Appendix I

Cross-Section of a Closed Depression at the Pollack Site

by

James E. Pizzuto
Department of Geology
University of Delaware
Newark, Delaware 19716
May, 1994

INTRODUCTION

Small undrained depressions are a common feature of the Delmarva Peninsula (Daniels, 1993; Pizzuto, 1992; Rassmussen, 1958; Stolt and Rabenhorst, 1987; Webb et al., 1989). The origin of these landforms has been widely debated, and they are also important for locating archeological sites.

In May, 1991, an opportunity arose to examine the stratigraphic setting of one of these landforms in conjunction with archeological investigations of the Pollack Site. This presented a rare opportunity to observe the stratigraphy of an undrained depression in considerable detail. The investigation occurred on May 21, 1991, and the results obtained are described below.

METHODS

Archeologists of the University of Delaware Center for Archeological Research located the undrained depression on the northeastern edge of the Pollack Site. The area was surveyed and the topsoil was removed with a hydraulic scraper. Next, a trench was dug along a northwest-southeast transect of the depression. The trench was dug with a large backhoe; at its deepest extent, the trench was over 5 meters deep.

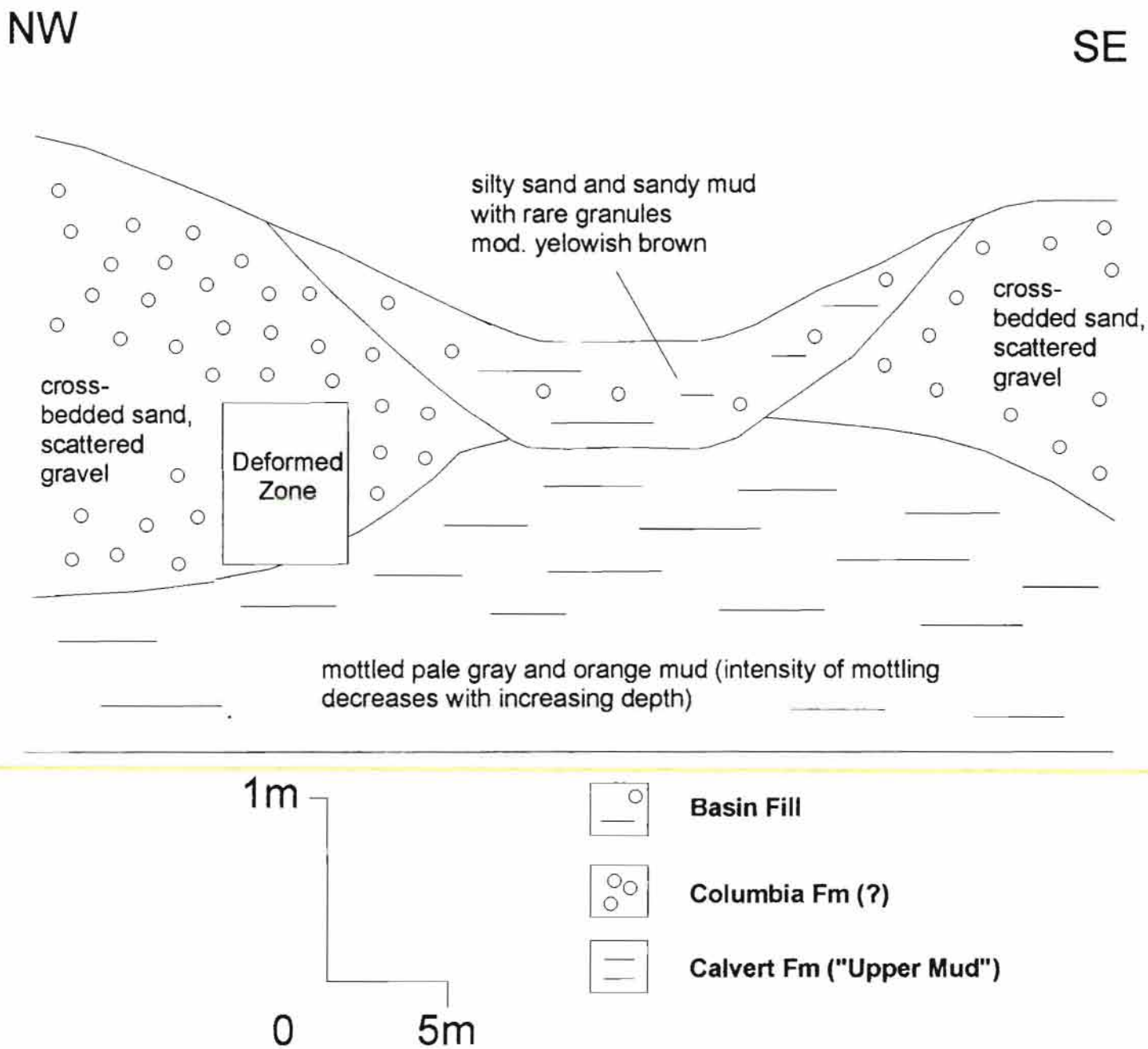
Stratigraphic units exposed in the trench were initially described visually by climbing into the trench. The texture of the sediments and any characteristic sedimentary structures were described in detail. Colors were defined using the GSA Rock Color Chart (Rock-Color Chart Committee, 1991).

As the trench became deeper, however, direct observations became impossible, as the steep sides of the trench presented a considerable safety hazard. Therefore, the stratigraphy of the trench was defined photographically. First, a tape was laid along one of the sides of the trench. Then, a well-marked stadia rod was lowered over the side of the trench along one of the trench walls. A photograph was taken of the section. This approach was repeated until the entire wall of the trench was photographed. This method allowed us to map the entire length of the trench. However, because of potential distortion of the photographs, the results lack precision. Furthermore, only the upper few meters of the wall of the trench could be observed and recorded using this method.

RESULTS

Three stratigraphic units were exposed in the wall of the trench (Figure 1). The lowest unit is a pale gray mud with orange mottles. The intensity of mottling decreases with increaing depth. These sediments represent the upper part of the Calvert Formation (Pickett and Benson, 1983), a unit which is localled referred to as the "Upper Mud", part of an informal division of the Calvert Formation in the area.

Figure 1. Cross-section of the basin.



APPENDIX I (cont.)

On the margins of the basin, the Calvert Formation is overlain by cross-bedded sands with scattered gravel. These sediments have been mapped in the area as part of the Columbia Formation (Pickett and Benson, 1983). However, recent geologic mapping to the south (Ramsey, 1993) has defined several units younger than the Columbia Formation which were deposited by the ancestral Delaware Bay. These formations occupy a similar topographic and physiographic setting to the cross-bedded sand and gravel encountered in the walls of the trench. Thus, detailed geologic mapping may indicate that these sediments are not part of the Columbia Formation, but rather are younger than the Columbia Formation. A likely correlative unit may be the Late Pleistocene Lynch Height Formation of Ramsey (1993).

In the center of the undrained depression, directly overlying both the mud and cross-bedded sand, is a silty sand and sandy mud with occasional granules. These sediments are deposits which filled the basin after it formed, thus, they postdate the other two units described above.

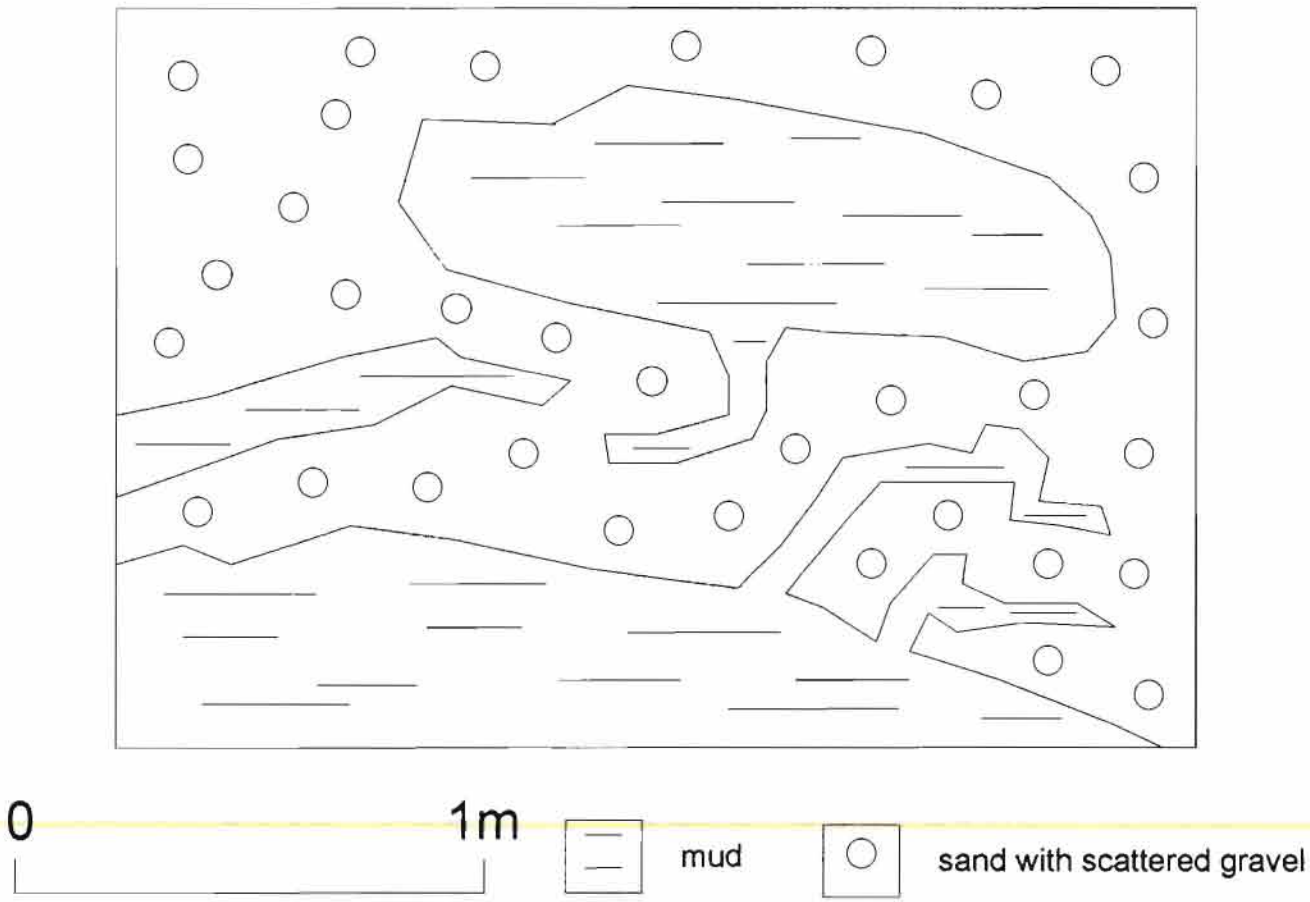
Several interesting features were also noted at the contact between the mud and the cross-bedded sand on the northwestern side of the trench (Figures 1 and 2). Here, the several stringers of mud extend into the sand; they are bent into long, thin, irregular laminae. A clast of mud about 1 m long is surrounded by sand and gravel; it appears as if this clast was once attached to a thin stringer of mud which enters the region from the left (Figure 2). However, the stringer has been separated (possibly 'torn') from the clast, and the two are presently completely separated by about 10 cm of sand.

DISCUSSION

The data presented above, though hardly definitive, do lead to some interesting conclusions regarding the geomorphic history of the basin, including observations regarding its age and origin.

Figure 1 provides little direct evidence of the age of the undrained depression, except that the stratigraphic relationships indicate that the basin is younger than the cross-bedded sand. If the cross-bedded sand unit is actually a correlative unit of the Lynch Heights Formation (Ramsey, 1993), then the basin is younger than 'Late Pleistocene'. This is consistent with several radiocarbon dates of 15,000 to 20,000 years B.P. obtained near the bases of fine-grained fill sampled in other basins elsewhere in Kent CO., Delaware (Pizzuto, 1992; Daniels, 1993; Webb et al., 1989).

The texture of the basin fill deposits indicates that the depression never held standing water for extended periods of time. This conclusion is based on the observation that muddy lacustrine basin fill facies were not observed in the trench. These facies have been described in several depressions elsewhere (Pizzuto, 1992; Daniels, 1993; Webb et al. 1989; Stolt and Rabenhorst, 1987).



Figrue 2. Sketch of deformed zone illustrated in Figure 1.

Apparently, the water was able to drain out the this particular depression more easily than out of others of the region (or, perhaps this particular depression occupies a different hydrogeological setting from those cited above).

Figure 1 provides few clues regarding the origin of the depression. The stratigraphic relationships indicate that the depression formed by erosion of the cross-bedded sand and gravel. The deformed zone on the northwestern side of the center of the basin (Figure 1) is intriguing, but such features have been commonly observed in the area (Ramsey, personal communication), and many of these deformational features are not associated with depressions. Thus, the deformation observed in the trench may not be associated in any way with the processes which formed the depression. The mound of the pale gray and orange mud under the center of the depression is unexpected and intriguing, but it too could be unrelated to the formation of the depression, as it may be much older than the depression itself.

The data presented here do provide enough evidence to discount at least two common theories for the origin of these features. Periglacial processes have occasionally been proposed to explain these depressions. Specifically, it has been proposed that these are fossil pingos. However, pingos should be associated with extensive large scale deformation. The well preserved sedimentary structures in the cross-bedded sand would probably have been destroyed or at least highly modified if these features were originally formed by the extensive frost heaving associated with the development of pingos.

It has also been suggested that these depressions formed by collapse following dissolution of underlying fossil-rich beds. However, the mounded configuration of the Calvert Formation under the center of the depression is inconsistent with collapse. It seems fairly certain that the depression formed through some erosional process which removed the cross-bedded sand from the center of the depression.

CONCLUSION

The stratigraphy of an undrained depression at the Pollack Site has been observed in a deep trench. The depression is underlain by three stratigraphic units, the Calvert Formation, the Columbia or Lynch Heights Formation, and a basin fill deposit. The depression formed by erosion of the overlying cross-bedded sand, possibly during the Late Pleistocene or early Holocene. This particular depression never held standing water for a significant period of time.

REFERENCES

Daniels, W.F., 1993, Late Quaternary geomorphic setting of archeological site 7K-C-107, Kent Co. Delaware. U. Of Del. M.S. Thesis, 139 p.

Pickett, T.E., and Benson, R.N., 1983, Geology of the Dover Area, Delaware Geological Survey Geologic Map Series #6.

Pizzuto, J.E., 1992, Paleogeomorphic history of archeological site 7K-C-360. Final Report submitted to the Univerity of Delaware Center for Archeological Research, 29 p.

Ramsey, K.W., 1993, Geologic Map of the Milford and Mispillion River Quadrangles. Delaware Geological Survey Geologic Map Series #8.

Rasmussen, W. C., 1958, Geology and hydrology of the "bays" and basins of Delaware. Ph.D. dissertation, Bryn Mawr College, Bryn Mawr, PA, 206 p.

Rock-Color Chart Committee, 1991, The Geological Society of America Rock-Color Chart, Geological Society of America, Boulder, CO

Stolt, M.H., and Rabenhorst, M.C., 1987, Carolina bays on the eastern shore of Maryland: II. Distribution and origin. Soil Science Society of America Journal. 51: 399-405.

Webb, R.S., Newby, P.C., and Webb, T. III, 1989, Palynology and paleohydrology of Delaware. Final Report submitted to the University of Delaware Center For Archeological Research, 45 p.

Appendix II

Killens Ware Type Description

Defining Criteria:	Temper - mix of finely crushed shell and rock. Exterior Surface Treatment - smoothed, corded, and smoothed-over corded.
General Description:	
Rim/Lip:	Rims range from everted through perpendicular to inverted; modifications include modelling and occasional appliques.
Rim Decoration Techniques:	Direct cord impression, incised impressions, pseudo-cord/cord-wrapped stick impressions.
Motifs:	Design motifs include the entire range of motifs described for Townsend and Minguannan wares (Griffith 1982; Custer 1989).
Exterior:	Cord-impressions cover the entire vessel when present, unless the they have been smoothed in rim areas of design applications. Mixes of smoothed and corded surfaces are not common below the rim, but some smoothing may not be complete and the original cord-marked impressions are sometimes partly visible.
Interior:	Predominantly smooth; many vessels seem to exhibit small striations, apparently resulting from the smoothing process.
Vessel Wall Thickness:	This attribute has not been systematically studied to date, although thicknesses are generally less than 5 mm.
Distribution:	In Delaware, Killens ceramics are most commonly found in the southern portion of New Castle County, south of the Appoquinimink River, and in Kent County. Similar north-south boundaries are also probably present on the Eastern Shore of Maryland.
Delaware Dates:	770 $\pm$ 170 B.P. Beta 42882 - Leipsic Site 530 $\pm$ 70 B.P. Beta 69339 - Pollack Site

APPENDIX III

GLOSSARY

Abrader - A rock that shows evidence of being used for the shaping of wood and bone implements.

Adze - An ax-like tool with a blade at right angles to the handle.

Aeolian - Carried by the wind.

Alluvium - Deposits of gravel, sand, and soil which are transported by flowing water.

Archaeology - The study of the people of the past through the recovery and analysis of the artifacts they left behind and their context.

Argillite - A metamorphic rock, intermediate between shale and slate, that does not possess true slaty cleavage.

Artifact - Any object shaped or modified by man, or as a result of human activity.

Assemblage - The array of contemporary objects and associations found at an archaeological site.

Atlatl - A throwing board or spearthrower, used in both the Old and New Worlds. The atlatl functions like an extension of the arm, providing more thrusting leverage.

Base Camp - A prehistoric dwelling site for hunter-gatherers from which resource procurement forays are made.

Battering Tool - A stone tool used for flint knapping such as a hammerstone, or for food processing.

Bay/Basin Feature - Also known as whale wallows, these shallow ponds, thought to have been formed during the end of the Pleistocene, represent a favored prehistoric settlement location.

Biface - A stone tool that has been flaked on both sides.

Boreal - The forest areas and tundras of the North Temperate Zone and Arctic region.

B. P. - Years before present, which has been standardized at A.D. 1950.

Cache - A collection of artifacts and/or ecofacts which have been deliberately stored for future use.

Catchment - The area surrounding a habitation site from which resources are obtained.

Celt - A prehistoric ax-like tool.

Chalcedony - A translucent to transparent milky or grayish silicate rock with distinctive microscopic crystals arranged in slender fibers in parallel bands.

Chert - A cryptocrystalline rock which occurs in siliceous rocks.

Cobble - Frequent lithic tool resource for prehistoric peoples.

Colluvium - A loose deposit of rock debris accumulated at the base of a cliff or slope.

Complex - An archaeological "complex" is a unit of time and space that had similar environments, prehistoric lifeways, artifacts, and features.

Contracting Stem Point - A point that has a stem with sides which come inward; opposite of flared point.

Core - A piece of stone from which other pieces of stone are flaked off to make artifacts.

Cortex -Weathered exterior of a piece of lithic material, may be either vein or water-worn cortex.

Coulbourn Ware - A Woodland I (400 B.C. - 100 B.C.) conoidal shaped ceramic of coiled construction tempered almost entirely with clay nodules or clay fragments whose exterior may be cord marked or net impressed.

Cretaceous Geologic Period - The third period of the Mesozoic Era characterized by the development of flowering plants and the disappearance of dinosaurs.

Cryptocrystalline - Indistinctly crystalline; having an indistinguishable crystalline structure (i.e., chert and jasper).

Culture - The nonbiological mechanism of human adaptation.

Curated Technology - When artifacts are reused and transported so often that they are rarely deposited in contexts which reflect their actual manufacture and use.

Dames Quarter Black Stone Tempered - A Woodland I (1200 B.C. - 700 B.C.) modeled and possibly coiled ceramic characterized by flat bottoms and tempered with crushed black hornblende or gneiss. Surfaces are usually smooth and occasionally the flat bases are mat impressed.

Datum - A fixed reference point from which all measurements are taken. A datum point can be either an existing landmark (such as a building, roadway, or tree) or a randomly established point.

Debitage - Waste material from the manufacture of stone tools.

Deciduous - Leaf bearing trees that shed in autumn.

Detritus - Particles of rock or other material worn or broken away from a mass, as by the action of water or glacial ice; any disintegrated material; debris.

APPENDIX III (cont.)

Diachronic - Referring to two or more reference points in time.

Diagnostic - Artifact with identifying traits that categorize the item to a specific time period.

Direct Percussion - Part of the lithic reduction process, a percussor is directly applied to the worked material with a sharp blow.

Discards - Stone tools which have been heavily resharpened and modified to be further utilized as tools.

Distal End - Reference to the pointed end of a projectile point.

Early Stage Biface Discard - A biface which was used as a tool early in its manufacturing/reduction stage, and then later discarded, usually due to extensive damage.

Early Stage Biface Reject - A biface that never passed beyond the initial steps of stone tool production due to either flaws in the raw material or manufacturing error.

Ecofact - The nonartifactual remains found in archaeological sites such as seeds, bones, and plant pollen.

Ecotone - An ecological community of mixed vegetation formed by the overlapping of adjoining communities.

Edaphic Factors - The factors in an environment which are due to the physical, chemical, and biological characteristics of the soil.

Estuary - The part of the wide lower course of a river where its current is met by the tides.

Extant - Still in existence.

Facie - A stratigraphic body distinguished from others by appearance or composition.

Fall Line - A transition zone from the Piedmont Uplands to the flatter Coastal Plain.

Feature - Any soil disturbance or discoloration that reflects human activity or an artifact that, being too large to remove from a site, normally is recorded only; for example, house, storage pits, etc. can also be a very dense collection of artifacts: for example, a lithic chipping feature.

Feldspar - Silicates of aluminum, containing sodium, potassium, calcium, or barium or combinations of these elements. Clay is the chief substance formed when weathering decomposes feldspars.

Fire-Cracked Rock - A rock that has fractured and/or discolored due to exposure to fire.

APPENDIX III (cont.)

Flake - A piece of waste material from the manufacture of stone tools, caused by percussion or pressure applied to the object by an external agent (e.g., hammerstone, antler pressure flaker); flake itself may be further utilized as a tool (see "Debitage").

Flotation - The use of fluid suspension to recover tiny plant and bone fragments from archaeological sites.

Fluvial - Produced by the action of flowing water.

Graminae - The plant family of grasses.

Geomorphology - The geologic study of the configuration and evolution of land forms.

Gorget - A perforated thin ground stone tool.

Graver - A lithic tool with a protruding edge or point.

Ground Stone Tool - A tool that has been produced by grinding or pecking.

Hammerstone - A rounded stone to be used as a hammer and which is sometimes grooved for hafting to a handle. Usually ungrooved, however, it has a variety of forms ranging from a crudely shaped sphere to a finely ground ovoid with a battered end.

Hell Island Ware - A Woodland I (A.D. 600 - A.D. 1000) conoidal shaped ceramic tempered with finely crushed quartz and mica inclusions, whose exterior surface may be fabric impressed or cord impressed.

Historical - The time period after the appearance of written records. In the New World, this generally refers to the time period after the beginning of European settlement at approximately 1600 A.D.

Holocene - The latest division of the Quarternary Period, which commenced around 12,000 B.P.

Hydrology - The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Hydrophyte - A plant that grows in and is adapted to an aquatic or very wet environment.

Illuviation - The deposition in an underlying soil layer of colloids, soluble salts, and mineral particles leached out of an overlying soil layer.

Indirect Percussion - In the lithic reduction process, a punch is held against the worked material and the punch is struck a sharp blow with a percussor.

APPENDIX III (cont.)

In Situ - In the original place.

Interface - A surface regarded as the common boundary of two bodies or spaces.

Ironstone - One of several kinds of iron ore with admixtures of silica and clay.

Jasper - An opaque variety of silicate rock, usually red, but also yellow, green, and grayish blue.

Laminae - A thin layer of sediment that is typically 0.05 to 1.0 mm thick.

Late Stage Biface Reject - A biface which was either broken during the later stages of manufacture, or which had been reduced improperly, so that further reduction would not produce a usable tool.

Limace - A small chisle-like stone tool for engraving bone. (Also called a "slug-shaped uniface").

Lithic - Pertaining to or consisting of stone.

Loam - A loose soil composed of roughly equal parts of silt, clay and sand, especially a kind containing organic matter and of great fertility.

Locus - A defined archaeological site or testing location.

Macro-band Base Camp - For a hunter-gatherer society, an archaeological site one hectare or larger in area characterized by a wide variety of tool types, abundant ceramics, semi-subterranean house structures, storage pit features, and abundant debitage from tool manufacture and reduction.

Marl - Soft and unconsolidated calcium carbonate, usually mixed with varying amounts of clay or other impurities.

Marcey Creek Plain - A Woodland I (1200 B.C. - 900 B.C.) ceramic tempered with crushed steatite characterized by flat-bottomed vessels made by modeling with lug handles sometimes used. The first true ceramics of Delaware.

Mean Ceramic Date - A date obtained from the study of historic ceramics recovered from a site that approximates the median occupation date of the site.

Mega Fauna - A number of species of presently extinct mammals including mammoths and mastodons.

Mesic Forest - A vegetation pattern characterized by relatively wet-adapted plant species, such as oak and hemlock forests.

Micro-band - A component of macro-band, perhaps one or two extended families, which periodically operates independently of the macro-band group.

Microenvironment - A characteristic biotic assemblage, often exploited by a distinctive ecological niche.

Midden - Refuse deposits resulting from human activities, generally consisting of soil, food remains such as animal bone and shell, and discarded artifacts.

Minguannan Ware - A Woodland II (A.D. 1000 - A.D. 1600) ceramic tempered with sand, grit, and crushed quartz whose surface treatment includes smoothed surfaces, corded surfaces, and smoothed-over-corded surfaces. Decorations include incising, cord-wrapped-stick, and direct cord impressions.

Mockley Ware - A Woodland I (A.D. 110 - A.D. 1000) conoidal shaped ceramic tempered with oyster shell or ribbed mussel whose exterior surface may be smoothed, cord marked, or net impressed.

Mottling - Spots or blotches of different color or shades of color interspersed with the dominant color.

Neritic - The waters and deposits of a shoreline.

Notched Point - Areas cut into a point which were used to bind the point to a shaft.

Palynology - The scientific study of spores and pollen.

Pedestrian Survey - The walking and collecting of an archaeological site without the excavation of subsurface units.

Pedogenic - Referring to the development of soils in place.

Physiographic Zone - Regions or areas that are characterized by a particular geography, geology, and topography.

Piedmont Region - An area of gently rolling to hilly land lying between the Appalachian Mountains and the Atlantic Coastal Plain. The division between the Piedmont Region and the Coastal Plain is marked by the Fall Line.

Pleistocene - A division of the geologic Quarternary Period, which began around 2.3 to 3 million years ago and is associated with rapid hominid evolution from Australopithecinae to *Homo sapiens sapiens*.

Plow Zone - In a plowed field, the upper layer of organic soil which is continually reworked by the plow. In the Middle Atlantic region this is about 8-12 inches thick.

Post Hole - A hole dug in the ground into which a post is placed.

Post Mold - The organic stain in the ground which is left by a decayed wooden post. A post mold stain may occur inside of a post hole stain on an archaeological site.

Prehistoric - The time period before the appearance of written records. In the New World this generally refers to indigenous, pre-Contact societies.

Primary Lithic Resource - Outcrops of workable stone that are found within the matrix of their original formation.

Procurement Site - A place that is visited because there is a particular item to acquire; i.e., lithic outcrops.

Projectile Point - Strictly speaking, a biface attached to the head of an airborne item of weaponry, like an arrow or a thrown dart; frequently used indiscriminately when referring to any biface.

Pseudo-cord - Method of impressing designs in ceramics by use of a cord-wrapped stick.

Quarry Site - A site located at either a primary or secondary outcrop of high-quality lithic material used in the manufacture of stone tools.

Quarry Reduction Station - A place where material obtained from a quarry site such as large flakes, cores and very early stage bifaces were taken for further reduction into smaller primary-thinned bifaces.

Quartz - A mineral consisting of silicon dioxide. It may be transparent, translucent or opaque; it may be colorless or colored. Varieties are classified as crystalline, cryptocrystalline, and clastic.

Quartzite - A consolidated rock composed of firmly cemented quartz grains. Usually it is white, light gray, yellowish, or light brown but it is sometimes colored blue, green, purple, or black by included minerals.

Ranked Society - A society in which there is unequal access to the higher status categories; many people who are qualified for high status positions are unable to achieve them.

Rejects - Stone tools which have been thrown away due to manufacturing or material flaws.

Secondary Lithic Resource - Cobbles and boulders of variable size that have been removed from the matrix of their original formation, transported by alluvial or glacial agents, and redeposited at a new location which may be quite distant from their original source.

Selden Island Ware - A Woodland I (1000 B.C. - 700 B.C.) ceramic of modeled or coiled construction with round or flat bases. The flat bases are associated with modeled vessels and the round bases are associated with coiled vessels. Cord impressed exteriors are common and the temper is steatite.

APPENDIX III (cont.)

Sherd - A piece of broken pottery.

Site - A space of ground containing evidence of human occupation that archaeologists select for their dig.

Soapstone - Steatite, a soft material that was carved with stone tools to produce stone bowls etc.

Soil Horizon - Soils are divided in 3 horizons, which reflect different kinds of chemical and physical processes that have resulted from changing climatic conditions.

Spokeshave - A stone tool with a semicircular concavity used for smoothing spears or arrowshafts.

Staging Site - A temporary camp where preparations are made for another operation such as a hunting foray.

Stemmed Point - A point that has an obvious area which was used to bind or haft a point to a shaft.

Stratigraphy - The examination of the soil layering on an archaeological site; the characteristics of each individual stratum and its relationship to others in the sequence is critical to understanding the temporal and spatial characteristics of the site.

Strata - The various layers of human or geological origin which comprise archaeological sites.

Subsoil - Sterile, naturally occurring soils not changed by human occupation.

Subsurface - Below the surface, not visible from the surface.

Surface Collection - Act of walking along a surface such as an open field or plowed field, and collecting artifacts seen on the surface of the ground.

Susquehannock Indians - Iroquoian people living along the lower reaches of the Susquehanna River.

Synchronic - Referring to a single period in time.

Temper - The foreign material introduced into clay to keep pottery from cracking when fired; also known as "grog".

Tertiary Geologic Period - The first period of the Cenozoic Era, extending from the Cretaceous period of the Mesozoic Era to the Quaternary Period of the Cenozoic Era, characterized by the appearance of modern flora and of apes and other large mammals.

Tool Kit - A collection of artifacts from a sealed context within a site interpreted as being designed for a specific function.

APPENDIX III (cont.)

Townsend Ware - A Woodland II (A.D. 1000 - A.D. 1650) ceramic tempered with crushed shell with fabric-impressed exterior surfaces. Decorations include incising, cord-wrapped stick and direct cord designs.

Transect - A single strip of land crossing an area possibly containing an archaeological site. Archaeologists may search a transect rather than survey the whole area.

Transect Sampling - A means of archaeological research design in which the sampling element is a square or rectangular grid.

Transverse Fracture - A break which is directed horizontal to the vertical axis of a point.

Topography - The surface physical features and configuration of land.

Uniface - A stone tool that has been flaked only on one side.

Ware Plain - A Woodland I (1200 B.C. - 900 B.C.) ceramic tempered with crushed sand or quartz characterized by flat-bottomed vessels with lug handles and resembling Marcey Creek vessels.

Wolfe Neck Ware - A Woodland I (700 B.C. - 400 B.C.) conoidal shaped ceramic tempered with crushed quartz whose exterior surface may be cord marked or net impressed.

Xeric Forest - A vegetation pattern characterized by relatively dry-adapted plant species, such as grasslands and forests of oak and hickory.

Xerophyte - A plant that grows in arid conditions.

Delaware Department of Transportation's Cultural Resource Bibliography for the State Route 1 Corridor

Custer, Jay F., Patricia Jehle, Thomas Klatka, and Timothy Eveleigh

1984 **A Cultural Resources Reconnaissance Planning Study of the Proposed Rt. 13 Relief Corridor, New Castle and Kent Counties, Delaware.** Delaware Department of Transportation Archaeology Series No. 30. Dover.

Custer, Jay F., and Kevin W. Cunningham, editors

1986 **Cultural Resources of the Proposed Route 13 Corridor: An Overview Prepared for the Draft Environmental Impact Statement.** Delaware Department of Transportation Archaeology Series No. 40. Dover.

Custer, Jay F., and David C. Bachman

1986 **An Archaeological Planning Survey of Selected Portions of the Proposed Route 13 Corridor, New Castle County, Delaware.** Delaware Department of Transportation Archaeology Series No. 44. Dover.

Custer, Jay F., David C. Bachman, and David J. Grettler

1986 **An Archaeological Planning Survey of Selected Portions of the Proposed Route 13 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 45. Dover.

1987 **Phase I/II Archaeological Research Plan, U.S. Route 13 Relief Route, Kent and New Castle Counties, Delaware.** Delaware Department of Transportation Archaeology Series No. 54. Dover.

Benenson, Carol A., and Mark A. Bower

1987 **Architectural Investigation of the U.S. Route 13 Relief Route Route 7 to U.S. Route 113, New Castle and Kent Counties, Delaware.** Delaware Department of Transportation Archaeology Series No. 55. Dover.

Bachman, David C., David J. Grettler, and Jay F. Custer

1988 **Phase I Archaeological Survey of the Early Action Segment of the Route 13 Corridor, Delaware**. Delaware Department of Transportation Archaeology Series No. 69. Dover.

Hodny, Jay, David C. Bachman, and Jay F. Custer

1988 **Phase I Archaeological Survey of the Chesapeake and Delaware Canal Section, Odessa Segment, of the U.S. Route 13 Corridor, New Castle County, Delaware.** Delaware Department of Transportation Archaeology Series No. 73. Dover.

Bachman, David C., and Wade P. Catts

1990 **Final Archaeological Investigations of the Lafferty Lane Cemetery 7K-D-111, State Route 1 Relief Corridor, Dover, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 80. Dover.

Grettler, David J., David C. Bachman, Jay F. Custer, and JoAnn Jamison

1991 **Phase II Archaeological Survey of All Historic Sites in the Early Action Segment of the State Route 1 Relief Route, Delaware**. Delaware Department of Transportation Archaeology Series No. 87. Dover.

1991 **Phase I and II Archaeological Survey of Kent Road 88 (Dover to Leipsic Road) and Kent Road 337 (Persimmon Tree Lane) Realignments, and Final Archaeological Excavations at the W. Eager Site for the Delaware Route 1 - Relief Corridor, Dover, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 90. Dover.

De Cunzo, Lu Ann, Angela Hoseth, Jay Hodny, JoAnn E. Jamison, Wade P. Catts, and David C. Bachman

1992 **Final Archaeological Investigations at the John Darrach Store Site, Delaware Route 6-Woodland Beach Road, Smyrna Section, Delaware Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 93. Dover.

Riley, Lynn, David C. Bachman, Glen Mellin, JoAnn E. Jamison, Barbara Hsiao Silber, Jay F. Custer, and David J. Grettler

1994 **Phase II Archaeological Excavation of all Prehistoric Sites in the Early Action Segment of the Delaware Route 1 Corridor, New Castle and Kent Counties, Delaware.** Delaware Department of Transportation Archaeology Series No. 101. Dover.

Kellogg, Douglas C., Robert Varisco, David J. Grettler, and Jay F. Custer

1994 **Phase II Archaeological Discoveries in the Chesapeake and Delaware Canal Section of the State Route 1 Corridor, New Castle County, Delaware.** Delaware Department of Transportation Archaeology Series No. 102. Dover.

Riley, Lynn, Scott C. Watson, and Jay F. Custer

1994 **Final Archaeological Investigations at Prehistoric Sites 7K-C-360 and Dover Downs (7K-C-365A and B), State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 105. Dover.

Scholl, Michael D., Angela Hoseth, and David J. Grettler

1994 **Transportation and Agricultural Changes in Blackbird Hundred: Final Archaeological Investigations at the Buchanan-Savin Farmstead, State Route 1 Corridor, Green Spring, New Castle County, Delaware.** Delaware Department of Transportation Archaeology Series No. 106. Dover.

(Continued on back cover)

Delaware Department of Transportation's Cultural Resource Bibliography for the State Route 1 Corridor

Grettler, David J., Brian H. Seidel, and Jack F. Kraft

1994 **Phase I and II Archaeological Survey of Five Proposed Borrow Pits and Wetland Replacement Areas for the State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 111. Dover.

Koski-Karell, Daniel

1994 **Discoveries and Site Evaluations: Underwater Archeological Investigations of Three Bridge Project Areas for the DE Route 1 Corridor, Kent County, DE.** Delaware Department of Transportation Archeology Series No. 112. Dover.

Kellogg, Douglas C., and Jay F. Custer, editors

1994 **Paleoenvironmental Studies of the State Route 1 Corridor: Contexts for Prehistoric Settlement, New Castle and Kent Counties, Delaware.** Delaware Department of Transportation Archaeology Series No. 114. Dover.

Custer, Jay F., Lynn Riley, and Glen Mellin

1994 **Final Archaeological Excavations at the Leipsic Site (7K-C-194A), State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 118. Dover.

Catts, Wade P., Jay F. Custer, JoAnn E. Jamison, Michael D. Scholl, and Karen Iplenski

1994 **Final Archaeological Investigations at the William Strickland Plantation Site (7K-A-117), A Mid-Eighteenth Century Farmstead, State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 119. Dover.

Custer, Jay F., and Barbara Hsiao Silber

1994 **Final Archaeological Investigations at the Snapp Prehistoric Site, (7NC-G-101), State Route 1 Corridor, Chesapeake and Delaware Canal Section, New Castle County, Delaware.** Delaware Department of Transportation Archaeology Series No. 122. Dover.

Grettler, David J., George L. Miller, Wade P. Catts, Keith Doms, Mara Guttman, Karen Iplenski, Angela Hoseth, Jay Hodny, and Jay F. Custer

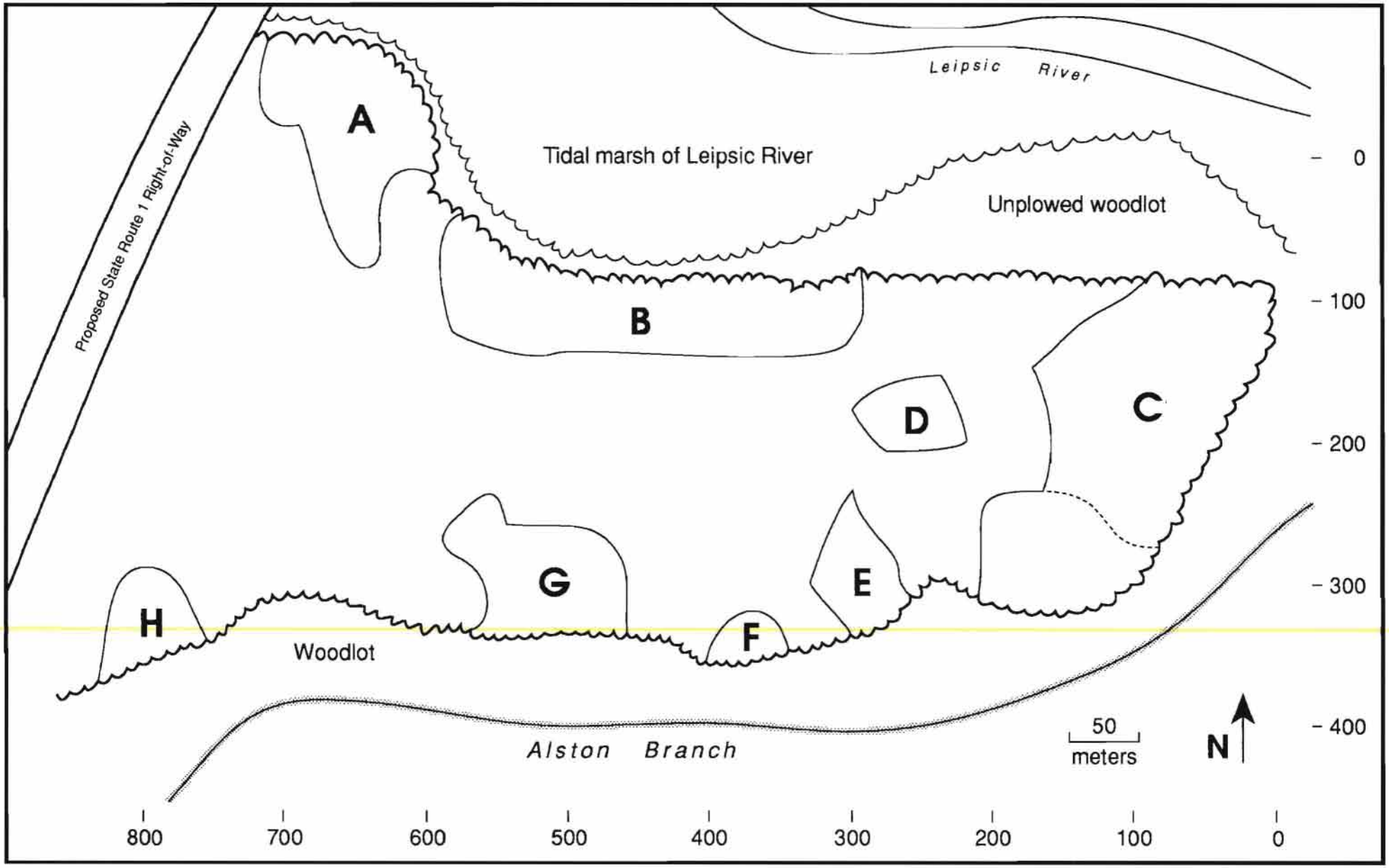
1994 **Marginal Farms on the Edge of Town: Final Archaeological Investigations at the Moor-Taylor, Benjamin Wynn (Lewis-E), and Wilson-Lewis Farmsteads, State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 124. Dover.

Jamison, JoAnn E., Jack Kraft, Rebecca Tinsman, Karen Iplenski, Keith Doms, David J. Grettler, Colleen DeSantis Leithren, and Jay F. Custer

1994 **The Archaeology of Nineteenth Century Agricultural Change: Final Excavations at the C. Kimmey Tenant Farm Site, State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 125. Dover.

Custer, Jay F., Angela Hoseth, Barbara Hsiao Silber, David J. Grettler, and Glen Mellin

1994 **Final Archaeological Investigations at the Pollack Prehistoric Site (7K-C-203), State Route 1 Corridor, Kent County, Delaware.** Delaware Department of Transportation Archaeology Series No. 126. Dover.

ATTACHMENT II

Areas of Artifact Concentrations