in the St. Jones River valley both revealed extensive concentrations of archaeological remains associated with cultural features, but were interpreted as the product of numerous, repeated short term occupations by small groups rather than long term occupations by large groups. Although Hickory Bluff was on the

main stem of the St. Jones, Puncheon Run was in a secondary location along a tributary stream. Although large cylindrical storage pits appeared to indicate relatively long-term site occupations, the absence of evidence for residential stability suggested that the resources stored in these features supplied small groups that visited the site opportunistically and for short periods of time.

Further complexity in site variability was introduced by excavations at Frederick Lodge (Egghart et al. 2003) and Blackbird Creek (Bowen et al. 2012). At Frederick Lodge, excavations revealed what appeared to represent early and middle Woodland I occupations by one or several small groups. However, intra-site organization of activity areas, in conjunction with the presence of what appeared to be a substantial semi-subterranean structure, suggested longer term or even intermediate term occupation by a small number of people. At Blackbird Creek, organized use of space by site occupants was even more pronounced. Here, flat bottomed cylindrical pits were evenly spaced in a linear arrangement suggestive of a highly organized resource processing activity (possibly fish oil extraction), again associated with relatively ephemeral middle Woodland I occupational debris.

Among recent, extensively excavated sites in Delaware, Sandom Branch (Bowen et al. 2011a) stands out as containing relatively unambiguous evidence of small Woodland I micro-band/task group sites occupied for short-term resource procurement and processing. At Sites 7NC-J-227 and 7NC-J-228, dispersed FCR clusters were found within low density artifact scatters, locally associated with small concentrations of basin features and a cobble cluster. Diagnostics and radiocarbon dates suggested that occupation of the sites occurred most frequently during the middle and late Woodland I periods. The role of these sites in general regional subsistence/settlement models thus appeared to conform to Custer's (1989) micro-band base camps and/or resource procurement camps.

Although the brief review here is hardly exhaustive, clearly one outcome of ongoing Delaware archaeological research is the increasing evidence of previously unsuspected variability in Woodland I site types, functions, and settings. To explain this variability, researchers have generally proposed alternatives to Custer's (1989) macro-band/micro-band/task group model of settlement/subsistence behavior. For example, LeeDecker et al. (2005) explain the seemingly anomalous characteristics of Puncheon Run by proposing a settlement/subsistence model they describe as "diffuse forager settlement pattern with frequent moves," in which supplies stored in the cylindrical pits at the site were for the future consumption by highly mobile groups during episodes of site occupation that were neither extensive or long term, and were not regularly scheduled within a seasonal round but were instead opportunistic and based on situationally conditioned individual choice.

In apparent contrast, Egghart et al. (2003) seek to explain occupations at Frederick Lodge, which again appeared to be by small groups but in this case of longer duration, by proposing what they refer to as the Watershed Range Model. In this construct, the watersheds of streams draining the Delaware coastal plain are viewed as providing

separate group territories, each possessing rich and varied resources that were redundant from one watershed to the next. Groups moved within these territories in a seemingly haphazard fashion from one easily accessible occupational locus to the next, performing varying activities for various durations at each. Group territoriality functioned to maintain the integrity of the ranges occupied by adjacent groups.

Not surprisingly, archaeological findings at Site 7K-F-11/169 once again do not “fit” easily into any of these various settlement subsistence models, or at least, do not in any obvious way provide support for any of them. What can reasonably be inferred regarding settlement/subsistence behavior during the various periods of occupation at Site 7K-F-11/169 is therefore presented below, with comparisons to other research as appropriate.

Early Woodland I Site Occupations: Previously excavated early Woodland I sites in Delaware have generally been notably different from middle Woodland I sites. Specifically, early Woodland I sites exhibit significantly denser concentrations of lithic debitage, suggesting larger occupational groups and a greater emphasis on lithic tool kits in the performance of everyday tasks, while middle Woodland I sites have notably lower concentrations of lithic debitage and few stone tools, but in contrast have notably high concentrations of ceramic artifacts, referred to as an “initial surge” in ceramic vessel use, relative to lithic artifacts (Egghart et al. 2003). Additionally, sites or site components with large pit features have generally been attributed to the middle Woodland I period, implying a shift at that time towards large scale resource processing and storage, in turn reflective of economic intensification. In contrast, early Woodland I sites are thought to lack features or contain a relatively few generally small features (Bowen et al. 2012).

Within this admittedly highly generalized summary, the early Woodland I site components at Site 7K-F-11/169 clearly did not conform to expectations. Both the early Woodland I occupational component and the early Woodland I activity area component had notably high concentrations of lithic artifacts relative to all other site components. In this regard they were similar to many early Woodland I site components in the region. However, the early Woodland I component also contained the densest concentration of large, deep, pit features at the site, including three especially large and deep cylindrical pits reflecting the investment of substantial labor in their construction. Even the spatially much smaller early Woodland I activity area component included a large pit feature. Additionally, evidence of possible habitations was limited to the early Woodland I occupational component and the Woodland II component, suggesting greater permanence of occupation. At least at Site 7K-F-11/169, the collective evidence indicated that the onset economic intensification involving larger scale resource processing and storage began during the early Woodland I period prior to the initiation of the use of ceramics, rather than in the middle Woodland I contemporaneously with ceramic use, as suggested by other sites in the region.

In terms of Custer’s hypothesized macro-band/micro-band/support group site hierarchy, the early Woodland I occupational component at the site again appeared anomalous. It had an assemblage indicative of a variety of activities performed at the site, it was

situated on a major stream near the fresh water/salt water interface, and it contained artifact densities and features that suggested relatively frequent occupations for longer periods, all characteristics indicative of a macro-band base camp. However, the limited aerial extent of the early Woodland I occupational component suggested that it was occupied repeatedly by smaller perhaps micro-band sized groups rather than large macro-band-sized groups. Like the Puncheon Run Site, the early Woodland I occupational component at Site 7K-F-11/169 may have been occupied during different seasons for different activities. However, the density of artifacts and overlapping features, and the evidence for internal organization of space, suggested that occupation of the component occurred on a regular basis and perhaps was scheduled as a part of periodic group movements, rather than opportunistic and occasional as suggested for Puncheon Run (LeeDecker et al. 2005). The presence of a separate early Woodland I activity area that was perhaps chronologically earlier suggested that other early Woodland I components might be present at the site as well, but were outside the current project area.

Middle Woodland I Site Occupations: The middle Woodland I occupational component contained relatively low densities of lithic artifacts and tools, and in this regard was similar to many middle Woodland I site components in the region. Additionally, early ceramics were present and compared to other components at the site, were relatively numerous. Relative to the early Woodland I component at the site and to other excavated middle Woodland I sites, however, features in the middle Woodland I occupational component were sparsely distributed and were mostly shallow basins and pits suggestive of expedient use rather than intensive resource processing and storage. Additionally, the middle Woodland I ceramic assemblage from the component spanned the entire middle Woodland I period and may even have extended into the early portion of the subsequent late Woodland I period. Coupled with relatively sparse artifact and feature densities this suggested that unlike the early Woodland I occupational component, occupation of the middle Woodland I component was irregular and opportunistic rather than scheduled, presumably by small micro-band or task specific sized groups who camped there for short periods for small scale resource gathering and processing. As indicated above, starch grains and phytoliths on middle Woodland I ceramics suggested an increased reliance on wetland plants, and it may be that the site was one of numerous localities for the exploitation of such resources and was visited occasionally by micro-bands or small task groups who came there when conditions for harvesting such plants were perceived to be favourable.

In addition to the introduction of ceramics and other socio-technological changes, the middle Woodland I period in Delaware includes evidence of Adena-like ritual mortuary ceremonialism, termed the Delmarva Adena Complex. The mortuary practices of the Adena complex suggest an incipient ranked society, with differential access to goods obtained in elaborate exchange networks. The Frederica Adena Site (7K-F-2) was located on the Murderkill River, 2.7 km (1.7 mi) south of Site 7K-F-11/169. It was discovered during gravel quarrying in 1964 and limited salvage excavations were undertaken there (Wilson 1964; Thomas 1976). The site yielded numerous burials which were covered with red ochre and marked by the presence of numerous exotic materials and ceremonial items.

No evidence of activities associated with the nearby mortuary complex was found in the middle Woodland I components at Site 7K-F-11/169. Red ochre could have been produced from the hematite found at the site, but hematite nodules were concentrated in features associated with the early Woodland I occupational component, not with any of the middle Woodland I components. The only evidence of use/consumption of exotic materials that was associated with a middle Woodland I feature was the cache of large rhyolite flakes found in Feature 200, and the potential significance of this feature is discussed further below (this Section). As indicated, the evidence from the middle Woodland I components suggested short-term seasonal occupation of the site for resource procurement activities. Evidence of Adena-like ceremonialism would be expected to occur at mortuary sites like the Frederica Adena Site, but at least to date has not been generally reported at middle Woodland I resource procurement and processing camps.

Woodland II Site Occupation: In the mid-Atlantic region generally during the Woodland II period, an increased reliance on domesticated crops was associated with increased sedentism and the development of permanently or semi-permanently occupied villages. In Delaware, it is assumed that more intensive wild plant food exploitation and perhaps maize horticulture became part of seasonal resource procurement. Macro-band base camps would have been occupied in the fall for harvesting and feasting. If located near prepared fields, they were presumably re-occupied in spring for planting. Between these activities, populations split into smaller groups at micro-band camps or procurement sites to pursue hunting, fishing, and gathering activities.

As compared to the early Woodland I and middle Woodland I occupational components, the Woodland II component at Site 7K-F-11/169 encompassed a smaller area and correspondingly fewer features. However, the distribution of Woodland II ceramics suggested that the component may originally have been larger, extending to the northwest into an area of dense tree throws where cultural resources may have been destroyed. If the original extent of occupational activity was in the relatively restricted delineated area, it would suggest occupation by relatively small micro-band or task groups.

The component was centered around an AIA that was penetrated by a cylindrical pit, surrounded by several FRC features, basins, and pits. Like the early Woodland I occupational component, the Woodland II component appeared to be spatially organized, with an AIA perhaps representing a semi-subterranean habitation surrounded by nearby FCR features and with larger and deeper basin and pit features at a greater distance. This suggested that the use of space was organized, with habitation and food preparation activities occurring in close proximity and with resource processing and storage activities occurring further away. The cylindrical pit, which penetrated the AIA, presumably represented a subsequent occupational episode.

A high density of charred hickory nut hulls in the cylindrical pit feature suggested that a principal activity of the Woodland II site occupants was the collection and processing of hickory mast. Additionally, large numbers of starch grains and starch grain clusters on Woodland II ceramics were exclusively of wild grasses and perhaps maize, suggesting

the collection and processing of wild grass seeds was a prevalent activity at the site, and the cultivation, processing, and/or storage of maize may have been as well. The Woodland II assemblage of starch grains and phytoliths differed from the early and middle Woodland I assemblages in the presence of wild grasses (and perhaps maize) exclusively. The data clearly suggested a more focused and specialized food gathering/producing strategy, in which the collection and processing of wild grasses and hickory mast were important, perhaps associated with maize horticulture, while gathering of wetland and other plants was less important. This was consistent with the intensified economies that are generally assumed to have characterized the Woodland II period in the mid-Atlantic region. An important goal of future archaeological research on the Delmarva Peninsula is establishing whether intensified Woodland II economies there were based on intensive and focused gathering of wild grasses, mast, other wild terrestrial plants, and combinations of marine and terrestrial animal resources, or were instead similar to the intensified systems throughout most of the mid-Atlantic region, where maize and other Mesoamerican cultigens supplied basic staples and were supplemented by hunting and gathering wild resources.

Exotics, Exchange, and the Intangible

Excavation and analysis indicated that during the early Woodland I period and the early part of the middle Woodland I period, occupants at Site 7K-F-11/169 participated in exchange networks that provided access to a variety of exotic goods and materials. Among these were argillite and rhyolite performs and perhaps finished tools, steatite containers, and in all likelihood, Marcey Creek ceramic containers.

Presumably, at least some of these items were important to site occupants as part of their everyday technological equipment. Steatite vessels, for example, have been described as "...a portable and durable boiling technology...." (Truncer 2004:487), and are generally assumed to have played an important role in everyday food processing and/or storage activities. The same could be argued for Marcey Creek ceramics, which were imitations of steatite bowls and thus presumably played a similar utilitarian role. Similarly, utilitarian items such as projectile points, drills, scrapers, and utilized flakes were made of argillite and less frequently, rhyolite lithic raw materials, indicating that these materials also had everyday utilitarian functions.

There is evidence, however, that exotic materials and goods played ritualistic as well as, or in some cases perhaps instead of, purely functional roles in the societies that occupied the site during this period. For example, Griffith (see Section 10.1.1) observes that regionally, Marcey Creek ceramics occur in isolated contexts, consistent with their use in ritualized social situations. Since Marcey Creek ceramics were not only imitations of steatite vessels but also actually contained fragments of steatite vessels within their fabric in the form of temper, it would be logical to assume that steatite vessels too were ritualistic objects. In fact, the relative scarcity of steatite sherds at sites where they are present might suggest that their principal role was ritualistic rather than utilitarian.

Direct evidence of the importance of exotic materials to the occupants at Site 7K-F-11/169 was present in several features. While steatite was generally scarce at the site, the majority of what was found came from the early Woodland I occupational component. Here, intersecting Features 279 (a pit) and 3 (a tree throw) contained numerous steatite sherds that collectively comprised major portions of two steatite vessels. Below these in Feature 279 was a pestle with an associated mortar stone, and at the very base of the feature there was a cache of large argillite blade-like flakes. These findings suggested that Feature 279 might itself have been a large cache pit into which valued items had been placed for later retrieval, including two complete steatite vessels, a ground stone mortar and pestle, and argillite flakes perhaps in a pouch or other non-durable container. The tree throw represented by Feature 3 later partially disturbed the cache pit and probably fractured the steatite vessels in the process.

In the middle Woodland I site component, Feature 200 appeared to represent a second cache pit, in this instance containing a concentration of rhyolite lithic debitage consisting of unusually large flakes, by far the largest concentration of rhyolite debitage found at the site. Like Feature 279, Feature 200 partially intersected a tree throw (Feature 201), apparently resulting in some admixture of feature contents. Diagnostics from the feature included Marcey Creek and Wolf Neck ceramics, dated to the beginning of the middle Woodland I period and the end of the middle Woodland I period, respectively. However, the Wolf Neck sherd was in the uppermost level of feature fill, suggesting that it might be a later intrusion, while the Marcey Creek sherd was deep within the body of the feature. It thus seemed likely that the feature and its rhyolite flake cache were contemporary with the Marcey Creek site occupation.

Although caching items for later retrieval clearly suggests that the items cached were “high value” objects that needed to be protected from loss, damage, or theft, caching does not in and of itself necessarily indicate that the items had ritualistic importance. But this is perhaps to impose western industrial cultural notions of value that are not necessarily appropriate to other cultural contexts. In societies in which “value” is not measured primarily in terms of exchange value, clear differences between material value and symbolic/ideological value may not exist. In such contexts, highly valued items tend to possess both types of value simultaneously, and caching and other behaviors indicating exceptional care are likely to reflect both the functional and the ritualistic importance of the items involved. And exotics are often represented differentially among goods and materials to which societies ascribe special symbolic significance and ritualistic importance.

In addition to their probable symbolic/ritualistic value, exotic goods and materials by definition reflect participation in long distance exchange. Possible sources for argillite and rhyolite lithic raw material are suggested above (see Section 6.4), and include the Lockatong Formation in southeastern Pennsylvania and South Mountain in south central Pennsylvania. Although sources closer than these may exist, the lithic reduction strategies used at the site to process these materials indicated that such sources were almost certainly not in close enough proximity to allow transport of unmodified lithic raw material to the location of the site, and in all probability, were too far away to be directly

accessible to site occupants. Similarly, both steatite vessels and Marcey Creek ceramics are generally assumed to have been imported in finished form from distant locations where they were manufactured, indicating long distance exchange networks linking coastal cultures such as those in Delaware with cultures to the north and west beyond the fall line (see Section 10.1.1).

Evidence of long distance exchange involving exotic lithic raw materials and steatite vessels in the early Woodland I and the early part of the middle Woodland I periods at Site 7K-F-11/169 is of course also characteristic of what have been termed Terminal Archaic or alternatively Transitional cultures throughout much of the mid-Atlantic region. To the north and west, Terminal Archaic/Transitional cultures are characterized by projectile points of the broadspear tradition, including Koens-Crispin, Susquehanna Broadspear, Lehigh, and Orient Fishtail. Although not common at Site 7K-F-11/169, four broadspears (one Koens-Crispin, one Susquehanna Broadspear, and two otherwise untyped) were found there, again suggesting a close connection with and/or participation in the general mid-Atlantic Terminal Archaic/Transitional cultural phenomenon involving long distance exchange of exotics. And it is intriguing that three of the four broadspears were of argillite, itself an exotic at the site, and thus might have been acquired by site occupants as finished tools.

Perhaps the closest archaeological parallel to the Terminal Archaic/Transitional exotic lithic raw material/steatite vessel exchange phenomenon in the mid-Atlantic is provided by Adena exchange networks, which involved long distance trade in materials such as mica from the Appalachians to the east, copper from the upper mid-west, and marine shell from the gulf coast. In Adena culture, exotic goods and materials played a key role in mortuary ceremonialism. While dramatic differences existed in the materials and distances involved and presumably in population size/density and complexity of social organization, the comparison between the mid-Atlantic Terminal Archaic/Transitional and Adena does suggest that in non-market economies, exotic goods acquired through far flung exchange networks are likely to have ceremonial/ritualistic as well as strictly functional importance. Evidence from Site 7K-F-11/169 provided independent support for this contention.

The development of long distance exchange networks in Adena and subsequent Hopewell society is generally viewed as occurring within the context of increasing population size and/or density, the development of social hierarchies, and greater overall social complexity. Archaeological evidence suggests that similar processes, albeit to a lesser extent, characterized the Terminal Archaic/Transitional broadspear traditions of the mid-Atlantic region. Components dating to the period are frequently larger and denser than earlier or later components at the same locations and are notable for their more substantial resource processing and storage facilities (e.g., Kinsey 1972). Additionally, calculations based on regional projectile point collections suggest that overall populations during the Terminal Archaic/Transitional were larger than at any time previously in the prehistory of the region, and were also larger than they would again be until the Late Woodland (e.g. Seigel et al. 2001). These observations would suggest that within the mid-Atlantic region, as in the Ohio River valley and the mid-West, long distance

exchange of exotic goods and materials developed in conjunction with increasing population density and social complexity.

Exhibiting the highest concentration of artifacts and features at the site, the early Woodland I occupation and perhaps the early part of the middle Woodland I occupation at Site 7K-F-11/169 thus appeared to reflect participation in the societal changes generally reflective of the Terminal Archaic/Transitional period in the mid-Atlantic region, including high population density, intensive resource procurement/storage, and participation in far-flung exchange networks in exotic goods of ritualistic/ceremonial significance.

8.2.2 The Historic Component

The historic component at Site 7K-F-11 was identified in the Phase I/II survey and was further investigated as part of the Phase III data recovery. Background research traced the ownership back to the initial patent for 600 acres in 1684. The site was not occupied until it was divided out as the 30-acre Bridge Lot in 1801. There was little documentary evidence of the occupation of the Bridge Lot, including the listing of a small house in the 1810 tax rolls, an 1833 Orphan's Court record in which it was described as "in the tenure of Jesse Smith" with a map showing a single structure near the northeast corner of the bridge over Spring Creek, and finally an 1852 tax roll listing as "a small farm tenant house in tenure of Elijah Warren, n[egro]." It is possible that the site was first occupied by a member of the owner's (Boone) family, then by a white tenant, and finally by a free black tenant. No dwelling was shown at this location on the 1859 or 1868 maps, and no mention was made in later deeds, indicating that the house had been demolished and the property incorporated into adjacent cultivated lands.

In 1810, the old bridge on the public road was replaced with a drawbridge, to accommodate river traffic on Spring Creek. In 1847, the drawbridge was permanently closed. The close correlation between these dates and the dates of occupation of the site suggest that it may have functioned as a bridge tender's house, rather than a farm tenancy.

Archaeological evidence of the historical occupation was found primarily in the distribution of artifacts in the plowzone. No house foundation or cellar cavity was uncovered in the extensive data recovery excavations, suggesting that the house may have been located outside the current project area. The only cultural features associated with the historical occupation were post molds. Four post molds formed a rough rectangle in the southwestern end of the project area, measuring approximately 15 x 22 ft (4.6 x 6.7 m). There was no evidence of a foundation, wall trench, or floor, suggesting that it was not a substantial structure. Patterns of artifact distribution in the plow zone showed that brick was concentrated in other areas but not near this structure, indicating that it had no chimney. It may have been a stable or cattle pen. The distribution patterns of other artifact types suggested that activity areas were located within the project area and the house had probably been nearby.

The composition of the historical artifact assemblage accorded well with the c.1810-1852 occupation period indicated by the background research. Small finds included a coin dating to 1807, and clay smoking pipes had bore diameters indicative of a post-1800 occupation. The ceramic assemblage contained a high frequency of redware sherds and the refined white earthenware ceramics were dominated by pearlware, followed by creamware and whiteware. Together, these ceramic wares are indicative of a late eighteenth through mid-nineteenth century occupation. Types that are chronologically later, such as ironstone, semi-porcelain, and Yellowware, were only present in low frequencies that could be attributed to field scatter from manuring, rather than direct occupation of the site.

Examination of ceramic types and decoration showed that tenants of the property could afford to purchase mid-range and some of the more expensive types of ceramics, such as transfer-printed wares, but not the most expensive ceramics, such as porcelain tea wares. It was also notable that later tenants did not introduce later ceramic wares such as ironstone in high frequencies, suggesting that they may have been poor and unable to afford the latest goods, buying cheaper, outmoded ceramics instead.

Overall, the archaeological data served to confirm information gleaned from the sparse historic record, that there had been an occupation at Site 7K-F-11 dating to the first half of the nineteenth century. Lacking evidence of a dwelling or intact sub-plowzone features, the archaeological data from plowzone contexts have little potential to yield significant information. The historic component was therefore not considered to contribute to the National Register eligibility of the site.

8.3 Summary of Public Outreach Activities

Located along a heavily traveled section of SR 1 just outside the town of Frederica, excavation activities at Site 7K-F-11/169 were prominently visible to the traveling public and to the residents of the town. It was thus inevitable that large scale archaeological excavations there would receive considerable attention from casual passersby, local residents, and the media. Consequently, public outreach was an important aspect of the project. The following summarizes the components of the public outreach program that was developed for the project.

On-site Handout Brochure: Before beginning intensive excavations at Site 7K-F-11/169, A&HC prepared a double-sided informational handout for distribution to site visitors. The handout was developed in consultation with DelDOT and the Delaware SHPO, and provided information on who was doing the work and why it needed to be performed, the age and type of archaeological resources being investigated, and what was known of the precontact people who had lived there. Illustrations of artifacts, excavations, and an artist's rendering were included in the handout (see Section 10.4). Throughout the course of the excavations from February to July, 2009, approximately 150 to 200 copies of the handout were given to casual and invited visitors to the site.

Casual Site Visitors: Impromptu visits by passersby and others occurred nearly continuously during the course of the excavations. Notable among them were members of a non-recognized group of Nanticoke Native Americans who appeared to have a special interest in the work and visited the site repeatedly both individually and in groups. A highlight of their participation was an impromptu blessing ceremony performed prior to the beginning of major Phase III excavation activities (Photograph 8.1). An informal attendance list was compiled (see Section 10.4).

Site Tours: In addition to numerous unscheduled site tours given to casual site visitors, formal tours were provided to fifth-grade students at Frederica Elementary School on April 21 and 22, 2009. Groups of 25 students each visited the site from 9:30 to 11:30 each morning, and received a tour of the site and a handout brochure. Students then received an introduction to archaeological excavation by assisting crew members sift earth through shaker screens to recover artifacts (Photograph 8.2). Members of the Archaeological Society of Delaware also received a site tour and handouts during their March 25, 2009 annual meeting at nearby Barrett's Chapel.

Closing Ceremony: The Lenape Indian Tribe of Delaware hosted a closing ceremony at the site after all excavation activities had been completed (Photograph 8.3). Attending were recognized and non-recognized Native American tribes including members who identified themselves as Cherokee, Cherokee Lumbee, Cherokee Oklahoma, Cherokee Eastern Band, Lenape, Lenape Cheswold, and Nanticoke. In all, 20 Native Americans attended. Also present were representatives of DeIDOT, the Delaware SHPO, FHWA, and members of A&HC's field crew. An informal attendance sheet was compiled (see Section 10.4).

Media Coverage: Designated media days were scheduled for June 10 and 16, 2009 (Photograph 8.4). Representatives of both the print and visual media were invited to visit the site. DeIDOT and A&HC personnel introduced the project, provided site tours, and handed out brochures. Reporters then had opportunities to take pictures and or videotape excavations in progress, ask questions, and conduct interviews. In addition to scheduled media events, reporters made impromptu visits to the site throughout the project.

The following articles on the project appeared in local and regional papers (see Section 10.4):

- *Dig near Frederica turns up artifacts.* Delaware State News, February 13, 2009.
- *Dig unearths secrets of early Delaware.* The News Journal and www.delawareonline.com, February 17, 2009.
- *Archaeologists digging through time in Frederica.* Dover Post and www.doverpost.com, February 18, 2009.
- *Digging up dirt to piece the past together.* The News Journal and www.delawareonline.com, June 17, 2009.



Photograph 8.1 Blessing ceremony performed after the first stage of excavations by past Lenape chief Dick Quiet Thunder and members of the Nanticoke Lenape.



Photograph 8.2 School students from Frederica Elementary School visited the site and participated in recovering artifacts through soil screening.



Photograph 8.3 Closing ceremony, performed July 15, 2009, after the completion of excavations, by members of the Lenape, Nanticoke, and Cherokee.



Photograph 8.4 Media coverage of the excavations, with David Clarke (DelDOT archaeologist) giving a television interview for WBOC on June 16, 2009.

Television coverage of the project was also provided on at least one occasion, during the WBOC evening news on June 16, 2009.

FHWA included an article on the project in *Environmental Quarterly* 5:2.

Post Excavation Outreach: Shortly after completion of excavations at the site, a T-shirt commemorating the project was designed and produced by A&HC, and was distributed to in-house staff, the field crew, DelDOT, and other interested parties.

As a follow-up to their site visit and tour, on May 22, 2010, A&HC gave a presentation and slide show on the site to the Archaeological Society of Delaware.

DelDOT, the Delaware SHPO, and other stake holders decided that Delaware's 2010 archaeology month poster would feature the excavations at Site 7K-F-11/169. At DelDOT's request, A&HC provided alternative poster designs for consideration by the archaeology month poster committee. The selected design, featuring artifacts, excavations, and public outreach activities, was then produced for delivery to DelDOT and for distribution to in-house staff, the field crew, and other interested parties.

The public outreach activities described above were all positively and enthusiastically received, demonstrating what archaeologists can learn through excavation and why it was beneficial to investigate this site in particular.

8.4 Lessons Learned

8.4.1 Excavation Strategy

The three-stage excavation strategy implemented during Phase III data recovery fieldwork proved to be effective during fieldwork in identifying the areas of the site with the highest concentrations of artifacts and features. It also had benefits during post-fieldwork data analysis by providing data at different scales, allowing interpretations of broad intra-site patterning as well as more focused information on sub-sections of the site of special interest. During fieldwork, test units on grid provided preliminary information on sub-areas within the site where artifact densities were highest, as well as preliminary information regarding locations of features. This first stage of fieldwork also provided artifact distribution data for the site area as a whole that was suitable for quantitative analysis of artifact distributions using Surfer® software.

Arguably, the block excavations performed during the second stage of Phase III fieldwork proved to be the least effective of the three Phase III data recovery strategies. However, this was attributable to the exceptionally high frequency of tree throw features at this site. In general, the locations of the block excavations were selected to further investigate subsurface anomalies found during excavation of test units on grid in conjunction with areas of higher artifact densities. In the event, six of the nine block excavations were located to investigate anomalies that turned out to be tree throws rather

than cultural features. As a result, many of the blocks ended up in portions of the site of lesser interest, and produced less information than might otherwise have been the case. Additionally, because individual test units were adjacent to one another in blocks, the artifact density information from the blocks was found to be incompatible with that from the test units on grid, and could not be incorporated into the surface maps of artifact densities.

In retrospect, at Site 7K-F-11/169 it would probably have been more cost effective to have removed the Ap horizon mechanically with small trenches rather than expending labor on blocks of hand excavated test units. However, this would probably not have been the case at a site without tree throw features or with relatively few of them. In the latter situation, a higher proportion of investigated anomalies would have been cultural, and blocks would more frequently have been located in portions of the site where cultural features were clustered. Since the prevalence of tree throws at Site 7K-F-11/169 was likely due at least in part to a high ground water table, sites in such situations in general might be expected to exhibit higher tree throw densities.

Despite these limitations, the information provided by the first two stages of Phase III fieldwork provided sufficient information to guide decisions regarding the allocation of effort during the third stage of fieldwork, the mechanical excavation of the Ap horizon from large trenches encompassing significant areas within the site. In this regard, clearly the most important decision made was to concentrate this last effort in the southwestern portion of the site in Trench 5. This trench contained the vast majority of cultural features found, and encompassed the three most important of the five occupational components that were ultimately identified. Not surprisingly, the remaining trenches varied considerably in the amount of data they provided. Trenches 2 and 4, as well as Excavation Block 8, encompassed small activity area site components, while Trenches 1 and 3 contained only tree throws and a few isolated cultural features.

8.4.2 Data Analysis Procedures

The various methods employed in the analysis of the data excavated at Site 7K-F-11/169 included conventional methods that produced generally expected results, such as projectile point and ceramic typology, spatial analysis, lithic analysis, and microwear analysis. Other analytical techniques were to varying degrees innovative/experimental and/or produced results that could inform future archaeological research. These latter methods are discussed and evaluated here.

Radiocarbon Dates: Although preservation of carbonized organic remains in features at Site 7K-F-11/169 appeared to be poor, small samples for potential radiocarbon dating were recovered from relatively secure contexts in many features during excavation. These bulk samples were supplemented by several samples extracted from floated light fractions, and were dated using the AMS counting procedure. The approach was successful in generating a series of dates that were highly consistent internally and with diagnostic artifact data, and were considered reliable indicators of the age of the contexts from which they derived. The dates contributed substantially to the development of an

overall chronological framework for the interpretation of the site, and allowed avoidance of the circularity of chronological inference based on diagnostics alone. The results from Site 7K-F-11/169 compared favorably to recent radiocarbon dating efforts at the Blackbird Creek Site (Bowen et al. 2012), where AMS dating of carbonized organic samples from feature contexts produced a series of internally consistent and mutually reinforcing dates.

In addition to samples of carbonized organic material from feature contexts, radiocarbon dates from two samples of marine shell were produced to enable calculation of a regional marine reservoir correction. The shell samples returned one reliable prehistoric date and one modern date, which was also probably reliable. The marine reservoir correction was successfully calculated from the prehistoric date. Four bulk sherd radiocarbon dates were also performed, and in all cases, the results were consistent with the presumed age of the ceramics that were dated. This method would thus appear to have considerable potential for addressing issues related to ceramic typology and chronology, as well those involving the age of the deposits in which ceramics are found.

Radiocarbon dating of tree throw features also contributed to the analysis of these features, indicating that they were probably not attributable to a single especially severe storm and that at least some post dated the period of prehistoric site occupation.

Optically Stimulated Luminescence (OSL) Dating: As a potential alternative approach for dating cultural features, currently accepted procedures for OSL dating do not appear promising. The OSL dates generated by soil samples from features at Site 7K-F-11/169 were consistently older than reliable radiocarbon dates from the same features, and in some cases, were quite substantially older. This outcome suggested that at least at this site, feature infilling occurred in a way that introduced soil into features without completely bleaching its constituent quartz grains in the process. Under these circumstances, current procedures for OSL dating could not provide a reliable and independent way to assess chronological issues. However, current research based on single grain OSL dating holds promise for the future.

Macrobotanical Analysis: Identification of carbonized botanical remains in feature flotation samples generated limited results, consistent with other similar research in the region. With the exception of six carbonized seeds, only wood charcoal and charred hickory nut hull fragments were found in the Site 7K-F-11/2169 samples. One could speculate that wood charcoal tends to be preserved in features simply because it was so prevalent a component of domestic waste at prehistoric sites, and that charred hickory nuts are preserved for the same reason, but also because they are exceptionally hard, dense, and durable. Other less prevalent and/or durable botanical remains presumably have not generally survived in the sandy, highly permeable soils of the coastal plain.

Starch Grain and Phytolith Analysis: Although research was exploratory and the sample of artifacts submitted was small, starch grain and phytolith analysis results from Site 7K-F-11/169 were promising. Of the 15 artifacts submitted for analysis, only two failed to produce microscopic remains of plants of economic importance to humans.

Represented in the assemblage were wild grasses including wild millet and wild barley, seed bearing plants belonging to the sunflower family, wetland sedges such as bulrushes, tuberous wetland plants such as Indian potato, and possibly maize. For whatever reason, starch grains and phytoliths apparently survive relatively well in regional soils, and the technique thus has the potential to provide important information concerning prehistoric use of both wild and domesticated plant foods. Since “old” starch grains and phytoliths are not distinguishable from modern ones from the same plants, artifacts submitted for analysis need to be from sealed contexts such as cultural features to avoid contamination by modern plants.

Protein Residue Analysis: Despite selection of artifact samples to maximize the likelihood that protein residues would be present, the results of protein residue analysis were disappointing. Of the 23 artifacts included in the sample, only three reacted positively to protein antisera. All three were artifacts on which animal tissue had been detected during microwear analysis, and all reacted positively to rabbit antisera.

The researchers suggest three reasons for negative results, poor preservation of protein, insufficient protein, or absence of appropriate antisera in the suite of antisera used in the analysis. In this regard, the role of fish harvesting by site occupants was of particular concern, and results from Puncheon Run (LeeDecker et al. 2005) demonstrate that fish protein residue can be recovered from prehistoric stone tools in Delaware. So in future, samples should be sent to a lab that specifically tests for Atlantic fish, not just the usual mammal proteins. As indicated above, the absence of shad or sturgeon in particular in the available antisera used in the analysis of artifacts from Site 7K-F-11/169 may have been an unfortunate oversight.

Statistics: Statistical tests of significance and statistical evaluations of data patterning made important contributions in the data analysis phase of the project. Site 7K-F-11/169 was unusual in having notably high frequencies of certain tool types that are generally rare or absent at other sites, such as grooved abraders and microtools. Additionally, the distributions of these tools as well as those of other artifact types and materials appeared to be concentrated within certain subareas of the site and these concentrations in turn appeared to correspond at least to some degree with chronologically distinct site components.

However, sample sizes for certain artifact types were low, such as projectile points and grooved abraders, and as a result, the observed patterns could to some extent have occurred simply by chance. Additionally, other associations that were not observed during data processing and manipulation might also have existed in the data, but remained undetected.

The role that statistics can and arguable should play in archaeological analysis is to critically evaluate these kinds of “observed” patterns, rather than simply accepting them at face value, and to search for other more obscure patterns that would otherwise be undetected. The basic question that should be asked and answered statistically is whether observed or detected patterns probably could, or probably could not, have occurred

simply by chance, with “probably” defined as occurring by chance less than five times in a hundred. If the patterns in question could pass this test, i.e. would be expected to occur by chance fewer than five times in a hundred, behavioral interpretations would at least be grounded in reasonably demonstrable “facts.”

Statistical analysis of data from Sire 7K-F-11/169 evaluated the observed association among early Woodland I projectile points, microtools, and grooved abraders, and then proceeded to include other variables encompassing the full range of artifact types and lithic raw materials recovered from the site. The result was the identification of complex patterns of association among artifacts and materials, some of which were suspected based on data observation and some of which were not. While these associations could not all be fully interpreted in terms of human behavior, future research may contribute additional insights. What is important is that the originally observed (as well as previously unobserved) patterns were critically evaluated and found to be statistically significant, and thus could be assumed to be “real” in the sense that they were not attributable to chance alone.

ADDITIONAL INFORMATION COMMENTS 34 through 36