# 7.0 THE BLACKBIRD CREEK SITE AND REGIONAL CONTEXTS

## 7.1 Chronology

In literal terms, chronology is the study of time. The purpose of chronological analysis in archaeological investigation is to provide a temporal dimension to the various data in a process that forms a backdrop for identifying and characterizing the nature of the site occupations. Temporal information from the Blackbird Creek site was derived from accelerator mass spectronomy (AMS) dates and diagnostic artifacts.

### 7.1.1 Radiocarbon Age Dates

Absolute dates were derived from AMS analysis of wood charcoal from pit features. The carbonized material was picked from the pit fill during excavation or was recovered via flotation conducted in the laboratory. In total, 12 dates were returned from feature contexts: ten from round, flat-bottomed pits; and two from irregular pit features (Table 7-1, Figure 7-1).

Radiocarbon results from the round, flat-bottomed pits ranged from 2930±40 BP (cal 2 σ AD 1264 to 1010; Beta -149990) to 3090±40 BP (cal 2 σ AD 1439 to 1263; Beta -149983) with a pooled radiocarbon age of 3002±13. The date range fell near the end of the Late Archaic period, approaching the temporally ill-defined Early Woodland transition.

**Table 7-1. Radiocarbon Results from Selected Features.**

| *Provenience* | *Radiocarbon Age* | *Calibrated Results (2-sigma)*[1] | *Laboratory Sample Number* |
|---|---|---|---|
| Round, Flat-Bottomed Pits | | | |
| Feature 170[2] | 2930±40 BP | BC 1264 – 1010 | Beta-149990 |
| Feature 136 | 2970±40 BP | BC 1370 – 1052 | Beta-149981 |
| Feature 112 | 2980±40 BP | BC 1374 – 1056 | Beta-149982 |
| Feature 95[2] | 2980±40 BP | BC 1374 – 1056 | Beta-149987 |
| Feature 167 | 3010±40 BP | BC 1386 – 1129 | Beta 149991 |
| Feature 191 | 3010±40 BP | BC 1386 – 1129 | Beta-149992 |
| Feature 52[2] | 3020±40 BP | BC 1395 – 1130 | Beta-149986 |
| Feature 159 | 3020±40 BP | BC 1395 – 1130 | Beta-149989 |
| Feature 96[2] | 3020±60 BP | BC 1419 – 1057 | Beta-149988 |
| Feature 140 | 3090±40 BP | BC 1439 – 1263 | Beta-149983 |
| Irregular Pits | | | |
| Feature 39 | 1770±40 BP | AD 134 – 380 | Beta-149985 |
| Feature 145 | 970±40 BP | AD 995 – 1159 | Beta-149984 |

[1] calibration data set: intcal09.14c (Reimer et al. 2009)
[2] Dames Quarter and/or Marcey Creek in pit fill

The irregular pits yielded dates of 1770±40 BP (cal 2 σ AD 134 to 300; Beta -149985) and 970±40 BP (cal 2 σ AD 995 to 1159; Beta -149984). The date range corresponded to the early Middle Woodland and the early Late Woodland. However, neither feature contained diagnostic artifacts that would corroborate the AMS results. Nor did the site-wide excavations yield artifact types temporally associated with these periods. Thus, while the irregular pits were accepted as cultural in origin, the absence of diagnostic artifacts and scarcity of associated artifacts in general, together with a lack of coherent feature form suggesting specific functions made further analysis of the two features problematic.

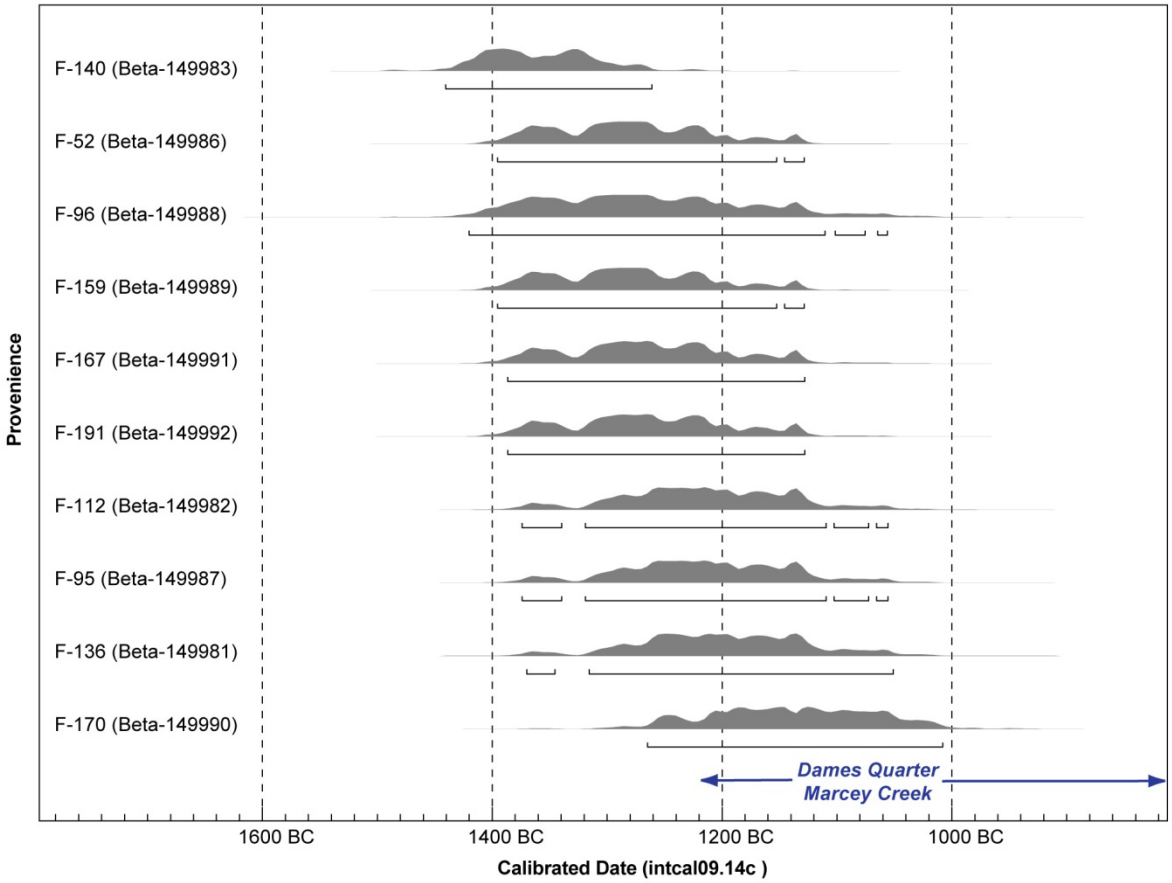



**Figure 7-1. Calibrated Radiocarbon Age Ranges from the Round, Flat-Bottomed Pit Features Identified at the Blackbird Creek Site.**

### 7.1.2 Artifacts

Temporally diagnostic artifacts recovered from the Blackbird Creek site were mainly confined to ceramic sherds. The types included Marcey Creek and Dames Quarter, and all but one of the sherds occurred in the round, flat-bottomed pits. The wares are generally regarded as the earliest examples of ceramic manufacture in the region, and as will be discussed below, they have dates firmly established in the Early Woodland that correspond with AMS dates from the pit features at the site.

While a number of projectile points were recovered from the site, none could be confidently placed within traditional point types. Most were heavily damaged or reworked. Moreover, all were recovered from disturbed contexts—either from the plow zone or from natural disturbances such as tree molds—and therefore could not be used to date specific depositional contexts or non-diagnostic artifact assemblages. Spatially, the points had a widespread distribution across the site with no recognizable patterning, and none was recovered in proximity to the Early Woodland temporal component represented by the round, flat-bottomed pit features.

The whole or nearly whole points fell into three morphological categories: corner/side-notched (n=5), contracting-stemmed (n=5), and unstemmed (n=2). Full descriptions of each point are presented in Appendix G. The corner/side-notched points indicate a general Archaic time span, resembling Brewerton but also earlier forms like Palmer and Kirk (Ritchie 1971, Kinsey 1972, Custer 1994), while the contracting-stemmed specimens resembled later forms such as Poplar Island or Lackawaxen (Ritchie 1971, Kinsey 1972, Custer and Bachman 1983, Petraglia et al. 1998). Unstemmed points with triangular form are most typically associated with the Late Woodland period, although some have been found in association with Archaic deposits such as Stewart's (1998) finds at Area D of the Abbott Farm. Similarly, Luckenbach et al. (2010) reported triangular points at Pig Point, in Anne Arundel County, Maryland, in Late Archaic through Early Woodland contexts. Generally, though, the inability to ascribe the points from the Blackbird Creek site to accepted types made using them as chronological markers impractical. The Early Woodland occupation associated with the round, flat-bottomed pit features was the only securely dated component at the site.

## 7.2 Ceramic Technology

### 7.2.1 Thin Section and Source Analysis

Ceramic thin section analysis was undertaken in order to record the detailed composition of the ceramics at the site and to compare the ceramic pastes to local clay. While a full sourcing study involving extensive sampling and a wide range of analytical techniques was not undertaken, the current study was seen as a first step in providing sourcing data. Two ceramic sherds from the Blackbird Creek site and an experimental ceramic tile were thin-sectioned and analyzed. The sherd samples were selected to represent each of the two wares present at the site, and the ceramic tile was made from clay collected adjacent to the site. The thin-sectioning was done by Spectrum Petrographics, Inc. of Winston, Oregon. Thin sections were stained to aid in the identification of potassium feldspars, embedded in an epoxy resin, and left uncovered. Each slide was engraved with a number provided by Spectrum Petrographics, Inc.

The selected sherds included one sherd of Marcey Creek ware (artifact number 338-1, petrographic slide NNN-1) and one sherd of Dames Quarter ware (artifact number 409-2, petrographic slide NNN-2) (Figure 7-2). The Marcey Creek sherd was from Stratum II of Feature 95. It was a body sherd that mended with sherd 336-1, which was the only other Marcey Creek sherd recovered at the site. The Dames Quarter sherd was from Stratum I of Feature 52. It was a body sherd that mended sherd 409-3 and was part of a larger group of nine sherds that mended to form the rim of a vessel (Group B).

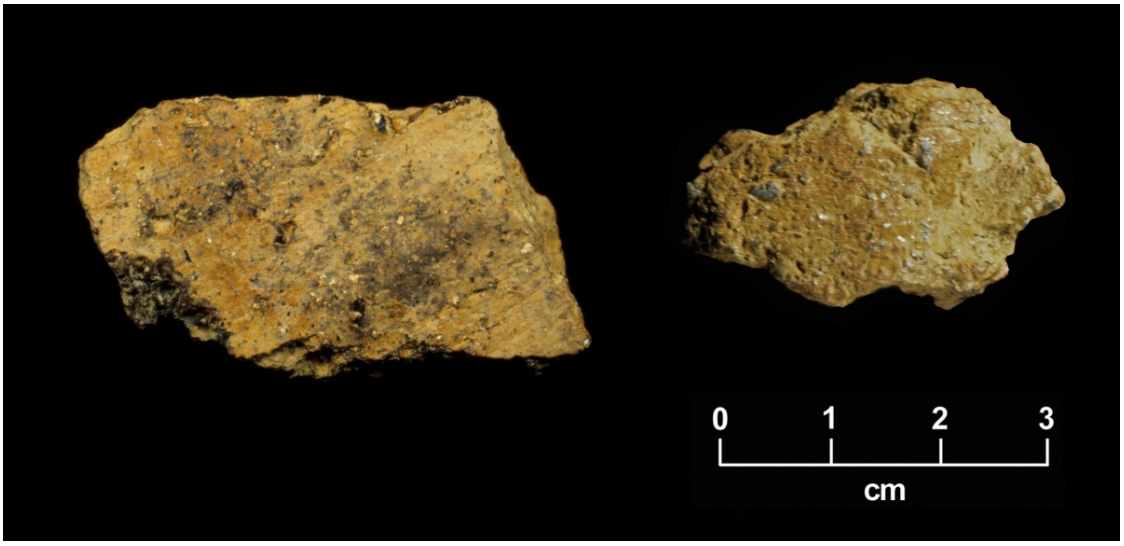



**Figure 7-2. Thin-Sectioned Ceramic Sherds.**

[Left, Dames Quarter, Artifact 409-2; Right, Marcey Creek, Artifact 338-1]

The ceramic tile (sample BB2, petrographic slide KCN-36) was made from clay collected from a small tributary of Blackbird Creek, just to the northeast of the Blackbird Creek site, at a depth of 2.0 m below the terrace surface (Figure 7-3). No tempering agent was added to the clay used to make the test tile. The clay was formed into a tile while plastic and then allowed to dry for a day prior to firing. The tile was then fired at 784 degrees centigrade (cone 017) for three hours in a modern kiln. This tile was one of four tiles made that were included in other DelDOT project studies as comparisons to archaeological ceramics (Petraglia et al. 2003, Versar 2011a). An initial examination of the Blackbird Creek site sherd and tile thin sections, in conjunction with the petrographic analysis of the thin sections from the Sandom Branch site, indicated that tile sample BB2 was the most similar to the Blackbird Creek archaeological samples (Goodfellow 2003). Since it also had been collected immediately adjacent to the Blackbird Creek site, the sample was selected as a comparison to the archaeological sherds for this analysis.

The three thin sections (Figures 7-4 to 7-6) were analyzed by Dr. James Stoltman of the University of Wisconsin, Madison. The complete study with detailed methods and explanation of terminology is presented in Appendix H. This excerpt of Stoltman's study includes characterization of the three thin sections and conclusions.

**Figure 7-4. Thin Section of Marcey Creek Sherd (338-1, NNN1).**

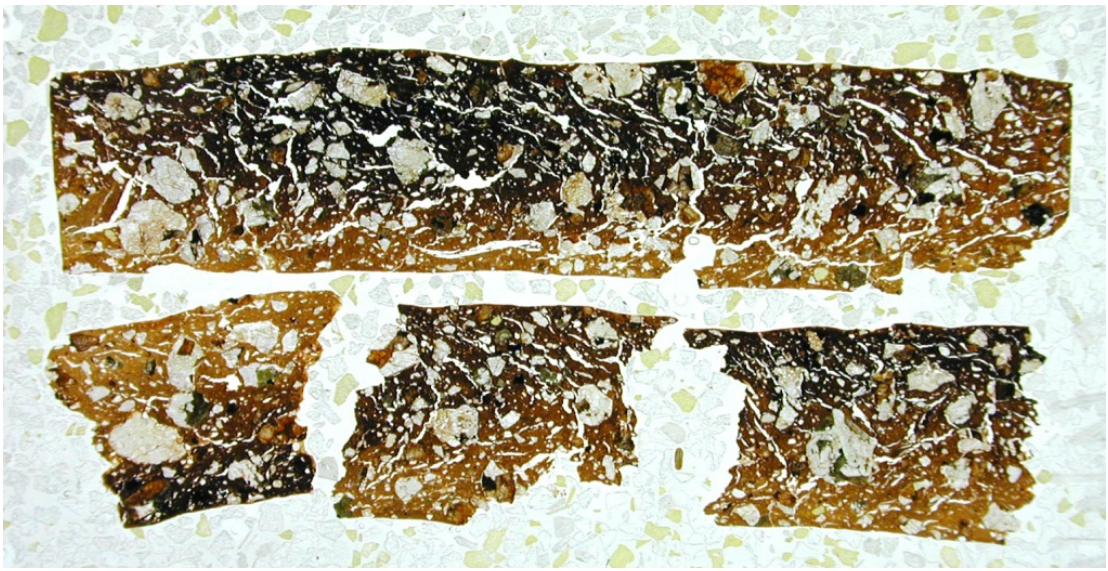


**Figure 7-5. Thin Section of Dames Quarter Sherd (409-2, NNN2).**

**Figure 7-6. Thin Section of Experimental Ceramic Tile BB2 (KCN-36).**

The following tables outline the composition of the ceramic paste (Table 7-2), which includes the naturally occurring minerals (i.e., exclusive of human additives) in each thin section, and the ceramic body (Table 7-3), which represents an artificial mixture of at least two materials – paste and temper – that typically derive from different geological sources. The discrimination of body from paste depends first and foremost upon the reliable identification of intentional, humanly produced inclusions, i.e. temper. In the two pottery vessels in this study, fragments of metamorphic rocks were employed as temper, identified by their large size, high angularity, and distinctive polymineralic character in contrast to the natural sand inclusions.

**Table 7-2. Thin Section Paste Values.**

| *Type* | *Thin Section* | *% Matrix* | *% Silt* | *% Sand* | *Sand Size Index* |
|---|---|---|---|---|---|
| Marcey Creek | NNN-1 | 98 | 1 | 1 | 3.00 |
| Dames Quarter | NNN-2 | 97 | 2 | 1 | 2.50 |
| Mean ± σ | [n=2] | 97.5±0.7 | 1.5±0.7 | 1.0±0 | 2.75±0.35 |
| | | | | | |
| Sediment sample | KCN-36 | 94 | 4 | 2 | 2.40 |

**Table 7-3. Thin Section Body Values.**

| *Type* | *Thin Section* | *% Matrix* | *% Sand* | *% Temper* | *Temper Type* | *Temper Size Index* |
|---|---|---|---|---|---|---|
| Marcey Creek | NNN-1 | 78 | 1 | 21 | Steatite | 2.8 |
| Dames Quarter | NNN-2 | 63 | 1 | 36 | Diorite | 3.25 |
| Mean & σ | [n=2] | 70.5±10.6 | 1.0±0 | 28.5±10.6 | | 3.02±0.32 |

**Marcey Creek Sample (Artifact Number 338-1, Thin Section NNN-1)**
Assigned to the Marcey Creek ceramic series, this vessel was characterized by multiple grains of the rock, steatite, which can be regarded as temper without doubt. Steatite is an alteration product of olivine-rich rocks. It is composed primarily of the mineral talc, with lesser amounts of serpentine and apatite also present. In Figures 7-7 and 7-8 talc shows up prominently in the crossed-polar views because of its high, second and third order interference colors—the reds and greens. The uncolored mineral in Figure 7-7 is apatite. In Figure 7-8 the uncolored, laminated zone in the large steatite grain is serpentine, which may occur as separate grains, or, as seen in the image, in association with talc. The uncolored grain with the scale in Figure 7-8 is quartz. It is considered natural sand since quartz does not occur in steatite.

From Table 7-3, it can be seen that the body of this vessel is comprised of 21 percent steatite by volume, with a mean temper size index of 2.8, in the range of coarse sand, i.e., 0.50-0.99 mm. Other than temper, the composition of this vessel's paste is noteworthy in its relative paucity of natural inclusions of both silt and sand. The principle sand inclusions were the mineral quartz that, interestingly, was sparse (only 1 percent of the paste) but generally coarse in size (sand size index for paste = 3.0, greater than the temper value). A coarse grain of quartz sand is shown in Figure 7-8.

**Dames Quarter Sample (Artifact Number 409-2, Thin Section NNN-2)**
This vessel has been assigned to the Dames Quarter ceramic series. It, too, is tempered with a metamorphic rock, but of a very different composition from NNN-1. As can be seen in Figure 7-9, the rock particles in this vessel are coarsely crystalline, i.e., derived from a plutonic igneous rock. They are composed principally of the mineral plagioclase, which has been subjected to considerable alteration as evidenced by the brown discoloration and presence of sericite (visible under crossed polars as fine, red, birefringent, micaceous inclusions on three of the larger plagioclase grains on the top half of the grain). In addition this rock contains lesser amounts of hornblende (the dark mineral with higher order interference colors at the bottom of the grain) and even lesser amounts of quartz (the small, clear, white grains seen best under crossed polars). Some plagioclase grains are twinned,

showing both fine lamelli of Albite twinning and broader, twin halves of Carlsbad twins. All these factors together suggest that the temper used in this vessel derives from an intermediate igneous rock of dioritic composition that has been subjected to considerable post-depositional alteration. Depending upon the amount of quartz present, it is possible that quartz diorite may be a better designation for this rock (e.g., Le Maitre 1989).

From Table 7-3, it can be seen that vessel NNN-2 is more coarsely tempered than vessel NNN-1; its volume of temper is greater—36 percent vs. 21percent—and its temper size is also larger—3.25 vs. 2.8. With a sample of but two vessels, it is currently impossible to make any valid inferences concerning the significance of these body differences. For example, the two vessels may reflect different pottery-making practices associated with two different cultural contexts or they might reflect different ceramic recipes associated with vessels engineered to perform different functions. Whether the two vessels come from different archaeological cultures or not, it is interesting to note the vessels have virtually identical pastes (See Table 7-2) suggesting that they were made of the same, or closely similar and possibly local clays.

**Clay Sediment Sample KCN-36**

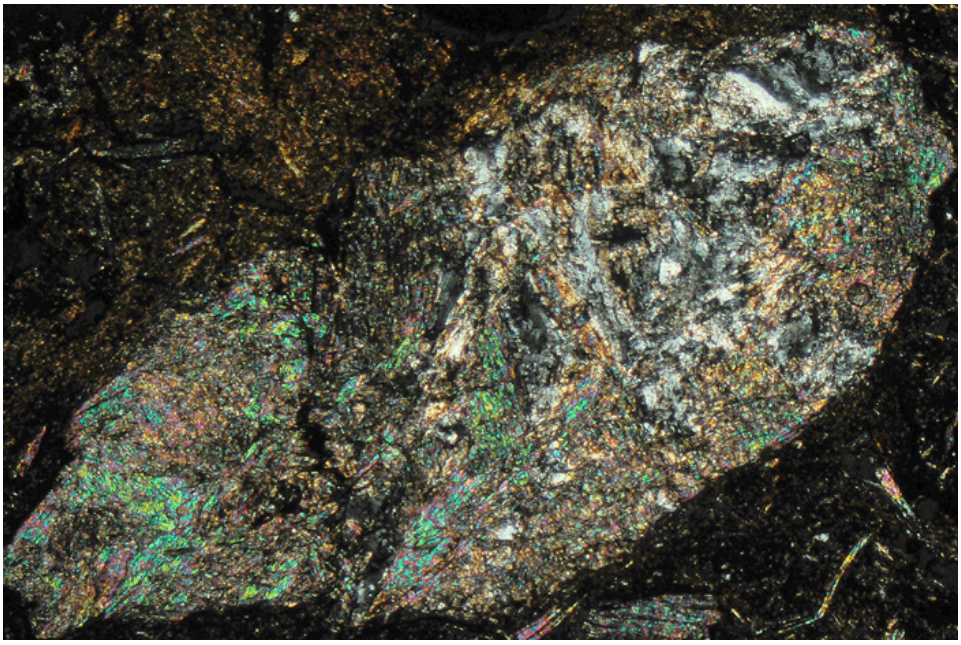
The local clay sediment sample was analyzed in exactly the same way as the two pottery vessels (Appendix H). To assess the relationships between the vessels and this clay sample properly, our comparative evaluations must focus upon the paste indices since no temper was added to KCN-36. There are some notable similarities between the clay and the vessel pastes. For example, sand grains are relatively sparse in all three (only 1-2 percent by volume), and those that do occur (mostly quartz) are relatively coarse in size (>2.40). However, KCN-36 is siltier than either of the vessels, with its 4 percent value falling outside of the two standard deviation range for the mean of the two vessels.

More importantly, however, is a qualitative distinction between the sediment sample and the two vessel pastes; the sediment sample seems to be composed of two distinct clays, a property not observed in the two vessel thin sections. This property is readily visible in Figure 7-10 under both crossed and plane polars. In the center of Figure 7-10 are two yellowish zones surrounded on all sides by a dark red field. The dark red of the latter is surely due to the oxidation of iron, which seems to be lacking in the yellowish zones. Whether this apparent compositional distinction represents two distinct clays or zonal variation within a single clay is not known, but this sort of variation was not observed in either of the two vessel thin sections. Based upon the latter two considerations, it does not appear that KNC-36 is a precise match for the pastes observed in the two vessels.

**Conclusions**

The two pottery vessels from the Blackbird Creek site thin-sectioned for this report were observed to possess nearly identical low-silt, low-sand pastes, suggesting that they were made from the same, or closely similar, clayey sediments. While the one “raw” clay ceramic sample analyzed did not match closely the pastes of the two vessels, it is still reasonable to view both vessels as local products. Rock similar to that used for temper in the archaeological sherds may have been available in the form of recycled steatite, such as the fragment recovered at the site, or the Columbia formation gravels, which contain quartz

diorite (Groot and Jordan 1999). This and the near identity of the pastes of the two vessels strongly argues that both were made from local resources regardless of whether or not their manufacture was contemporary.



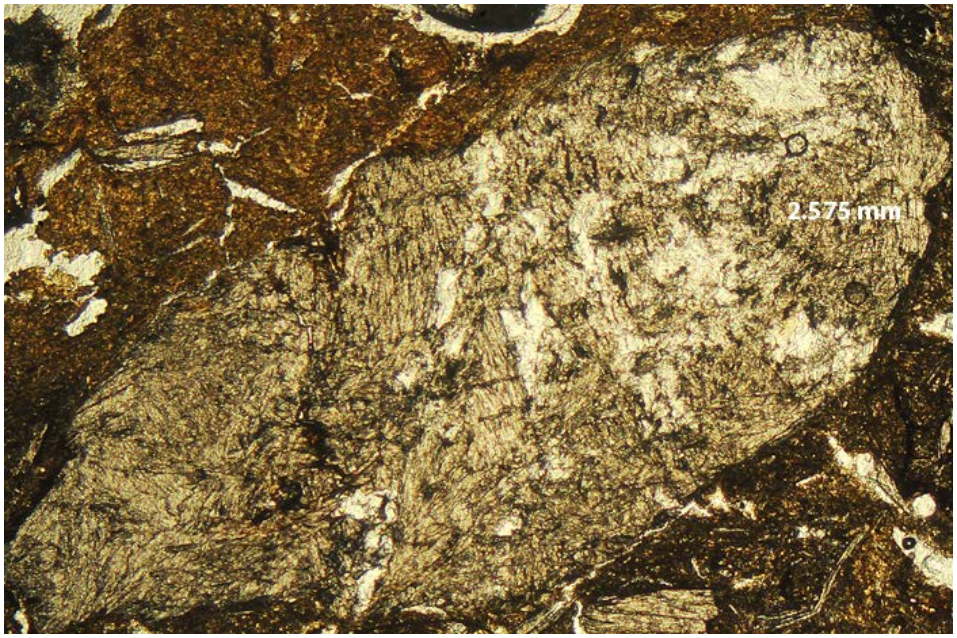



**Figure 7-7. Photomicrograph of Steatite Grain Composed of Polychrystalline Talc and Minor Amounts of Apatite, Thin Section NNN-1, Marcy Creek Sample 338-1.**
[View under Crossed Polars (above) and Plane Polars (below) at 10x magnification][2]

[2] Plane and crossed polar views refer to the two polarizing filters (lower and upper) used in petrographic microscopes. The lower or plane polarized filter shows a section in true or natural color. The addition of the upper filter shows the section in its interference color which can highlight certain minerals thus aiding in their identification.

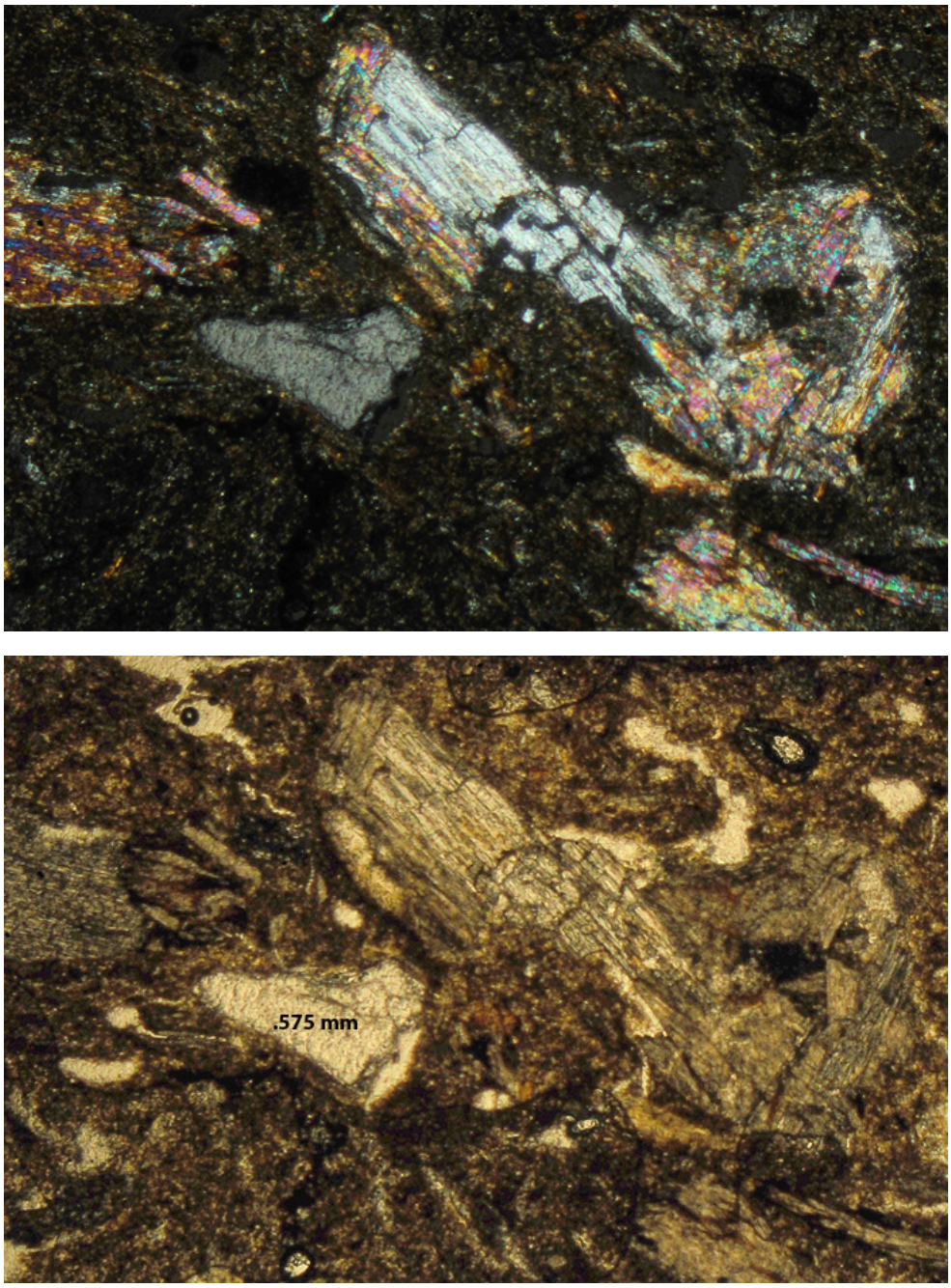



**Figure 7-8. Photomicrograph of Steatite Grain Composed of Talc and Serpentine, Thin Section NNN-1, Marcy Creek Sample 338-1.**
[View under Crossed Polars (above) and Plane Polars (below) at 10x magnification. (also present is a grain of quartz that serves as the scale)].

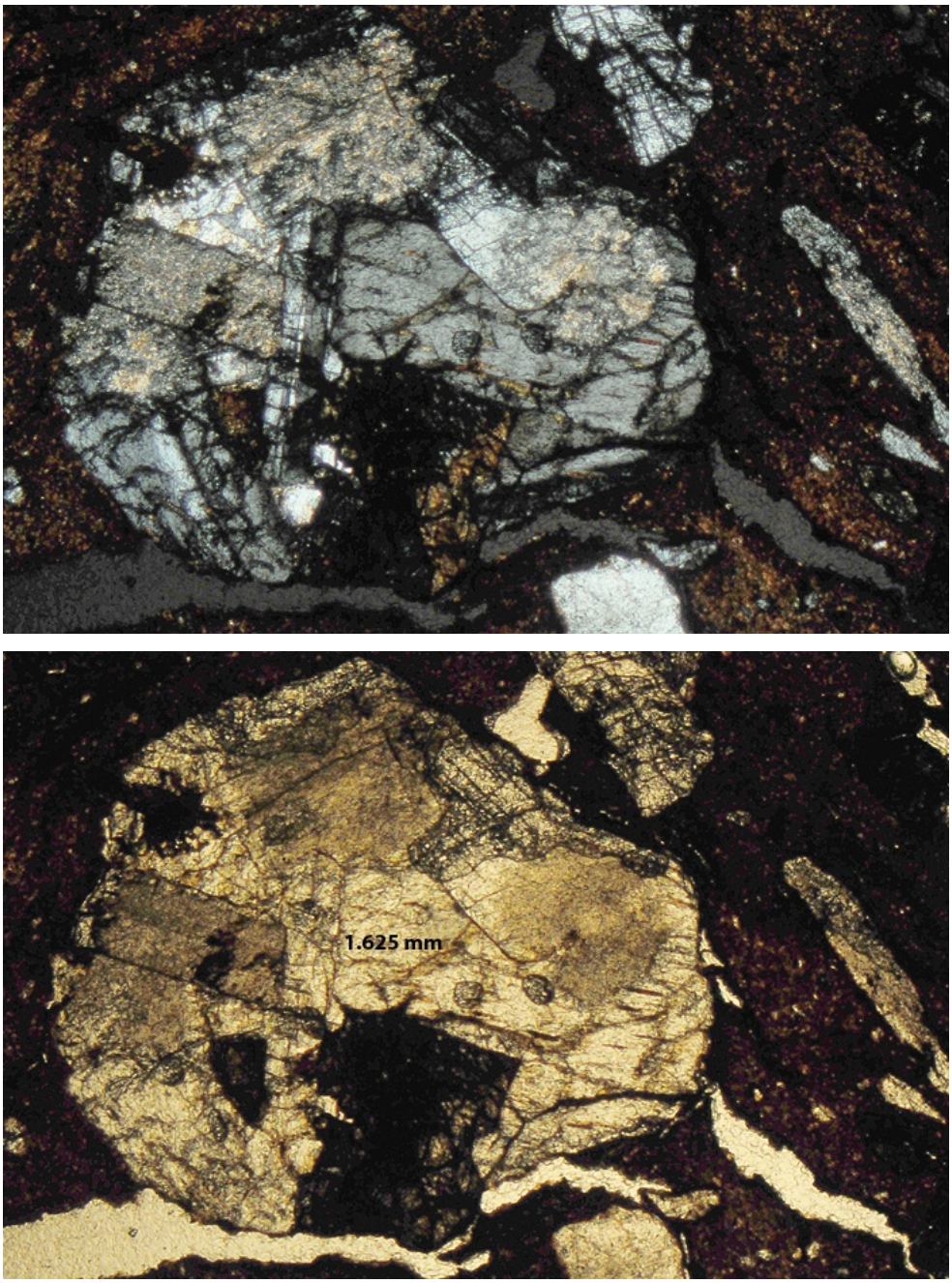



**Figure 7-9. Photomicrograph of Polymineralic Grain of Diorite Composed Mainly of Plagioclase and Hornblende and Minor Amounts of Quartz, Thin Section NNN-2, Dames Quarter Sample 409-2.**
[View under Crossed Polars (above) and Plane Polars (below) at 10x magnification]

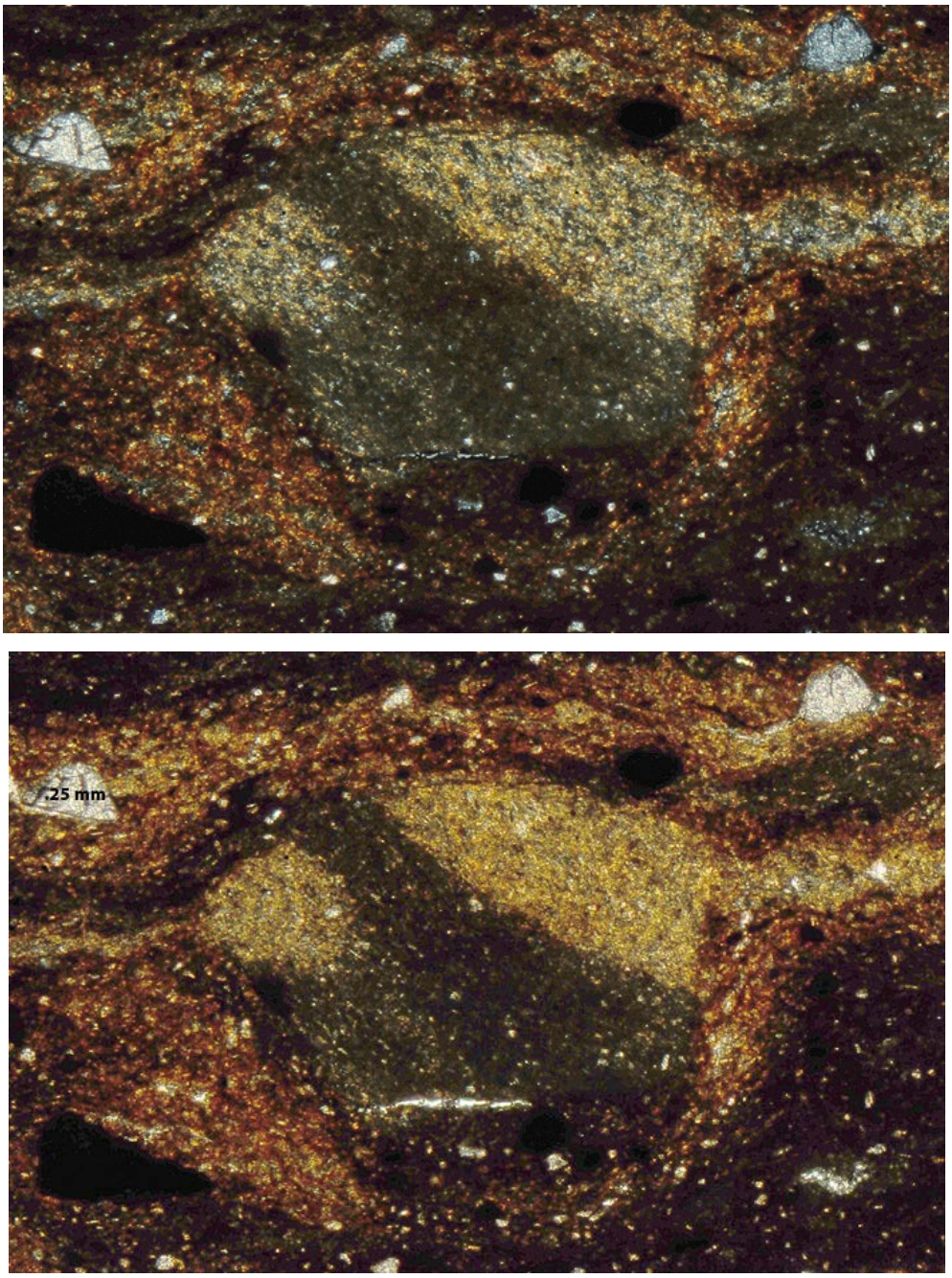



**Figure 7-10. Photomicrograph of Thin Section of Sediment Sample KCN-36, Showing Intermixture of What Appear to be Two Different Clays and Relatively Greater Incidence of Silt-Size Particles**

[View under Crossed Polars (above) and Plane Polars (below) at 10x magnification. Sand Grain of Quartz Serves as Scale]

### 7.2.2 Comparisons to Regional Ceramic Types: Experimental Wares

The ceramics from the Blackbird Creek site were identified as Marcey Creek (1200-900 BC) and Dames Quarter (1200-700 BC). As noted earlier, Marcey Creek ceramics are generally considered the earliest ceramic wares identified in the Middle Atlantic region. First described at the Marcey Creek site, at the fall line along the Potomac River in northern Virginia, Marcey Creek vessels were tempered with fragments of steatite measuring up to 1 mm and comprising 25-50 percent of the paste (Egloff and Potter 1982). Vessels were modeled, as opposed to coil-constructed, and were shaped as flat-bottomed, open-mouthed, oval or rectangular bowls. Impressions of matting appear on some bases; side walls were curved or straight, with smoothed surfaces and a slightly protruding heel at the base. Lug handles were common.

Dames Quarter is one of three ceramic types broadly defined in Delmarva as "experimental wares" (Custer 1989; Wise 1975). These experimental ceramic types include: Dames Quarter (Wise 1975); Ware Plain (McCann 1950); and Selden Island (Slattery 1946). Dames Quarter was initially defined by Wise (Lewis 1972; Wise 1975) as Dames Quarter Black Stone Temper, the black stone consisting primarily of crushed hornblende. The vessels typically exhibit flat bases and evidence of coiled side walls. Lug handles were common. Although specific surface treatment was not evident on most vessels, cord-marking and fabric impressions have been noted on a few samples. In a recent reappraisal of the ware, Griffith (2012) suggested that two separate series may be in evidence: a plain variety associated with slab or modeled construction; and a cord-marked variety associated with coil construction. In her original description, Wise suggested that Dames Quarter had a restricted geographic range and may have been a regional variant of Ware Plain.

The second of the so-called experimental wares is Ware Plain, named for the Ware site, in southwestern New Jersey across the Delaware Bay from New Castle County. The paste of this ware was occasionally tempered with 1-2-mm fragments of dark gray limestone, although the original description indicated that "more often no tempering material is visible" McCann (1950:316). Later researchers characterized the temper as crushed quartz, sand, or limestone (Wise 1975; Kraft 1970; Custer 1989). Bottoms were described as flat and ranged from circular to rectangular in shape, with side walls sloping outward to a wide mouth. Also at the site, McCann described a ceramic ware she referred to as Koens-Crispin Plain that was steatite-tempered but otherwise identical to Ware Plain; no other reference to this ware occurs in the regional literature.

Like Marcey Creek, the third of the experimental wares, Selden Island, was tempered with steatite. Originally identified and defined on Selden Island, in the Potomac River above the fall line, the ware appears differentiated from Marcey Creek largely on the basis of coiled construction and cord-marked exteriors (Slattery 1946; Artusy 1976; Wilkins 1978). Both flat bottomed (Evans 1955) and conoidal (Gardner 1975; Wise 1975) forms have been reported.

Other wares in the Chesapeake Bay region that have been termed experimental include the mainly schist-tempered Bushnell (Waselkov 1981), and a grog and steatite-tempered ceramic labeled Croaker Landing Plain (Egloff and Potter 1982). Like the experimental wares in

Delmarva, these ceramic wares generally shared common attributes including wide openings and flat bottoms. Tempers that are usually not reported in later wares were also characteristic. Waselkov (1982:283), for example, listed a variety of inclusions used as temper in Bushnell: hornblende schist, muscovite schist, grog, fiber, shell, bone. Like other experimental wares, Bushnell vessels were typically shallow, straight-walled, with lug handles, protruding basal heels, and flat bases with an elongated oval shape. Although the ware is referred to as Bushnell Plain, indicating the absence of surface treatment, cord-marking was reported on some base and lip sherds, while "impressions of fibers arranged in parallel bundles" occurred on bases. In a detailed comparison of Bushnell pots and a steatite bowl from a single site, Waselkov (1982:275) reported similar vessel heights (85-88 mm) and similar opening diameters (126 mm steatite; 104 mm Bushnell).

Croaker Landing Plain, documented on the Western Shore of the Chesapeake Bay, was reported as flat-bottomed, with rounded or semi-rectangular bases; modeled rather than coil-constructed; and tempered with "subangular clay particles 2-to-7 mm in diameter composing 20-to-40 percent of the paste" (Egloff and Potter 1982:97). Preliminary analysis suggested that the particles were not grog (bits of previously fired ceramic), but were inclusions of coarse-textured clay that were intentionally crushed and added to the paste (Egloff et al. 1988). Petrographic analysis by Stoltman of a sample of sherds from a collection of more than 800 sherds recovered at the Enfield Plantation in Virginia indicated that in some cases the temper was in fact grog (Pullins et al. 1996). Variation in vessel shape was also recorded in the collection, with large rounded vessels present as well as the more common flat-bottomed shape.

As a side note, Kinsey (1958) reported one of the few fiber-tempered ceramics in the region, a poorly fired, plain-surfaced, fiber-tempered ware from the Heck rockshelter in southern Pennsylvania. The ceramic was found in contexts associated with cord-marked Vinette I-like sherds (the earliest ceramic ware in the Northeast, tempered with crushed chert and occurring later than most of the experimental wares described here), along with an assortment of projectile points from the latter part of the Late Archaic. While indecisive regarding a date range for the deposits, Kinsey assumed that the projectile points were holdovers from the Archaic period rather than the ceramics being an exceptionally early appearance of the container technology.

Artifact associations and absolute dates suggest that experimental wares appeared in the Middle Atlantic during the transitional period between the Archaic and Woodland periods. Many of the reported dates cluster around 3000 BP (Table 7-4) suggesting this as the beginning of the period of greatest experimentation. The associations of some of the outlying dates, such as Marcey Creek or Selden Island in the ranges of 3500 BP or 2500-2300 BP, are difficult to assess.

Most sources cite Marcey Creek as the earliest ceramic in the region, and a case can be made for that position on the basis of dates and the imitative nature of the ware, which will be discussed below. In terms of other diagnostic artifact associations, the experimental wares occur with various stemmed points from the Late Archaic-Early Woodland transition, such

**Table 7-4. Reported Dates for Early Ceramics in the Middle Atlantic.**

| *Ceramic Ware* | *Date* | *Lab ID* | *Site Location* | *Reference* |
|---|---|---|---|---|
| Marcey Creek | 3260±30 | Beta-307658 | Gray Farm, DE | Griffith 2012 |
| | 3170±120 | Y-2589 | Miller Field, NJ | Kraft 1970 |
| | 3100±30 | Beta-304997 | Gray Farm, DE | Griffith 2012 |
| | 3070±40 | Beta-160613 | Powhatan Co, VA | Bowden et al. 2002 |
| | 3000±50 | Beta-113653 | Hickory Bluff, DE | Petraglia et al. 2003 |
| | 2980±40 | Beta-149987 | Blackbird Creek, DE | reported herein |
| | 2900±95 | I-5091 | Monocacy, MD | Boyce and Frye 1986 |
| | 2800±90 | Beta-34386 | 522 Bridge, VA | McLearen 1991 |
| | 2790±40 | Beta-117149 | Hickory Bluff, DE | Petraglia et al. 2003 |
| | 2660±40 | Beta-128589 | Hickory Bluff, DE | Petraglia et al. 2003 |
| | 2495±95 | I-5090 | Monocacy, MD | Buckley and Willis 1972 |
| | 2480±60 | Beta-79127 | Hickory Bluff, DE | Petraglia et al. 2003 |
| Selden Island | 3500±100 | Beta-158705 | Sunny Side, PA | MacDonald 2003 |
| | 3150±40 | Beta-272400 | Clark's Branch, VA | Inashim 2011a |
| | 2955±90 | UGa-5376 | Clyde Farm, DE | Custer et al. 1986 |
| | 2890±30 | Beta-307657 | Gray Farm, DE | Griffith 2012 |
| | 2800±40 | Beta-244349 | Clark's Branch, VA | Inashima 2008 |
| | 2790±40 | Beta-304999 | Gray Farm, DE | Griffith 2012 |
| | 2710±30 | Beta-307656 | Gray Farm, DE | Griffith 2012 |
| | 2360±95 | Beta-11799 | 44LD15, VA | Rust 1986 |
| Dames Quarter | 3020±60 | Beta-149988 | Blackbird Creek, DE | reported herein |
| | 3020±40 | Beta-149986 | Blackbird Creek, DE | reported herein |
| | 3005±28 | Beta-157390-1[1] | Glasgow School, DE | Bowen et al. 2003 |
| | 2980±40 | Beta-149987 | Blackbird Creek, DE | reported herein |
| | 2955±90 | UGa-5376 | Clyde Farm, DE | Custer et al. 1986 |
| | 2930±40 | Beta-149990 | Blackbird Creek, DE | reported herein |
| | 2930±30 | Beta-307655 | Gray Farm, DE | Griffith 2012 |
| Ware Plain | no specific dates but related contextually to early steatite-tempered wares | | | |
| Bushnell | 3110±70 | SI-4377 | White Oak Point, VA | Waselkov 1982 |
| | 3060±75 | SI-4375 | White Oak Point, VA | Waselkov 1982 |
| | 3020±70 | SI-4376 | White Oak Point, VA | Waselkov 1982 |
| Croaker Landing | no specific dates but related contextually to Marcy Creek | | | |

[1]averaged date

as Susquehanna, Fishtail, and Calvert. Marcey Creek, for example, is often reported in association with Orient fishtail points and steatite bowls (Kinsey 1972:451; Ritchie 1944:227-232), while Stewart (1998:14) adds broadspears to the associations. Inashima (2011a) reported Selden Island sherds from northern Virginia in association with Savannah River. Bushnell is cited occurring with Calvert points, the latter referred to as "the latest in a series of stemmed projectile points which became progressively shorter throughout the Late Archaic and Early Woodland" (Waselkov 1982:283). Calvert is a somewhat difficult artifact to use as a temporal diagnostic since the points have also been noted in association with Middle Woodland Popes Creek ceramics, suggesting that the type was either long-lived or may merely be poorly defined. Custer (1984, 1989) puts Dames Quarter in his Clyde Farm/Barker's Landing complexes in Delaware along with Bare Island/Lackawaxen and Orient fishtail points and Marcey Creek.

### 7.2.3 Regional Introduction of Ceramics

The ceramic wares identified at the Blackbird Creek site were among the first ceramics known in the Middle Atlantic, but they did not originate at the site or in the region. Ceramic technology arrived in the Middle Atlantic fully developed, whether through diffusion or migration, as part of a suite of technological variations that entered the region near the end of the Late Archaic period (Dent 1995). Among the innovations were rigid containers, the first of which were stone bowls carved from steatite.

Evidence in fact suggests that pottery probably was not invented as such anywhere in eastern North America. Ceramics first occur in the southeast, sometime around 5000 BP. The earliest dates are for a fiber-tempered ceramic referred to as Stallings, first reported by Claflin (1931): a date of 4465±95 BP (GXO-345), from Rabbit Mound (38AL15), on the Savannah River, was calibrated as 5000 BP (Stoltman 1966). The ware may have appeared even earlier along the coast (Sassaman 2004), and there are numerous dates recorded slightly later, between 4500-4000 BP. Sassaman (2004), one of the more widely published researchers on early ceramics in eastern North America, indicated that the area in which the early fiber-tempered ceramics occurred was the center of a "soapstone cooking-stone technology" that dated as early as the Middle Archaic period. Flat-bottomed steatite bowls had long been used for indirect heating, accomplished with heated steatite slabs that fit into the containers. The earliest pottery reproduced this flat-bottomed form and presumably the cooking technique, since there is little evidence that the first pots were used in direct heating. Following its initial appearance in the southeast, ceramic technology did not move out of the core area for 1,000 years, when it appeared to the west in the Lower Mississippi Valley region. It did not extend northward to the Middle Atlantic for yet another 1,000 years.

Saunders and Hays (2004), drawing on the work of Brown (1989), Hoopes and Barnett (1995), and Rice (1999) among others, summarized several theories that have been advanced regarding the ultimate development of pottery:

1) the architecture hypothesis: that ceramic containers were an ancillary development to the use of wattle and daub for construction;
2) the culinary hypothesis: that ceramic containers were developed to help make food preparation more efficient and effective;
3) the resource-intensification hypothesis: that the development of ceramic containers paralleled climatic changes at end of Pleistocene that either generated resource scarcity or abundance; and
4) the social/symbolic elaboration hypothesis: that ceramic containers were developed as an adjunct to non-utilitarian prestige or ritual practices.

In fact, these theories generally tend to address the effects of pottery adoption as much as the genesis of the technology. In contrast, Hayden (1995) proposed that ceramic containers were part of a more generalized emergence of socio-cultural complexity. Incorporating elements of the social/symbolic elaboration and prestige theory, Hayden suggested that pottery was first made and used by hunter-gatherer groups with relatively complex social organizations in areas of abundant resources, with abundance implying less need for mobility and a tendency towards territoriality and displays of prestige through feasting.

Particularly in Old World settings, ceramic containers were typically preceded by fired-clay figurines or other semi-representational objects of some sort (Rice 1987). While not noted in the Middle Atlantic, small, baked clay objects have been recorded on otherwise aceramic sites in the Southeast. Occasionally mis-labeled as Poverty Point objects, after the spherical, hand-molded lumps from the Poverty Point site in Louisiana (Gibson 2001), the objects pre-date pottery but continued for some time after ceramic containers appeared (Russo 1996; Sassaman 1993; Thompson and Worth 2011). The objects are thought to have been associated with heat retention for cooking, although occasionally elaborate shapes and decoration also suggest a deeper symbolic dimension.

Many of the theories of pottery introduction imply that ceramics were not necessarily adopted quickly and universally as a direct addition to the technology of everyday life. Ceramics may initially have seen as exotic, uncommon, or exceptional: thus the notion of prestige in several of the origin theories. Only after a period of non-utilitarian use, according to these theories, did ceramics expand into practical, day-to-day use. Sassaman ultimately saw a culinary basis for the innovation, the adoption and use of rigid containers being related to food preparation and serving. He further noted that a prestige/feasting dimension was less important, although "the power of certain individuals to manipulate soapstone exchange…was probably legitimated in the contexts of public ceremony and ritual" (Sassaman 1995:233).

In the Southeast, the spread of the technology westward from the initial core area is viewed as as an adjunct to steatite exchange, although the process was slow due to what has been called the "absence of appropriate avenues of transport" (Jenkins et al. 1986; Saunders and Hays 2004:21). Sassaman (1993), in contrast, considered steatite exchange was a barrier, that those who controlled access to steatite saw ceramics as a threat to their power and authority. When the technology did start to spread regionally, the distribution came more quickly in coastal plain areas, away from the controlling aspect of piedmont source areas.

In the end, there are no clear answers to the question of why ceramics developed or were adopted. But the issue highlights the vibrancy of the cultural landscape of the Middle Atlantic and eastern North America that was the end of Late Archaic. "New theories are coalescing to provide a glimpse of a much more interesting [picture] than has existed before. The players are active, the situations dynamic, and the results are indirectly documented in the archaeological record, which we are continuously relearning to interpret" (Saunders and Hays 2004:21).

**Early Ceramics in the Middle Atlantic**

Early researchers in the Middle Atlantic suggested parallels between the development of ceramics in this region and in the Southeast. Ceramic containers were assumed to have appeared in one location, with little evidence of a gradual spread into the area. Citing Cross (1941), Kinsey (1972) noted that the greatest concentration of steatite-tempered vessels in the Middle Atlantic was in central and southern New Jersey, and that they did not occur south of Virginia. Kinsey concluded that rather than pots having been carried into the Middle Atlantic from the south by immigrant populations, the technology diffused into the region.

Basic positions regarding diffusion and migration aside, the explanation does not account for the concentration of wares in Virginia nor their absence south of that region—diffusion implies gradual spread, and wide geographic gaps in distribution do not lend themselves to explanations involving gradualism. Later researchers suggest a different scenario, but still one involving isolated rather than widespread and immediate adoption of ceramic technology. Dent (1995) and Klein (1997), for example, argued that ceramics initially appeared across the Middle Atlantic Piedmont in areas roughly similar to, if somewhat wider than, the distribution of soapstone or steatite.

In general, early ceramics occur infrequently and in an uneven geographical distribution. Stewart (1998) suggested that ceramics did not become widely integrated into container technology in the Middle Atlantic until the Middle Woodland, when ceramics are found on a broader range of sites, occur in greater quantities, and occur in larger storage-type vessel forms. Marcey Creek, while widespread, is indeed typically found in limited frequency within sites across the Middle Atlantic region, whereas later wares are more common and occur on a wider range of sites implying more generalized the use (Hantman and Gold 2002). Steatite sources are not widely or evenly distributed, so use of the material, first for bowls then as temper, would have been 1) greater closer to the sources; and 2) connected by exchange systems that were probably obligation-based in some way as much as strictly commercial and impersonal.

The sporadic appearance of ceramics is not an isolated phenomenon characteristic only of the Middle Atlantic. As noted earlier, Sassaman and others have described a similar scenario in the Southeast. Likewise, in various parts of the Old World, early ceramics are noted in limited frequency and with limited geographic distribution, not seeing widespread use for long periods of time (Hayden 2009). Moreover, there appears to have been a key geographic association in some regions. Rice (1999), for example, observed that worldwide the earliest pottery is found in low latitudes and coastal or riverine settings, while Hayden (2009:29) claimed "a strong association between sites where initial pottery is found and semi-sedentary sites where aquatic resources were important." Some researchers have gone so far as to label this an "estuarine model" (Jordan and Zvelebil 2009). While there may be similar geographic patterns in the Middle Atlantic, more finely resolved distribution studies would be required to confirm this type of association regionally.

Sassaman (1993) noted that the existing social order would have been a major determining factor in adoption of ceramics. That is, if the new technology did not mesh with existing technology or if it undermined political power (which in the Southeast, he argued, involved access to and control over the distribution of steatite), its adoption would have been resisted. Thus, he reasoned, ceramics did not expand from their core area in Georgia westward to the Mississippi Valley for almost 1,000 years after their initial appearance. Klein (1997) and (Hantman and Gold 2002) proposed that in the Middle Atlantic, the production and exchange of steatite was similarly controlled, the material being used to produce items for feasting and ritual. Steatite-tempered ceramics would have begun in the same mode (following Saunders and Hayes' social/symbolic elaboration hypothesis) and eventually weakened this exclusivity. More recently, Bedard (2011) argued an essentially economic basis for the way ceramics were adopted in the Middle Atlantic, although the process was still closely related to access to steatite. Noting the distinct difference between the extensively decorated, grit-

tempered wares that were present in the Southeast at the time that undecorated steatite-tempered pottery appeared in the Middle Atlantic, Bedard suggested that the groups who controlled steatite exchange systems were responsible for introducing the earliest pottery to the region, and that they used steatite for temper and mimicked undecorated stone bowls to link the new containers as closely as possible to the original forms to maintain their control—he refers to a "technological transfer within the existing social system in which vessel style and raw materials were socially meaningful and semantically complex" (Bedard 2011:139).

**The Imitative Nature of Early Wares**

William Henry Holmes was probably the first researcher in North America to note that ceramic vessels tended to take the form of existing vessel technology. He noted that clay as a raw material is malleable and does not limit the form of artifacts made from it in the way wood or stone might (Holmes 1886). Exemplifying this observation, the original ceramic wares that occur earliest in the Southeast—Stallings and Orange—appear to have been patterned after stone bowls, being flat-bottomed with wide openings. While not steatite tempered, as they would be in the Middle Atlantic, the pottery did imitate the form of the steatite vessels that were common in the region.

While copying the form of stone bowls would have had a practical, functional value, steatite may also have been used originally as a tempering agent in this region to impart particular qualities of the stone vessels to the ceramic replicas—hardness, for example. The imitation may not necessarily have been solely on a technological level, but may have been symbolic, in that part of the stone vessel was used to reproduce the quality or power of the original in the new form. Outside the piedmont region though, steatite is not widely available. As ceramic technology began to spread, both geographically beyond the piedmont and functionally away from ritual significance or status uses, other materials were used as temper, leading researchers to term the new wares experimental. At the same time, the flat-bottomed stone bowl form appears to have been replaced relatively quickly, with conical or conoidal baskets seemingly the new template (Selden Island and Croaker Landing occurred in both forms, for example).

Functional considerations aside, imitating existing container technology may have been an example of traditionalism, in which a new technology is embraced, but is cast in a familiar and useful form. Traditional societies are slow to change, for a variety of reasons, many of which involve socio-cultural constraints that the theorist Bourdieu subsumed under the term *habitus*. Yet, even without reference to this theoretical construct, it is easy to assume that moving away from familiar things that work, whether on a practical or a symbolic level, could be seen as fraught with danger. Newly introduced technologies may be slowly accepted, but more easily so when in the guise of existing structures and practices. Whether a technological basis for the selection of specific tempers was understood by the potters at the time is unclear and possibly irrelevant, at least at first. The use of temper may originally have been merely imitative for symbolic reasons—harnessing power.

**Technological Implications of Ceramic Experimentation**

Regardless of its basis, the variation in temper for the Marcey Creek sherds at the Blackbird Creek site suggests experimentation with types of raw materials other than steatite. The use

of hornblende/gneiss and schist probably represents the replacement of steatite as a tempering agent with locally available raw material (or at least ones less distant than the steatite quarries in Maryland, Virginia, and Pennsylvania: Custer 1989; Dent 1995). According to Rice (1987), temper is a substance added to clay to change its properties "when wet or dry as well as during and after firing." A classificatory dilemma has been identified in the literature in terms of distinguishing between incidental, natural inclusions in clays and deliberately added substances. Both Rice (1987) and Shepard (1964) note that this is not a trivial question, since the archaeological classification of ceramics often relies on variations in temper. This is perhaps nowhere more the case than in the Middle Atlantic region where ceramics are typically undecorated and variation in vessel shape is either not well developed or is difficult to determine because of the sizes of the sherds available for study. Thus, distinguishing between natural and intentional inclusions is important not only technologically but also typologically. As for terminology, Rice (1987:412-413) recommends avoiding the term temper because it carries unintended connotations: "…temper is a behavioral inference drawn from an analytical observation…inclusions is a more appropriate term than temper." But like many labels in contemporary archaeology, such as projectile point or fire-cracked rock, the term temper is ingrained in the literature. And so, it is easier to use the term, although we should be explicit as far as the meaning we intend—in this case, intentional inclusions.

In discussing the operational sequence of production and use, or *chaîne opératoire*, Jones (2008) suggested that temper represented a symbolic choice, being a selective part of the technological process, the choice of tempering agent "depending on the symbol the community intends to transmit." There appear to be unvoiced assumptions behind this observation since in practical terms one uses what works best, and in terms of social convention, one may use a particular temper because that is what is expected. But symbolism may indeed have been a factor at some point, since as noted steatite may have been selected to figuratively impart the qualities of the stone bowls to the pots.

Although the sample sizes were small and made interpretations guarded, the presence of both Marcey Creek and Dames Quarter sherds in a single feature at the Blackbird Creek site could indicate that manufacture and use of these ceramic types was not mutually exclusive and that the variations in temper employed in the wares may have been the result of distance to and/or availability of temper sources. These variations may reflect socio-cultural characteristics particular to the Early Woodland lifeway, such as an overall decrease in population mobility or changes in exchange or trade networks. It has been suggested that Dames Quarter ceramics were "a direct technological outgrowth of Marcey Creek wares with refinements in temper and modeling technique" (Custer 1989:234).

Temper refinement is difficult to assess, since the mechanics of temper are subtle and the degree to which they were appreciated at the time is not clear. That Marcey Creek appears to be the most widespread geographically of the early wares does suggest that it was the first ceramic, imitating stone bowls both in form and material (temper). The number of regional variations based on temper that followed may have been as much a factor of material availability as of technological refinement. In some ways presaging the work of Klein and Sassaman, Waselkov (1982) noted that the tempering agents used in Bushnell and other

experimental wares, including Marcey Creek, Dames Quarter, and Croaker Landing Plain, came ultimately from the piedmont "perpetuating the same resource procurement network by which steatite bowls were formerly acquired." It is clear that the earliest ceramics in the Middle Atlantic such as Marcey Creek were influenced by trends in piedmont areas, assuming the wares originated in that region. Immediate regional or experimental variants suggest similar geographic associations. Wise (1975) noted that outcrops of hornblende, used as temper in Dames Quarter vessels, occur "sporadically" in the northern Delaware Piedmont. Griffith (personal communication, 2012) recently referred to Dames Quarter as "a Piedmont influenced type, like Marcey Creek." At Blackbird Creek, petrographic analysis suggested that the clays used in both wares found at the site could have been locally derived however, and we suggest further that the tempering agents need not have been acquired directly from the piedmont, but would have been available locally—steatite from curated bowl fragments and black stone from local gravels (Groot and Jordan 1999). The motivation for selecting a particular type of stone for temper, whether from gravel beds or from distant outcrop sources, is unclear nonetheless.

In contrast to refinements in temper, vessel form and modeling technique may be easier to interpret. That is, there appeared to be a fairly rapid movement away from recreating wide-mouthed, flat-bottomed containers with lug handles on the plan of steatite bowls. Both flat-bottomed and globular forms occur among several of the earliest wares, such as Selden Island and Croaker Landing. Coil construction may also have been introduced relatively quickly, as witness the coil-built side walls of some Dames Quarter vessels. While the data are not sufficient to make a clear distinction, Griffith (personal communication, 2012) recently suggested that among Dames Quarter, the plain, modeled variety might be earlier than the corded, coil constructed variety. There may also be a physical dimension to the change in form that was at least partially correlated with the move away from vessels as prestige items used infrequently for ceremonial occasions to practical items put to day-to-day use. Bunzel (1972:3) noted that low-fired ceramics tend to be spherical for reasons of strength: "Pottery is a fragile product at best, and gains strength as corners are eliminated and the exposed surface in proportion to capacity is reduced." Globular vessels would thus be more likely to stand up to utilitarian service.

In the Blackbird Creek sample, the Marcey Creek sherds were small and fragmentary, insufficient to determine the shape of the vessel or vessels represented. The Dames Quarter sherds, however, were from a flat-bottomed vessel, modeled rather than coiled, with straight sides, a smoothed lip, protruding heel, and fabric-like impression on the base. The form is typical of that reported for Marcey Creek, Bushnell and others among the earliest experimental wares. If we assume an evolutionary perspective, the vessels from Blackbird Creek may be seen as representing the early part of the development away from the steatite bowl form, an interpretation further implied by the early radiocarbon dates from the features.

**Social Implications of Ceramics**

Regarding the ultimate significance of pottery's impact on socio-cultural systems in the region and on the people who occupied the Blackbird Creek site, there are opposing perspectives. Saunders and Hay (2004) provide a number of references from Old World contexts regarding the idea that pottery was in important innovation sociologically as well as

technologically. But in North America, and particularly in eastern regions, researchers tend to see relatively little impact. Many echo Caldwell's (1958) observation of continuity between preceramic and ceramic sites, the platitude being that the Early Woodland was the Late Archaic with pottery. Stoltman (1972) referred to ceramics as an additive, non-disruptive cultural attribute and noted that little evidence of change is seen in the archaeological record following its introduction. In the Middle Atlantic, Stewart (1998) likewise contended that ceramics did not necessarily revolutionize cooking technology, nutrition, or social organization when they were initially introduced, largely because their adoption was slow and uneven. Without referencing the notion of ceramics used in prestige situations, Stewart argued that the low frequency of pottery on sites early in the Woodland period indicates that the containers were not accepted universally. They were common in some areas, absent in others, and their impact is seen as minimal. In sum, "overall continuity in subsistence-settlement patterns is in evidence across the greater Late Archaic-Early Woodland temporal span. The new ceramic vessels may have made life easier…but they do not seem to have provoked any other dramatic cultural changes" (Kingsley 2002:3). In this view, the idea of a "container revolution" is considered misleading. Following what was perhaps an initial period of high-status use associated with ceremony or feasting, pottery may have eventually become merely an alternative way of making already familiar objects, or as Egloff (2012) stated, "a translation of function to a different medium."

Yet, the question remains as to whether ceramics merely replaced stone bowls, and later other container types such as baskets, or whether they were part of a larger change in cultural systems, which would be implied if a high status/prestige theory were correct. The Late Archaic period in the Middle Atlantic represented a time of change. The changes included shifts in how people used and altered the landscape, shifts in settlement patterns, changes in the ways in which various resources were obtained and used, and the development or adoption of material culture traits significantly different from those of the preceding millennia. Dent (1995) cites a general modification of life ways, from maintenance of resource production to what he refers to as intensification, involving a redirection of domestic economic activity to certain individuals within social groups (in a form of specialization). Ceramics may have been a product of these socio-cultural changes, the technology being adopted as more sedentary lifestyles developed, as the environment stabilized, as Dent's intensification took hold. Alternatively, ceramics may have fostered sociological change, becoming the agent of that change by providing new means for processing, storing or transporting materials. The manufacture of rigid clay containers spread more quickly in the Middle Atlantic than had been the case in the Southeast, so it may be that in the intervening years social systems in this region were more prepared to embrace the technology—perhaps the resource intensification that Dent points to at the end of the Archaic period did have an effect, with societies were becoming more complex, less egalitarian. There may have been a need for the technology, and it relatively quickly filled the gap.

Observations regarding differences between contemporary ceramics in the Southeast and the Middle Atlantic at the time latter first appeared have been cited by Bedard (2011) as an example of what Clark and Gosser (1995) referred to as dependent invention. This notion describes the way in which a new technology is accepted, contingent in large part on the

structure and needs of the socio-cultural system into which the technology is introduced. The technology may not spread completely or uniformly, but may be broken down, with individual attributes sampled and incorporated separately. Bedard took this a step further by considering the selective process as an example of agency: rather than, in his phrase, "passively adopting" the technology in its entirety people acted consciously to select the parts of the process that were appropriate. The earliest ceramics in the Southeast were not steatite-tempered, but were tempered at first with fiber and soon after—within about 300 years—with sand, materials apparently in the what-is-available category. The use of steatite was essentially a Middle Atlantic variation, seen as an example of selection or agency. Sassaman assumed the function of stone bowls and the first ceramics to be indirect cooking, rather than serving platters, as is their presumed function in the feasting model proposed in the Middle Atlantic Piedmont. It might then be argued be that the introduction of ceramics in the Middle Atlantic, delayed in relation to the Southeast for reasons that are not clear, was more imitative, and so may have been used on a more ceremonial/symbolic basis at first than had been the case in the Southeast. Individuals exercising their independence within the existing social order soon transferred the technology to different uses however, and selected different materials to create the containers.

Boivin (2008) has written about peoples' developing relationship with soil, describing the use of soil as a tool rather than merely a surface on which to live. She argued that using soil tends to change people's relationship with the landscape, encouraging settling while at the same time aiding in that process on several levels. The "eminently malleable nature of soil [encouraged] rapid and efficient creation [of new array of] containers, enclosures, and spatial divisions." The discussion is aimed more at structures, such as wattle and daub or clay brick, and the relationship between people and soil that she describes may not be as dramatic in terms of making and using ceramic containers. But the relationship with the land would necessarily have been altered by the introduction of ceramics. Mobility would have been impaired somewhat due to the fragility of the pots, for example. If the containers and their contents were stored or cached in some location, or if specific clay sources are used repeatedly, the character of seasonal rounds may have been influenced. Social relationships regarding the manufacture of ceramic containers may have altered personal relationships within social groups or between communities, while avenues for trade and new outlets for decorative arts and symbolism may have developed, highlighting or even fostering what Boivin referred to as "a growing interest in the human capacity to create substantial, durable changes to the natural world."

Kramer (1985) similarly noted that in some contexts, ceramic vessels might alter or reinforce principles of social structure such as gender and power relationships. In the Middle Atlantic, ceramics may at first have imitated and reinforced relationships regarding access to steatite, as proposed by Klein or Hantman and Gold, while eventually altering and disabling the power structure. Kramer further observed that technological innovation like the introduction of pottery is questionable in the absence of consumer demand, a statement made in the context of manufacture for trade. Yet the idea may apply to community use as well, where consumer demand would be seen as the needs of the immediate population. In this view, as recognition of the utility of ceramics grew creating local demand, new materials and

manufacturing models were developed, and the technology would have transferred out of the hands of the original minority who controlled it for prestige or ritual purposes.

## 7.3 Feature Analysis and Site Structure

The 26 features identified at the Blackbird Creek site consisted of plow-truncated pit or basin features of two general types: round, flat-bottomed; and irregular. Functional interpretation of the irregular pits documented across the site was problematic given their lack of patterning in form or location, and very low artifact counts. In some cases there was no clear evidence indicating that the features were cultural in origin. Interpretations of similar features documented elsewhere in Delaware range from pit houses to the remnants of naturally occurring tree-throws (Custer 1994, Mueller and Cavallo 1995, Petraglia et al. 2002). Several of the irregular features from the current investigation, Features 158 and 179 in particular, resembled Custer and Silber's (1995) Type 8 feature, as identified at the Snapp site (7NC-G-101). This feature type was described as shallow, irregular, and oval, and was interpreted as an internal storage feature or "sub-basement" related to a pit house structure. Leaving aside the validity of the interpretation at the Snapp site, the data available from the Blackbird Creek site were insufficient to draw such conclusions. Post molds and concentrations of thermally altered stone, typically associated with residential feature patterns, were absent, and a generally low artifact frequency in the sampled portions of the overlying plow zone deposits did not indicate areas of intense activity that would be expected in the vicinity of residential structures.

In contrast, the round, flat-bottomed features at the site shared common characteristics such as regularized form, similar contents, and close spatial distribution, all of which suggested similar functions performed during a discrete timespan. Detailed analysis of the form, content, possible functions, and spatial distribution of these features follows in this section of the report.

### 7.3.1 Feature Categories

While the round, flat-bottomed features shared common characteristics of form, variations were observed, leading to their analytical separation into three categories: 1) cylindrical-to-bell-shaped; 2) steep-sided, flat-bottomed; and 3) shallow, basin-shaped (Figure 7-11). The cylindrical-to-bell-shaped pits had walls that were either vertical or flared outwards slightly with depth. Floors were completely flat, and the basal diameters were as great as or greater than the orifice. Features of this sub-type included Features 52, 95, 112, and 159. While not common, bell-shaped pits are well-known in the Middle Atlantic region and this class of feature is usually ascribed a storage function.

Steep-sided, flat-bottomed pits were the most common sub-type. These included Features 136, 140, 167, 169, 171, 190, and 191. The pit walls were steep, but not vertical, and tapered to a flattened bottom that was somewhat smaller in diameter than the pit orifice.

Two other features, Features 53 and 96, were classified as shallow, basin-shaped. These two pits were located immediately adjacent to one another and exhibited a relatively shallow, bowl-shaped profile with a nominally flattened bottom. Features 53 and 93 also registered the lowest volumes among the pit features.

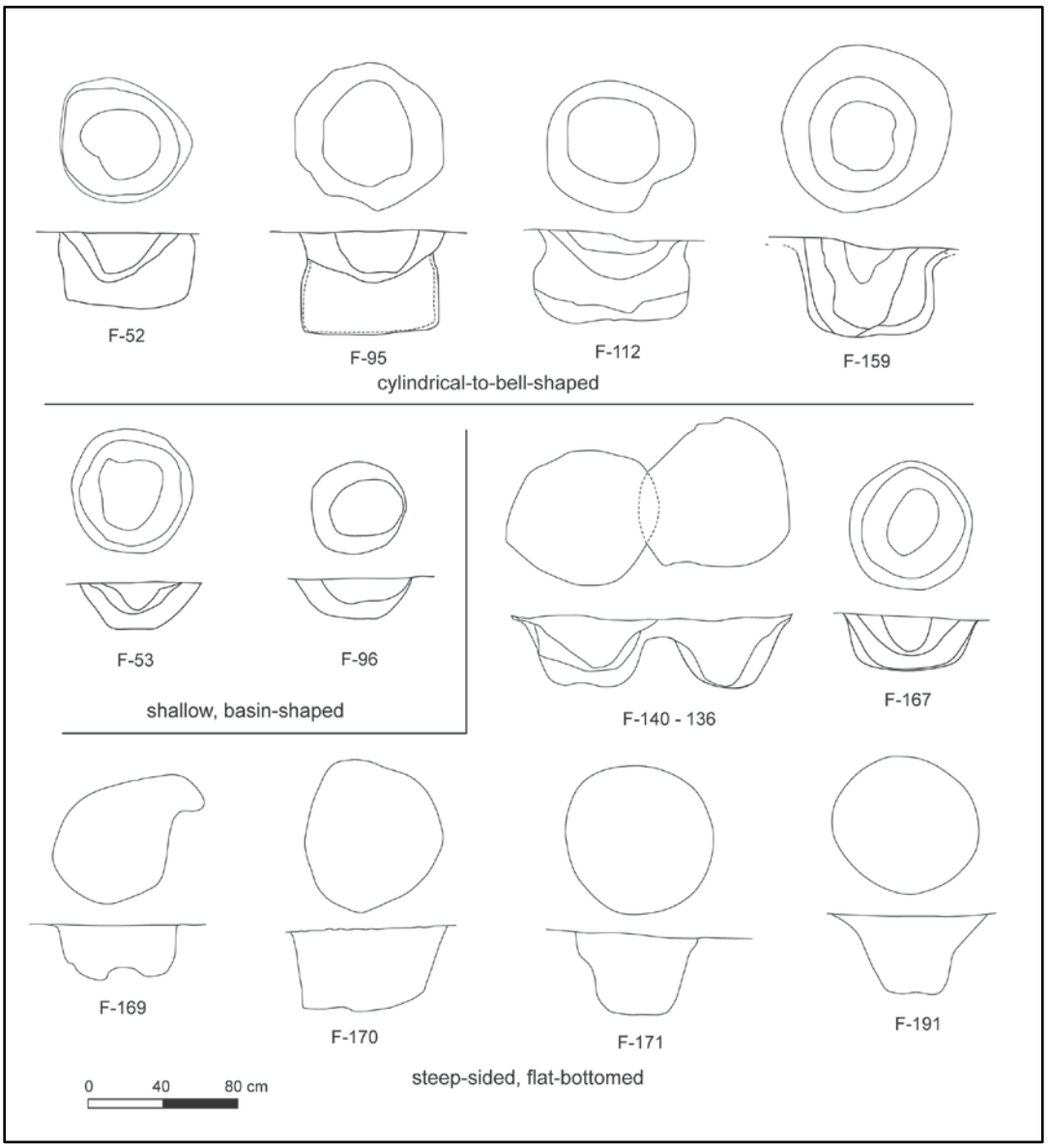



**Figure 7-11. Plan and Profile Sections of the Round, Flat-Bottomed Pits by Subtype.**

As illustrated in Figure 7-11, the features also exhibited various amounts of internal stratigraphy. Features 52 through 167 contained multiple strata which appeared as concentric bands in plan and as U-shaped bands in profile. Soil color and texture of the fill was slightly darker and loamier within the center stratum and the strata became lighter and more clayey toward the side walls. Features 169 through 191 contained fill that was homogenous in color and had a texture that was generally darker and coarser than the surrounding subsoil. Artifact frequency within the features ranged from 97 in Feature 52 to 5 in Feature 53 (Table 7-5). Most of the artifacts were contained in the first two strata of the stratified features which comprised the center of the pit in most cases. The uniformity of artifact types recovered from these strata, as well as ceramic mends between levels, suggested that the differential

soil color and banding was the result of gradual post-occupational infilling rather than deposition related to use. A clear pattern was evident; features with multiple strata occupy the lower portion of the terrace while those with homogenous fill are located at higher elevations coinciding with the upper portion of the lateral crest (Figure 7-12). Since the lower elevations are more susceptible to ponding and the feature fill was less compact than the surrounding subsoil, these pits would held groundwater for longer periods thus promoting differential stratigraphy. Regardless of the pedological processes at work, the internal stratigraphy of the pits appeared to have little bearing on functional interpretation.

**Table 7-5. Artifact Frequency by Feature and Stratum.**

| | ***Feature*** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Stratum*** | ***52*** | ***53*** | ***95*** | ***96*** | ***112*** | ***136*** | ***140*** | ***159*** | ***167*** | ***169*** | ***170*** | ***171*** | ***191*** | ***Total*** | ***Freq.*** |
| I | 50 | 3 | 14 | 25 | 8 | 36 | 5 | 7 | 12 | 11 | 29 | 8 | 91 | 299 | 68% |
| II | 44 | 1 | 39 | 0 | 4 | 0 | 2 | 12 | 12 | | | | | 114 | 26% |
| III | 3 | 1 | 8 | | 7 | | 0 | 5 | 3 | | | | | 27 | 6% |
| IV | | | | | 0 | | | 1 | 0 | | | | | 1 | >1% |
| Total | 97 | 5 | 61 | 25 | 19 | 36 | 7 | 25 | 27 | 11 | 29 | 8 | 91 | 441 | |

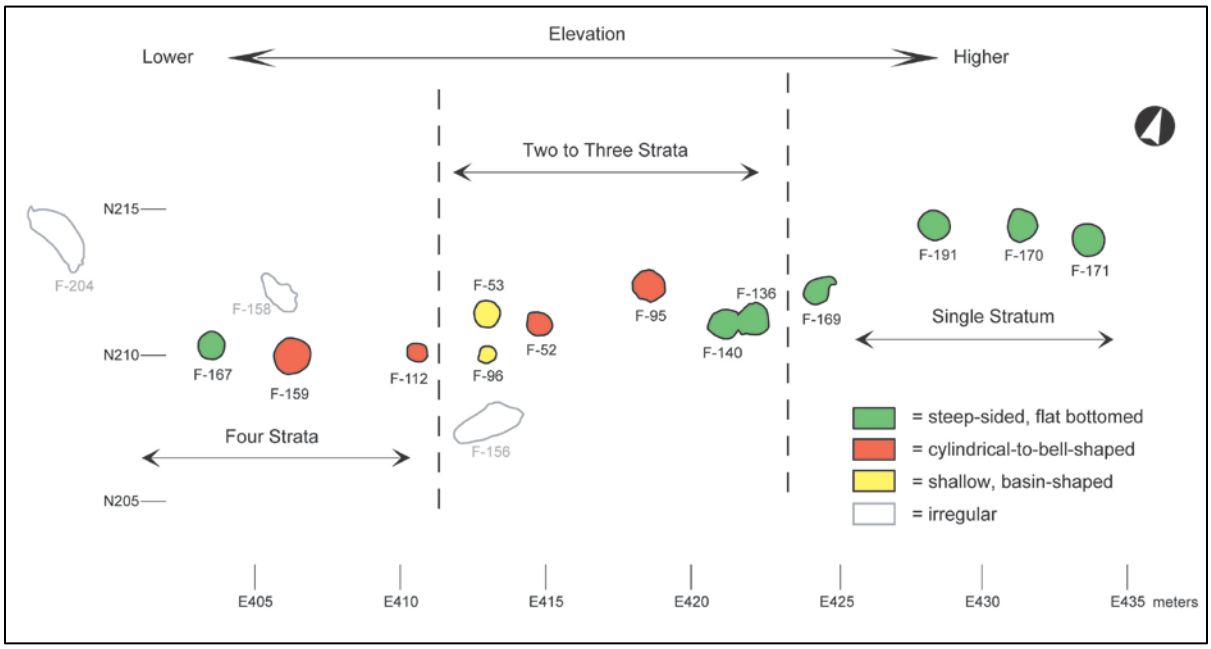



**Figure 7-12. Distribution of Round, Flat-Bottomed Pit Features by Strata.**

### 7.3.2 Thermally Altered Stone and the Evidence for Fire Related Activity

Thermally altered stone was the second most frequently occurring artifact type within the round, flat-bottomed features, with one fragment recovered for every two fragments of flaking debris. Several attributes recorded among the thermally altered stone in the assemblage were potentially important in the context of indirect heating or cooking. First, the individual rocks were relatively large. The mean weight of thermally altered stone

fragments recovered from the round, flat-bottomed pit features was 361.5 g, compared with a range of 4 g to 110 g in the irregular pit features. Three features (95, 96, and 136) contained individual sandstone and quartzite fragments weighing between 1 and 6 kg. Also in contrast to the irregular pit features, in which quartzite cobbles were predominant, more than one-half of the thermally altered stone recovered from the round, flat-bottomed pit features was sandstone. Quartzite was the second most common material (23 percent), quartz third (17 percent), with individual chert, jasper, or siltstone fragments present.

The high frequency of sandstone and large sizes of the thermally altered stone fragments in the pit features also contrasted with comparative data from nearby site excavations for which detailed data was gathered. At the Frederick Lodge site complex, excavations of upland occupations dated to the Middle Woodland identified discreet activity areas interpreted as the remains of stone boiling or other indirect heating activities (Versar 2011b). Features identified at the site included discreet thermally altered stone clusters interpreted as pot dumps or collections of stones being stockpiled for reuse, as well as a scatter of smaller fragments thought to represent spent and discarded stone. Direct functional association between the thermally altered stone clusters and scatters was demonstrated through refitting.

At the Hickory Bluff site located along the St Jones River in Dover, 15 thermally altered stone features were subjected to intensive analysis (Petraglia et al. 2002). One feature consisted of a single quartzite boulder fractured in situ. Others were comprised of between 11 and 705 stones, with an aggregate mean weight of 81 g. Sandstone fragments were a minority, comprising a maximum of 20 percent of each cluster.

Table 7-6 compares summary attributes of all thermally altered stone feature elements from the Blackbird Creek, Frederick Lodge, and Hickory Bluff sites.

**Table 7-6. Thermally Altered Stone Frequency from Features on Select Sites on the Delaware Coastal Plain.**

| ***Site*** | ***Setting*** | ***Mean*** | ***Qztite*** | ***Quartz*** | ***Jasper*** | ***Sand.*** | ***Other*** |
|---|---|---|---|---|---|---|---|
| Blackbird Creek | Blackbird Creek | 361 g | 23% | 6% | 2% | 55% | 2% |
| Frederick Lodge | Bay/basin Uplands | 82 g | 82% | 16% | -- | 1% | -- |
| Hickory Buff | St. Jones River | 81 g | 32% | 40% | 5% | 8% | 14% |

The data in the table clearly indicates the differences between the thermally altered stone from the Blackbird Creek site and that from the other local sites for which detailed data are available. Mean weights were more than four times greater in the Blackbird Creek contexts. The dominance of sandstone and to a lesser extent quartzite indicated specific selection of raw material, since these types occur in a minority in the adjacent stream beds: lithic source studies conducted in the context of the broader SR 1 data recovery efforts indicated that sandstone comprised just four percent of the Blackbird Creek and Sandom Branch stream bed samples (Versar 2011a).

### 7.3.3 Feature Function

The round, flat-bottomed pit features at the site exhibited distinctive and common shapes that suggested they had been constructed and used for specific and possibly interrelated activities. Several likely functions were considered, including storage and a variety of resource processing activities.

**Storage**

Storage pits are common features on prehistoric American Indian sites throughout the region. They are often considered an indication of increased efficiency in resource procurement and processing, since the need for storage implies production in excess of immediate requirements, as well as semi-sedentary subsistence-settlement patterns implied by a degree of planning and cyclical return to a particular location (Dent 1995). Silo-like storage pits were documented at two regional sites in Delaware—Lums Pond (Petraglia et al. 1998) and Delaware Park (Thomas 1981)—where investigators noted that the features had been excavated into coarse sandy subsoil, thus providing drainage to protect contents stored in them. In contrast, the Blackbird Creek site pits were excavated in dense, clayey soils at the expense of considerable effort. While storage may be a plausible interpretation for these pits, their excavation in poorly drained soils in proximity to water suggested that the purpose of the features may have been the retention of liquid.

**Ovens—Cooking/Ceramic Manufacture**

Earth ovens for cooking or for ceramic manufacture were also considered as possible functions for the Blackbird Creek pit features. Thermally altered stone fragments were found in sufficient sizes and quantities to have been the remnants of either activity. However, little supporting evidence such as burned or baked earth within the pits was documented. In addition, the pits would have been damp and were probably too deep to support hot fires. In terms of ceramic manufacture, the clayey soils might have been suitable material for pottery, but the features appeared to have been carefully excavated, with relatively straight and regular side walls and flat bases rather than the wider, irregularly shaped pits that might be expected in connection with clay extraction. Moreover, as with cooking, the depths and relatively narrow diameters of the pits would not have allowed fires to burn hot and long enough to fire ceramics, and there was no evidence of excess tempering material or of wasters—failed or incompletely fired pieces.

In the end, the nature of the soils within which the features were located suggested that the pits had been deliberately excavated into dense sediments that would allow the features to retain liquids. This observation opens up a number of possibilities for functional interpretation, such as the bulk processing of hides, tree mast (nuts), or anadromous fish, where soaking or steeping materials in liquid is essential to the process.

**Hide Tanning**

Another possible function of the pits may have involved a step in the hide tanning or skin dressing process. There is scant data on hide processing in archaeological literature, and most ethnographic accounts are from the Plains or from northern Europe, where game or herd animals were present in large numbers. The few accounts from the Northeast or Southeast describe the processes of removing fat and hair and they include the mention of

pits for soaking the skins to soften them. Specific cleaning tools, some referred to as beamers, are also noted, although most these tools are made from bone. One account in particular describes the process as practiced by early twentieth-century Choctaw in Louisiana: "…a hole is dug in the ground, its size being determined by the number of skins to be prepared. The walls and bottom are made smooth and water is poured in, which, on account of the nature of the clay and sand formation, remains several hours, or sometimes during the night" (Swanton 1946:446). At the turn of the eighteenth century, John Lawson recounted skin dressing practices of tribes of the Carolinas: "Their Way of dressing their Skins is by soaking them in Water, so they get the Hair off, with an Instrument made of the Bone of a Deer's Foot; yet some use a sort of Iron Drawing-Knife, which they purchase of the English, and after the Hair is off, they dissolve Deers Brains, (which beforehand are made in a Cake and baked in the Embers) in a Bowl of Water, so soak the Skins therein, till the Brains have suck'd up the Water…" (Lawson 1984[1709]:208).

The round pits at the Blackbird Creek meet the soil criteria noted in the first account and also provide a vessel for combining the brain matter as described in the second. However, while some of the scraping tasks could have been performed with *ad hoc* flake tools, few formal scraping tools were observed in the pit fills or in sampled portions of the plow zone. Moreover, the sizes and number of pits that were present indicated a relatively large-scale operation, more than would be expected to serve the needs for animal hides of a small group of people, making tanning an unlikely interpretation as a function for the pit features.

**Nut Processing**

Tree mast has long been recognized as an important resource to American Indian populations from the Paleoindian through the Late Woodland periods and beyond (Gardner 1997; Gremillion 2004; Thomas 1981). Some of the first accounts of the Middle Atlantic region by early European explorers note the use of nuts, as in the Haklyut Society's *Roanoke Voyages: 1584-1590*: "Besides their eating of them after our ordinarie maner, the breake them with stones and pound them in morters with water to make milk which they vse to put into some sorts of their spoonmeate" (Quinn 1955:351). A later observer, William Bartram, wrote in the 1770s that: "I have seen above an [sic] hundred bushels of these nuts, shell-barked hickory…stored up by one family [of the Creeks]. They pound them to pieces, and then cast them into boiling water, which after passing through strainers, preserves the most oily part of the liquid; this they call by a name which signifies hiccory milk. It is as sweet and rich as fresh cream, and is an ingredient in most of their cookery, especially homony and corn cakes" (Bartram 1792, in Battle 1922:177).

Nutmeat and oils rendered from boiled nuts were an important source of carbohydrates and fat calories. Ozker (1982) suggested that the earliest pottery documented in the Northeast (Vinette I) was used in the seasonal production of nut oils, reporting the association of crushed hickory, butternut, and walnut with hearths and ceramic sherds. Extracting nut meat can be a slow and laborious process, especially for certain types of walnut, butternuts, and hickory nuts (Taché et al. 2008). An alternative means of obtaining the nutritional value of nuts is through rendering their oils. In terms of fat content, 1.2 gallons of oil (4 to 5 pounds) could be extracted from 100 pounds of hickory nuts; black walnut is higher in protein content

but lower in fat content, producing about 0.625 gallons of oil (2 pounds) per 100 pounds of whole nuts (Battle 1922:182).

Hickory was reportedly the most important nutmeat in use by American Indian populations at the time of European contact (Reidhead 1980), and hickory shell is not surprisingly the most common nutshell found at prehistoric archaeological sites in the eastern U.S (LeeDecker et al. 1991). The processing of hickory nuts has been documented in archaeological contexts at other regional sites, such as the Byram site, on the upper Delaware River (Kinsey 1975); 28ME-1 Area B, on the Abbott's Farm Complex, in New Jersey (Cavallo 1987); and at Lower Black's Eddy, on the Middle Delaware River (Kingsley et al. 1991).

At the Blackbird Creek site, the local environment along the creek during the Sub-Boreal climatic period would have provided a number of mast-bearing species, most notably oak and hickory and, to lesser extents, chestnut and beech. The group of features at the site may thus have coincided with a productive stand of mast-bearing trees that was visited seasonally. The round water-retentive pits may have served as soaking basins to soften the nuts prior to removing their shells or to boil the shelled and crushed nuts to render nut oil which would then be skimmed off and retained (Cavallo 1987).

Acorn processing is another possibility, since the nuts are common but require leaching to remove bitter tasting and sometimes poisonous tannin. That the round, flat-bottomed pits were used to leach acorns is unlikely though, since the process required that the nuts be finely ground and that water be poured through the resulting meal. While there are ethnographic accounts of acorn leaching being conducted in excavated pits, a key element of the procedure was coarse sandy soils with good drainage (Ojibwa 2011; Ortiz 1991), which was not in evidence in the Blackbird Creek features.

Gardner (1997) provided a contrary view on the efficiency of oil rendering, suggesting that the process would have been too time consuming during the short harvest season. Roasting nuts for storage would have been more economical, he argued, the nutmeat would have been easier to manage than heavy, bulky liquid, and less prone to spoilage. Yet, with better liquid storage technology available in the Early Woodland in the form of ceramic containers, nut oil production may not have been as costly or inconvenient as in earlier periods.

Possible artifact evidence of rendering nuts for oil was present at the Blackbird Creek site in the form of ceramic vessel fragments, thermally altered stone, and a number of groundstone tools including seven hammerstones, three abraders, a pestle, and an anvil recovered from the fill of the round, flat-bottomed pits. The ceramic vessel represented by the Dames Quarter fragments may have been used to hold or store the skimmed oil. While little charred nutshell was recovered from the features overall, most of the fragments that were present were from beech mast, which could indicate the exploitation of an isolated stand of beech, a mesophytic tree common in bottomland environments (Biohabitats 2007). Processing nut oil was thus considered among the more likely interpretations for the function of the features.

**Fish Oil Rendering**

Another function proposed for the round, flat-bottomed pits was the rendering of fish for oil content. Cavallo (1987) was one of the first in the Middle Atlantic region to propose rendering oil from anadromous fish as an interpretation for large processing features, based on investigations at the Area B Site at Abbott Farm. Following Northwest Coast ethnographic descriptions, Cavallo proposed that people harvested large numbers of fish during seasonal spawning runs, allowing the carcasses to partially decompose and break down the oil-rich flesh. The rotting material would be mixed with water in a large vessel such as a pit or dugout log and brought to boil through the addition of heated stones. Oil would be released to be skimmed off the surface and collected.

The Blackbird Creek site was ideally located for exploiting the spawning runs of anadromous fish such as blueback herring. The site is located astride the interface between High Coastal Plain terraces and the Low Coastal Plain. This topographic break forces the Blackbird Creek channel to down cut, creating a deep and narrow constriction. The presence of this minor scarp also directs numerous tributary streams, including Sandom Branch and Herring Run, to meet the reek just upstream from the site. The pronounced nature of the High Coastal Plain/Low Coastal Plain interface in the region makes it likely that the head of tide has remained in this location since at least the end of the Late Archaic, despite rising sea level. The archaeological site is situated at the head of tide of the creek: downstream, the creek widens into a tidal estuary; above the site, the creek and its immediate tributaries are gravelly, free flowing streams. As a relatively substantial third order stream, Blackbird Creek extends approximately 13 km inland from the SR 1 crossing to drain the Blackbird State Forest area. This portion of the Delaware Coastal Plain contains numerous Carolina bay "bay basins", with interior wetlands and surface springs common. Blackbird Creek's robust year round flow can be at least in part attributed to the presence of these hydrological features in and around its headwater reaches.

Historically, spawning blueback herring were abundant in local Delaware Bay tributaries. The species' favored spawning areas are the upper portions of streams and creeks and they will utilize streams only a few meters wide and a few centimeters deep (Fay et al. 1983, VDGIF 2011). Alewife can exploit similar habitat, and both species require hard or gravelly bottom for good spawning success. Well-oxygenated water is also a critical requirement. In contemporary times, herring continue to be taken in a variety of methods. However, the most traditional fishing method utilizes dip nets along stream constrictions (VDGIF 2011). The Blackbird Creek environs provide good spawning habitat for blueback herring and alewife including a gravelly bottom, strong flow and clear, oxygen-rich water. The site setting is also ideally suited for intercepting and harvesting these fish. The occupation overlooks the point where the fish would leave tidal waters through a channel constriction to pass over gravelly shallows before reaching various tributary forks of the stream.

Direct artifact evidence for fishing or fish processing was difficult to identify at the site. Cutting tools recovered from pit feature contexts consisted of a single biface and a single utilized flake. Weapons or hunting implements were not found in the features, while cobble tools from the features were of uncertain connection with fishing or fish processing.

Looking outside Delaware, Cavallo (1987) proposed that large thermally altered stone deposits uncovered at Area B of the Abbott Farm site complex near Trenton, New Jersey represented the material byproduct of intensive stone boiling activities, with the cooking and/or preservation of fish playing a prominent role. Cavallo cited Northwest Coast ethnographic sources in proposing that the local river herring group, namely shad, herring and alewife, were rendered on site utilizing stone boiling. Kraft (2001) similarly proposed that such activity may have occurred at Abbott Farm. Cavallo (1987), Stewart (1999), and others have also elaborated on Cross's (1956) early observations that the large ceramic vessels at the Abbott Farm site complex may have been used for storage, including fish and fish products.

Schindler (2006) investigated the feasibility of rendering anadromous fish in an experimental study that closely followed ethnographic descriptions of Northwest Coast Indians as described by Hillary Stewart (1977) and others. Schindler's efforts were part of his dissertation work on American Indian exploitation of migrating fish in the Delaware Valley. The interdisciplinary research project incorporated archaeological data, ethnographic sources, and extensive experimental and replication studies utilizing primitive technology and methods. The goal was to arrive at a fuller understanding of the importance of migratory fish exploitation in the Delaware Valley and the implications of this resource for American Indian subsistence, settlement, and material culture in the region.

Schindler's work demonstrated that a relatively small number of partially decomposed fish, in this case American shad, can yield high quality oil that can be stored on a long-term basis (Schindler 2006:235-241). In the experiment, nine American shad were placed in vegetation-lined pit, covered as protection from scavengers, and left to partially decompose in seasonable June weather conditions. After seven days, the remains were removed and placed in a hide-lined pit measuring 83-x-66 cm and 25 cm deep. Water was added and the mixture brought to a vigorous boil with eight fist-sized heated cobbles. After each of several heating cycles, oil was skimmed off. The process resulted in the recovery of 414 mm of oil, approximately 60 mm per fish. The oil appeared remarkably refined and was deemed fit for human consumption. Such a product would clearly have provided American Indians with a highly nutritious food supplement or condiment in what would have otherwise been a seasonally fat-poor diet. The oil's suitability as lamp fuel also proved to be excellent. A small amount of oil was placed in a natural depression on a river cobble and a twisted basswood wick added. The impromptu lamp burned for hours while consuming only a tablespoon of oil.

Schindler's work utilized American shad, which are larger than blueback herring or alewife and spawn in the deeper waters of large tributaries. It is unlikely that shad would have ventured above the tidal reaches of Blackbird Creek. However, as smaller but identical trophic level species, blueback herring and alewife would have been present in the stream large numbers. Like all river herring, these species are rich in oil content (Schindler 2006).

The dominance of sandstone and quartzite in the thermally altered stone assemblage appears to be consistent with the stone boiling/rendering scenario. Stone boiling replications have shown quartzite to be durable and resistant to thermal fracturing (Guernesy 1984). Sandstone

has been also been shown to very resilient to thermal shock, which is of obvious importance in boiling applications. However, sandstone can become friable with heating and thus may contaminate food being cooked (Guernesy 1984). In a rendering scenario, this would not pose a limitation as loosened grains or crumbled fragments would naturally separate out from the finished product.

In his replicative fish processing work Schindler employed Fox Creek-form blades as cutting implements. At the Blackbird Creek site, only a single biface was recovered from the round, flat-bottomed pits. However, formal cutting implements are not necessarily needed for dressing fish. Experimental work conducted by one of the current authors (Egghart) suggested that unmodified flakes could serve as highly efficient fish processing tools. An unmodified quartzite flake measuring approximately 5 cm in length and width was used to split and fillet a 1.5-kg American shad in a little over 90 seconds. The action resulted in no detectable wear on the flake edge, though the experiment was limited to a single fish. It is likely that given the very soft flesh and delicate skeletal material of the river herring group, even repeated use would result in little macro-wear on the cutting tool edge, particularly if flakes were used opportunistically and frequently discarded. Harvesting of fish adjacent to the site could also be expected to leave few durable artifact signatures, especially if dip nets or short stretches of gill net or simple weirs were employed.

The near impervious nature of the flat-bottomed pits at the Blackbird Creek site would have been well-suited for temporarily holding decomposing fish and for rendering their oils through indirect heating. The processes could have been undertaken sequentially in the same features or in steps in a series of pits. The distinctive spatial patterning exhibited by the flat-bottomed pits suggested the possibility of a step-wise process. As they were harvested over the course of the spawning season, fish or fish remains could have been added to one set of pits while boiling and rendering were conducted in other pits. Some of the features may also have been used for underground storage of the final product, utilizing ceramic vessels as containers.

### 7.3.4 Feature Patterning/Site Structure

The Blackbird Creek site exhibited distinctive structural elements that suggested the purposeful division of space and activity areas. Site structure was evidenced not by artifact distributions but rather through the patterning of the round, flat-bottomed pit features along the bluff-side terrace. The features appeared to have represented the main organized activity at the site. Evaluation and data recovery efforts failed to identify other artifact or feature distributions that could be tied to specific site components or occupations.

The only notable occurrence of cultural material outside of the pit feature context on the terrace was a distribution of thermally altered stone identified on the spur landform overlooking Blackbird Creek. These artifacts were investigated during the site evaluation through a series of 1-x-1 m units (Figure 7-13). No diagnostic artifacts were recovered from the spur that could link the thermally altered stone there to the nearby pit features. Nor was the rock dominated by sandstone as were the fragments in the pit feature contexts—the material distribution roughly mirrored that of cobble samples taken from the adjacent

Blackbird Creek bed. Thus, temporal or functional connections between the artifact concentration on the spur and the round, flat-bottomed pit features could not be made.

The most obvious aspect of the round, flat-bottomed pit distribution was their linear orientation along the bluff-side terrace (Figure 7-13, Figure 7-14). The 13 pits were aligned roughly southwest-northeast in an area that measured approximately 35-x-3 m. Spacing between the features ranged from 1-to-5 m, with one pair, Features 136 and 140, overlapping slightly (less than 10 cm). The maximum opening dimensions ranged from 70-to-100 cm, with a mean of 99 cm; depths ranged from 27-to-74 cm, with a mean 52 cm; volume ranged from 69-to-550 liters. At a minimum, the linear orientation corroborated evidence from diagnostic artifacts, absolute dates, and common morphological attributes underscoring the interpretation that the features were closely related and likely the product of occupation or reoccupation of the site by a single group of individuals. None of the features fully intersected, suggesting that they were either in use at the same time or that people returning to the site were aware of the locations when constructing new features.

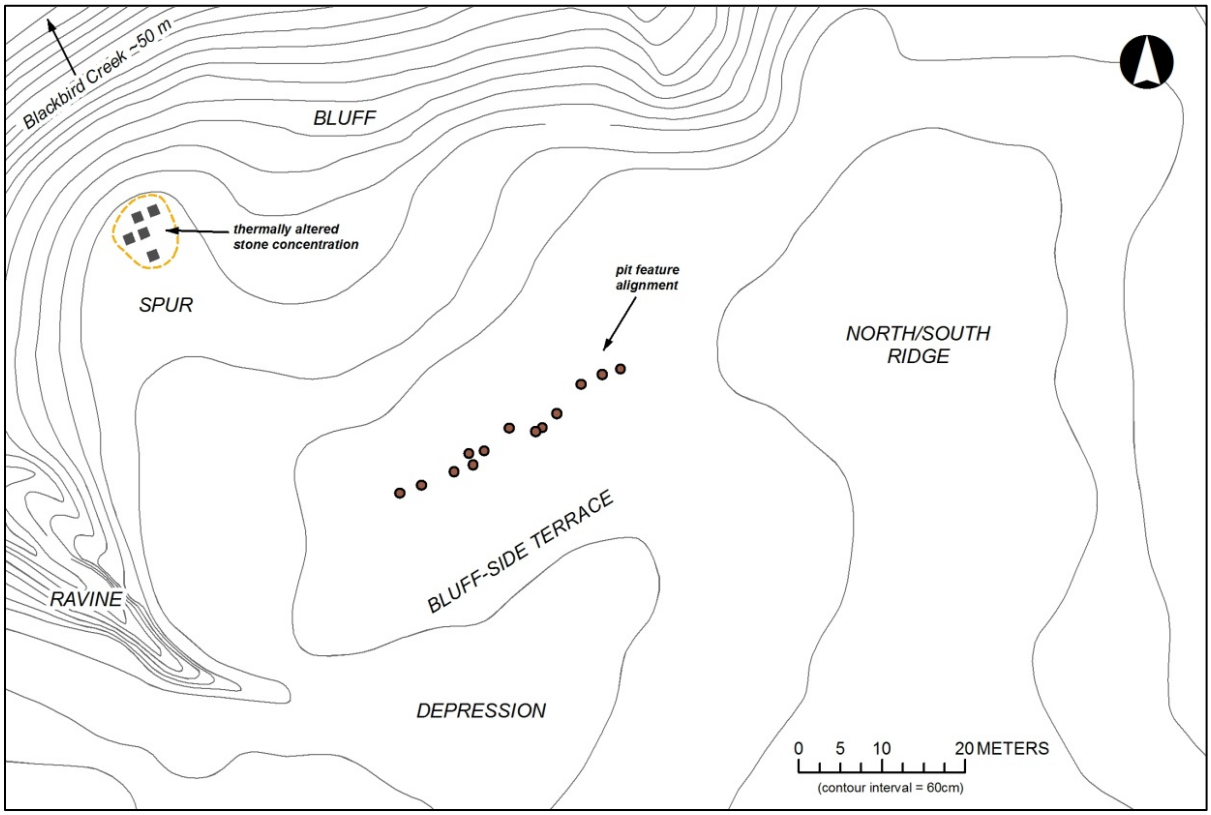



**Figure 7-13. Topographic Situation of the Round, Flat-Bottomed Pit Features.**

**Figure 7-14. View Southwest Showing Distribution of Round, Flat-Bottomed Pit Features.**
[Feature 52 in foreground]

The second unusual aspect of the features was their occurrence in the least well-drained soils on the site. In virtually all prehistoric site locations, occupations are centered in areas with positive soil drainage characteristics. By contrast, the pit locations at the Blackbird Creek site coincided with a localized area of dense and clayey subsoil. No features associated with the occupation were identified on the adjoining north-south ridge landform, despite this area having sandier soils and generally lying the same distance to presumed water sources—either the creek or the spring within the depression to the south of the occupation ridge. The lack of good subsurface drainage on the bluff-side terrace may in part account for the linear orientation of the pits. The terrace was not fully level but was shallowly sloped from east to west (opposite the flow of the creek). The terrace landform also exhibited a slight lateral crest running along its long axis, parallel to the bluff. From this lateral crest, elevations fell slightly toward the bluff edge as well as in the opposite direction toward the depression or springhead. The pits and the activity areas they represent roughly followed the lateral crest and this orientation may have been selected, in lieu of good infiltration and subsurface drainage, to take advantage of run-off during heavy precipitation.

The spatial distribution of the three sub-types also exhibited distinctive patterning (Figure 7-15). The two smaller, basin-shaped pits were located immediately adjacent to each other, flanked on either side by pairs of cylindrical-to-bell-shaped pits. The latter were regularly spaced roughly equidistant from the basin-shaped pits between them. Together the six features formed a cross-like pattern. One steep-sided, flat-bottomed pit occurred west of the

outermost cylindrical-to-bell-shaped pit. The remaining steep-sided, flat-bottomed pits occurred further to the east. A planned and purposeful division of space within the area was suggested by this arrangement, with hearth features represented by the small basins in the center, surrounded on either side by temporary storage features and processing pits located beyond the storage facilities, clustered on the eastern limits of the encampment.

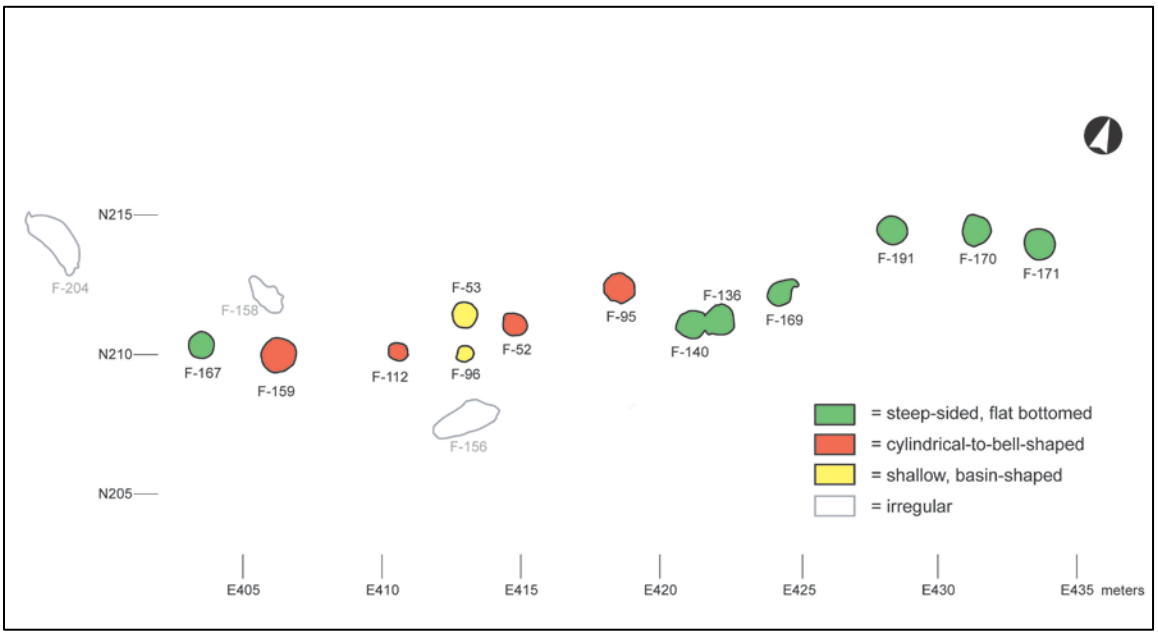



**Figure 7-15. Distribution of Round, Flat-Bottomed Pit Feature Sub-Types.**

## 7.4 Early Woodland Regional Comparisons and Summary Discussion

The following sections summarize regional sites containing major Early Woodland occupations for comparison with data from the Blackbird Creek site. Rather than providing a comprehensive listing of Early Woodland components, emphasis has been placed on discussing sites containing early ceramics and associated features or other sealed contexts. The intent is to gain better understanding of the Blackbird Creek site occupation through examination of the findings from similar site components throughout the region.

**Delaware**

Several significant Early Woodland site components have been studied in Delaware. Excavated sites with major Early Woodland occupations include the Delaware Park site (7NC-E-41) (Thomas 1981); the nearby Clyde Farm complex (Custer et al. 1986); Lums Pond (7NC-F-18) (Petragila et al. 1998); and Hickory Bluff (7K-C-411) (Petraglia et al. 1998, 2002).

***Delaware Park (Thomas 1981).*** The Delaware Park site yielded extensive evidence of Early Woodland occupation in the form of large pit features. The site was located in far northern New Castle County, along White Clay Creek, near the Piedmont-Coastal Plain interface. This Fall Line setting was centrally located between interior uplands and the extensive marsh

complexes common along the Inner Coastal Plain in that part of New Castle County. Radiocarbon assays were performed on 21 individual large pit features at the site, five of which returned Early Woodland period dates (Table 7-7).

**Table 7-7. Early Woodland Radiocarbon Dates from Features at the Delaware Park Site.**

| ***Feature*** | ***Description*** | ***Dimensions (l,w,d) (cm)*** | ***Volume (l)*** | ***Radiocarbon Date*** |
|---|---|---|---|---|
| F-139 | Oval; Vertical Side, Flat Bottom | 188-x-128-x-128 | 2,812 | 2375±60 BP |
| F-180 | Circular; Vertical Side, Flat Bottom | 110-x-110-x-66 | 749 | 2430±60 BP |
| F-46 | Circular; Vertical Side, Flat Bottom | 110-x-120-x-48 | 1,258 | 2680±575 BP |
| F-138 | Circular; Slope Side, Flat Bottom | 96-x-94-x-n/a | 2,590 | 2690±80 BP |
| F-130 | Irregular | 288-x-392-x-72 | 3,903 | 2740±65 BP |

Source: Thomas 1981: IX 135; IX 145-149

Early Woodland artifact densities were very light, both in pit feature contexts and across the site as a whole. Ceramic finds attributable to the Early Woodland occupation consisted of a small number of Vinette sherds. A single Rossville point was recovered from Feature 46, although the corresponding radiocarbon date from the feature had an associated sigma of 575 years, making an actual Early Woodland association less than certain. The large, cylindrical, flat-bottomed pits uncovered at Delaware Park were described as having an inverted silo shape and were interpreted as storage features. Large cylindrical pit features have subsequently been encountered on other Delaware sites, and the class of features has come to be known as "silo pits," in reference to their form and presumed use.

***Lums Pond (Petraglia et al. 1998).*** Additional examples of Early Woodland silo pits were documented at the Lums Pond site, also located in New Castle County. Nine cylindrical or silo-shaped pits were recorded at the site, described as having straight sides and relatively deep, flat bottoms. Volumes ranged between 272 and 806 liters. A set of five radiocarbon dates obtained from the features ranged from 2660±100 BP to 2960±60 BP, with all overlapping at the 2-sigma level. Relatively few artifacts were recovered from the features, despite their substantial volumes. The artifacts present consisted primarily of flaking debris and thermally altered stone. Stemmed projectile points and ceramic sherds were recovered from several of the silo pits from which dates were obtained. Of 22 sherds, 12 were tempered with crushed schist, the remainder were sand-tempered. Although small and eroded, the schist-tempered sherds were considered to conform to the definition of experimental wares and thus to be Early Woodland in date. A smaller, basin-shaped pit was also recorded among the larger silo-like features, and was thought to have had a thermal function. At both the Blackbird Creek and the Lums Pond sites, features presumed to thermal in use, serving heating/cooking/lighting purposes, were be seen as demarcating domestic areas that may have functioned in support of the processing and storage activities represented by the larger features. Despite the numbers and dimensions of the other apparently specialized pit features, the occurrence of a small number of shallow basin-shaped pits at these two sites suggested a relatively small group size.

***Hickory Bluff (Petraglia et al. 2002).*** The Hickory Bluff site was located in Kent County, along the St. Jones River within the Dover city limits. The site was repeatedly occupied over a long period spanning the second half of the Late Archaic through much of the Middle Woodland. Among the results of mitigation efforts at the site was the recovery of a large sample of Marcey Creek sherds. Of the nearly 4,200 identifiable ceramic sherds recovered at the site, approximately one quarter (n=1,068) consisted of Marcey Creek. Dames Quarter comprised a very small minority of 13 sherds. Despite the frequency of early ceramic sherds, few features of comparable age were identified. The large number of cultural components and repeated site visits at the Hickory Bluff site made establishing associations between the Marcey Creek ceramics and other artifacts problematic. For example, although a variety of point forms common in the northern Middle Atlantic and Northeast regions were present, including Lackawaxen (n=11), Poplar Island (n=4), Koens-Crispin (n=5), Bare Island (n=11), Teardrop (n=11), as well as Adena (n=7) and a generalized side notch form (n=7), none could be confidently linked to the Marcey Creek occupation. AMS dates obtained from what were considered reasonably secure contexts in association with Marcey Creek sherds included 2790±40 BP and 2660±40 BP.

***Puncheon Run (LeeDecker et al. 2005).*** Early ceramics were far less prevalent at the Puncheon Run site, located on the opposite bank of the St. Jones River from the Hickory Bluff site. Large scale mitigation efforts at the site encountered a single, heavily disturbed pit feature containing almost 100 Selden Island and Marcey Creek sherds. Little additional evidence of Early Woodland occupation at Puncheon Run was reported.

***Glasgow School (Bowen et al. 2003).*** An Early Woodland component also was present at the Glasgow School site (7NC-D-212). While ceramic sherds were considerably less frequent than at either the Puncheon Run or Hickory Bluff sites, with only five Early Woodland ceramic sherds (3 Marcey Creek, 2 Dames Quarter) recovered from nearly 200 square meters of excavation, two AMS dates (2980±40 BP and 3030±40 BP) were derived from charcoal associated with one of the Dames Quarter sherds in an unstratified, irregularly-shaped pit feature. The feature was also notable for 45 kg of thermally altered stone along with other artifacts that included an axe fragment, an abrader, and flaking debris from a variety of materials.

***Summary.*** Review of these Early Woodland occupations revealed some common themes as well as contrasting findings. A common attribute appeared to be location in proximity to zones rich in natural resources. The occupations were also centrally located among a variety of physiographic and environmental settings offering an array of resource opportunities. The Delaware Park, Lums Pond, and Glasgow School sites were located near the Fall Line, giving easy access to both Piedmont and Inner Coastal Plain resources. Similarly, the Blackbird Creek site was situated near settings that included interior uplands and tidal marshes. The Delaware Park and Blackbird Creek sites were also located near the head of tide of intermediate-size streams.

In terms of material culture traits, a common attribute in these Early Woodland occupations appears to have been a de-emphasis on bifacial tool manufacture, expressed not only in relatively sparse flaking debris assemblages, but also in markedly few projectile points. By

contrast, the occupations often contained substantial amounts of ceramics. Perhaps the most prominent manifestation of the Early Woodland in Delaware is the occurrence of large cylindrical pit features that were well constructed and typically excavated into coarse sandy subsoil that would have promoted good drainage. These features are typically interpreted as storage facilities. Less certain is what may have been stored in the pits, although processed plant resources such as nuts, acorns, or marsh tubers would seem likely commodities. Given their large size, ranging in volume for several hundred liters to more than 2,000 liters, utilization was likely on a communal scale in some cases.

A notably different pattern was encountered at the Hickory Bluff site, where Early Woodland silo pits were not identified. The primary material culture trace of the Early Woodland occupation at that site was the remarkably large number of Marcey Creek ceramic sherds. Early Woodland features, including thermally altered stone clusters and a small, rock-lined pit, appeared to have been associated with cooking activities rather than storage. The distinction between the Lums Pond/Delaware Park findings—large storage pits and low ceramic counts—and those of Hickory Bluff—cooking features and high ceramic counts—is open to interpretation. One possibility could be that the Delaware Park and Lums Pond sites, despite having large storage features, were not residential locations, but rather were specialized exploitive camps at which people processed food stuffs and cached them for later use. In contrast, the Hickory Bluff site with its riverine setting, extensive evidence for ceramic use, and cooking related features, may have represented a longer-term, more generalized occupation. Based on the amount of cultural evidence at the Blackbird Creek site and on the type and distribution of features present, the occupations there would seem to have more in common with locations at which people processed specific resources.

**Virginia**

Relatively few Early Woodland sites have been systematically excavated in Virginia. Two data recovery investigations that included major Early Woodland occupations within the state's Chesapeake Bay drainage were the Enfield Plantation site (44KW81) (Pullins et al. 1996) and the 522 Bridge site (44WR329) (McLearen 1991). The presence of Early Woodland features and other sealed contexts at each site allowed for detailed, component-specific analyses.

***Enfield Plantation (Pullins et al. 1996).*** The Enfield Plantation site is perhaps the only fully investigated Early Woodland occupation in the Virginia Coastal Plain. The site was located along the Mattaponi River, in King William County. Ceramic sherds accounted for 40 percent of the total number of artifacts recovered from the archaeological excavations. More than 76 percent of the sherds represented Early Woodland wares, with grog-tempered Croaker Landing sherds (n=839) as the overwhelmingly predominant type. Manufacture of ceramic vessels utilizing local clay appears to have been a major activity on this site. In addition to clusters of sherds interpreted as "pot drops," identified features consisted of small bowl shaped pits of undetermined function, as well as isolated post molds. Two apparently distinct Early Woodland cultural horizons were identified. The Early Woodland II horizon contained a large number of Croaker Landing ceramics, but only one point and one biface, the latter unfinished. The deeper Early Woodland I horizon also contained limited numbers of weapons/cutting tools, as well as few ceramics. Greater thermally altered stone counts in

the Early Woodland I horizon and the presence of faunal remains suggested a different activity focus than during the later Early Woodland II occupation. In sum, the Early Woodland site visits at Enfield Plantation were thought to have been short term and carried out by a relatively limited number of individuals.

***522 Bridge (McLearen 1991).*** The 522 Bridge site was located along the North Fork of the Shenandoah River at its confluence with the South Fork, in Front Royal. Extensive evidence of Early Woodland occupation at the site included numerous house outlines containing a repeated internal pattern of central hearths, doorway locations, large interior support posts, and formal storage facilities. Ceramics from the 522 Bridge site were predominantly Accokeek, with Marcey Creek and Ware Plain occurring as minority types. Four features directly associated with the structure patterns yielded conventional radiocarbon dates of 2740±150 BP, 2800±90 BP, 2930±100 BP, 2960±120 BP. All four dates overlap at the 1-sigma level with an uncorrected mean of 908 BC.

Despite the evidence for a long term occupation, artifact density at the 522 Bridge site was extremely light. In terms of overall numbers, the Early Woodland component at the site was virtually invisible until mechanical removal of plow zone sediments resulted in the exposure of well-preserved pit features. Consequently, almost all of the Early Woodland artifacts were from sealed subsurface feature contexts.

The Blackbird Creek site findings exhibited some distinct similarities to the 522 Bridge site. Both sites yielded high quality chronometric data for what is otherwise a relatively poorly understood period in regional prehistory. Common attributes among the artifact assemblages included: 1) an extremely light artifact density overall; 2) a high number of ceramic sherds relative to overall artifact counts; 3) low counts of flaking debris implying little evidence for lithic reduction; 4) a low occurrence of cutting tools and weapons; and 5) a high relative frequency of cobble tools. The frequency of cobble tools relative to total artifact counts at both sites strongly points toward plant food processing activities, including the hulling and grinding of seeds, nuts and acorns, or similar functions. This conclusion was endorsed by Errett Callahan in discussions pertaining to the cobble tool findings at the 522 Bridge site (in McLearen 1991:92).

Most of these attributes were expressed in the sealed Early Woodland II context at the Enfield Plantation site as well. The predominance of ceramic fragments and relative absence of weapons, cutting tools and flaking debris also clearly expressed. The only notable difference in the Enfield Plantation assemblage was a lack of formal cobble tools (Table 7-8).

Nearly two-thirds of the pit features identified at the 522 Bridge site were categorized as flat-bottomed. Although some of the pits were smaller than those at the Blackbird Creek site, there was clear repetition of form in the two locations. At the Blackbird Creek site, the cylindrical-to-bell-shaped subtype pits (Features 52, 95, 112, and 159) were similar to the Type I pits at the 522 Bridge site (McLearen 1991:28, 52-53). All three Type I pits at the 522 Bridge site were situated inside the north walls of structures. This location, together with their cylindrical-to-bell-shaped morphology, clearly implied that the features had been used for storage. Most of the remaining pits at the Blackbird Creek site, the steep-sided, flat-

bottomed subtype that included Features 170, 171, 191, bore strong similarities to those McLearen classified as Type II pits at the 522 Bridge site, described as "roughly rounded to heart-shaped or slightly ovoid with steeply sloping sides to somewhat irregular to flat bottoms." The dimensions of these pits corresponded closely with the similarly shaped pits at the Blackbird Creek site. Average opening dimensions of the Type II features at the 522 Bridge site was 110-x-98 cm, with most ranging between 100-x-128 cm, while similar features at the Blackbird Creek site averaged 99-x-93 cm. McLearen's Type II pits were interpreted as having served primarily a cooking function. As previously discussed, the steep-sided, flat-bottomed features at the Blackbird Creek likely functioned as processing pits for the rendering of fish or nut oil.

**Table 7-8. Summary of Artifacts from Early Woodland Contexts at the Blackbird Creek, 522 Bridge, and Enfield Plantation Sites.**

| ***Artifact*** | ***Blackbird*** | ***522 Bridge*** | ***Enfield EW II*** |
|---|---|---|---|
| early ceramics[1] | 95 | 166 | 40 |
| Early Woodland point | -- | 6 | 1 |
| biface | 1 | 6 | 1 |
| utilized flake | 1 | 3 | -- |
| flaking debris | 250 | 366 | 107 |
| core | 1 | 1 | 1 |
| cobble tool | 10 | 24 | -- |
| *non-thermally altered stone lithic subtotal* | *263* | *406* | *110* |
| thermally altered stone | 102 | 1,103 | 31 |
| Total | 460 | 1,675 | 181 |

[1]Typed specimens only; does not include small untyped fragments

Two of the pits at the Blackbird Creek site were somewhat anomalous. Features 53 and 96 were significantly smaller in diameter than the other round, flat-bottomed pit features and exhibited a shallow, more basin-like profile. At the 522 Bridge site, small, basin-shaped pits were interpreted as having been used for cooking rather than storage. A similar interpretation was proposed for small basins at Lums Pond. In size and form these pits also closely resembled the small pit features associated with the Croaker Landing occupation at the Enfield Plantation site.

In contrast, there were clear distinctions between the sites that may have been related to differences in the lengths of the occupation at each site. The 522 Bridge features yielded more than 10 times the number of thermally altered stone fragments than occurred in the round, flat-bottomed pits at the Blackbird Creek site and more than 30 times the number at the Enfield Plantation site. In addition, more bifacial tools and flaking debris were recovered at the 522 Bridge site than at either Blackbird Creek or Enfield Plantation. Both findings supported the interpretation of extended occupation at the 522 Bridge site that was initially evidenced by structure patterns.

**New Jersey/Middle Delaware Valley**

Perhaps the best known view of Early Woodland settlement in the Middle Delaware Valley comes from the Trenton Complex sites at Abbott Farm, located in and around the Fall Line (Wall et al. 1996a).

***Trenton Complex.*** Major sites of the Trenton Complex with Early Woodland components include the Shady Brook sites (28Me20 and 28Me99) and Gropps Lake site (28Me100G). These sites were located in interior or streamside locations beyond the immediate Delaware River floodplain. Delaware River floodplain sites containing Early Woodland occupations were the Area B site (Cavallo 1987), the Area D site (Wall et al. 1996b).

The Early Woodland occupation at the Gropps Lake site (Stewart 1987) was defined by limited numbers of amphibolite tempered ceramics in spatial association with Lackawaxen points. A radiocarbon date of 2650±150 BP was obtained from an adjacent feature. Lackawaxen points were also recovered at the Shady Brook site, and these specimens were suspected to have an Early Woodland association. A set of three Early Woodland radiocarbon results was obtained from the Area B site, dating an occupation floor that contained Fishtail points (Wall et al. 1996). Very limited numbers of early ceramic sherds, including an untyped steatite-tempered ware were present. At the Area D site, a series of thermally altered stone clusters was identified. Most of these features had Fishtail points in close spatial association. Thermally altered stone clusters dating to, or suspected to date the Early Woodland were also uncovered at the Area B site, together with flaking debris concentrations indicative of lithic reduction workshop locations (Wall et al. 1996).

The most common Early Woodland features identified at the Trenton Complex sites were thermally altered stone clusters. The features were interpreted as either hearth locations or as material residues of indirect heating activities such as stone boiling. The Area B site in particular contained large aggregations of thermally altered stone thought to represent deposits of spent heating stone. Large, formally constructed pits were not found at these sites, nor was there evidence for shelters or formal structures (Wall et al. 1996).

Early Woodland occupations at both of the interior Trenton Complex sites as well as in floodplain locations seemed to have had similar functions. Evidence from all the sites suggested they had been occupied for relatively short periods of time by small groups of individuals exploiting a range of local resources. The people occupying the Trenton Complex sites during the Terminal Archaic/Early Woodland were thought to have "continued to follow similar hunting/fishing/collecting patterns of earlier Late Archaic groups" (Wall et al. 1996: 157). These economic patterns were thought to be manifested in the same range of sites and site types across in the Delaware Valley region.

***Williamson.*** More recent excavations in Middle Delaware Valley have led to a somewhat different conclusion regarding local Early Woodland settlement and life ways, at least in major floodplain settings. The Williamson site (Hummer 1994) was situated along the Delaware River three kilometers north of Frenchtown, New Jersey. The site was positioned on a broad levee complex within the Delaware River floodplain. A major Early Woodland occupation level was extensively investigated at the site. The deposits were fully buried and

separated from evidence of earlier and more recent occupations by alluvial soils. Hummer (1994) characterized the Early Woodland occupation not as a short term visit but as a multi-seasonal base camp. Group size, however, was thought to be relatively small.

Features reported at the Williamson site consisted primarily of pits (n=24) and clusters of thermally altered stone (n=16). The pit features were relatively small, described as having basin or bowl shapes, and were thought to have been used for cooking or heating. Large, formally constructed storage pits were not encountered. The diagnostic artifact assemblage was characterized by ceramics that included Marcey Creek and a previously undescribed ware referred to as Williamson. Points associated with the Early Woodland occupation included a side-notched type with serrated blade labeled Hellgrammite, as well as several other untyped side- and corner-notched forms. A total of five radiocarbon samples from feature and living floor contexts returned somewhat disparate dates ranging between 1260 BC and 790 BC. Tool analysis suggested that a range of processing activities was undertaken onsite. Also evident was an overwhelming dominance of local stone for tool manufacture. Cobble tool forms at the site were interpreted as plant processing implements, and some of the larger cobble tools, such as pitted stones, were thought to have been purposefully left at the site for use during return visits. Nut and acorn remains were prominent in feature contexts, including one pit feature that contained nut and acorn remains together with an apparently cached cobble tool kit.

***Summary Discussion.*** Investigations at the Blackbird Creek site yielded significant new information on a relatively poorly understood period in Middle Atlantic prehistory that coincided with the introduction of ceramics to the region. Inherent to the study of the Early Woodland in the Middle Atlantic are numerous challenges. Not the least of these is a general lack of site components in many areas. In the Virginia Coastal Plain, Early Woodland sites appear to be rare, a phenomenon that has been discussed by numerous researchers (Bowden 2000; Egghart 2004; Fiedel 2001; Mouer 1991). West of the Fall Line, Early Woodland sites are more prevalent, and settlement seems strongly oriented to floodplain settings (Klein and Klatka 1991; Klein 2003; McLearen 1991; Mouer 1990, 1991). Perhaps not coincidentally, a riverine orientation has been observed in various other parts of the world in connection with the introduction and adoption of ceramics (Jordan and Zvelebil 2009; Rice 1999). While a potentially intriguing pattern, determining whether such an association was truly integral to the development or adoption to ceramic technology would require additional in-depth research.

Other researchers, notably Fiedel (2001), have taken the view of the settlement shifts and overall lack of site components during the Early Woodland period as evidence of a distinct cultural discontinuity. Fiedel suggested that the site distributions and material culture trends of the period were not merely a reorientation of settlement patterns but reflected severe cultural stress or even population collapse. The root causes for such stress, he proposed, may have included sudden climate change or even pre-Colombian epidemics. Additional data would be needed to support a theory of this nature, but extreme underlying cultural factors such as population collapse cannot be ruled out in explaining the differences observed between Late Archaic and Early Woodland material culture trends and settlement patterns.

Direct comparison of artifacts from secure Early Woodland contexts at the Blackbird Creek site and other major regional sites has revealed several informative patterns regarding how people used the landscape during this period. Foremost was the predominance of ceramic artifacts within what were otherwise relatively sparse material culture assemblages. Also common to the majority of site locations was the absence of lithic reduction debris and other evidence for bifacial tool manufacture and use. Weapons and formal cutting tools made from chipped stone were often extremely limited in frequency. These attributes were expressed across different physiographic settings, and across sites with varying occupation terms and apparently distinct site structures. The finding suggests that the similarities in material culture among the sites at least in part reflected broad-based commonalities in life ways, such as an increased emphasis on intensive foraging and plant processing, with the occurrence of formal, heavily used, and cached or curated cobble tools representing evidence for a greater reliance on plant resources than in earlier periods. Further, fishing and related activities may have become more important during the period than the hunting and game processing activities typically represented by Archaic period lithic artifact assemblages.

The common presence of flat-bottomed pit forms at many sites is also noteworthy. A direct, functional connection between flat-bottomed ceramics and flat-bottomed pits seems reasonable to assume. Were flat-bottomed pots such as Dames Quarter and Marcey Creek vessels to be stored for any length of time, pits with flat bases would be the most practical in order to avoid breakage and to maximize storage space. Presumably, this type of storage would have included preserving high value commodities, such as fish or nut oil, or storing the empty vessels themselves between site visits.

Another common regional attribute appeared to be limited group size—only small numbers of people are represented at these archaeological sites, a situation that seems to have been independent of occupation term. The Trenton Complex sites, for example, were interpreted as short term occupations by small groups of individuals. Likewise, the Williamson site, while interpreted as a long term base camp, also appeared to have been occupied by limited numbers of individuals. A relatively small group of people may also have been responsible for the archaeological remains at the Blackbird Creek site. While their length of stay was uncertain, the occupation was of sufficient duration to encompass the construction and use of large, formal pit features. The Delaware Park and Lums Pond site findings were similarly interpreted. Despite the construction of large formal pit features at these three Delaware sites, sparse artifact assemblages were documented. While reliance on a largely organic tool kit could result in a similar artifact signature, the tight and coherent clustering of pit features at the Blackbird Creek and Lums Pond sites pointed to small group sizes. The nature of the Early Woodland occupation of the Hickory Bluff site was more difficult to assess due to intermingled evidence from numerous additional temporal components. The very prominent occurrence of early ceramic vessels at that site could suggest large groups or extended period stays. However, the evidence was interpreted as the remains of numerous repeat occupations rather than a single large or extended occupation. In Virginia, house outlines from the Early Woodland occupation at the 522 Bridge site occurred immediately adjacent to each other without intersecting or overlapping, a pattern interpreted as evidence of rebuilding during seasonal reuse of the site and implying a limited number of site occupants.

The scarcity of Early Woodland site components seen in portions of Virginia and elsewhere is not clearly replicated in the Delaware coastal plain, where occupations from the period appear to be relatively common and show a strong orientation to resource-rich settings, be they mid-drainage areas of large streams or locations adjacent to marsh complexes. Site locations straddling topographic breaks along two or more distinct environmental zones are also well represented. Given that many Early Woodland site components in Delaware are in terrace settings, the sites tend to be surface manifestations, which may make them easier to identify archaeologically than buried components. Yet, overall the visibility of Early Woodland site components is greatly reduced by the apparent scarcity of lithic artifacts that they contain. At the Blackbird Creek site, the primary physical remains of the Early Woodland occupation consisted of subsurface features, as was the case at the Delaware Park site, the Lums Pond site, and other locations. It has been proposed that Early Woodland use of these sites may have been geared towards intensive foraging and perhaps fishing, subsistence strategies that would have relied heavily on non-durable material culture items such baskets, digging sticks, cordage, nets, or weirs, that do not preserve under prevailing archaeological site conditions.

As a final note, a methodological observation resulting from this review concerns the discovery of site components. Early Woodland period sites appear prominently in the archaeological record of the Delaware Coastal Plain, in contrast to the record in some other areas in the Middle Atlantic. The phenomenon could be attributed to the surface nature of major prehistoric sites in Delaware, making them easier to recognize. More importantly perhaps, wide-area plow zone soil stripping that is commonly practiced on DelDOT-sponsored excavations has likely resulted in the identification and study of numerous Early Woodland site components, such as at the Blackbird Creek site, that would otherwise have remained undiscovered had feature patterning not been exposed.

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