INTRODUCTION

This report describes the results of Phase III data recovery excavations at the Carey Farm (7K-D-3) and Island Farm (7K-C-13) prehistoric archaeological sites in central Kent County, Delaware (Figures 1 and 2, Plates 1 and 2). The two sites are described in this single report because they form a relatively continuous distribution of prehistoric artifacts and pit features that spans a distance of nearly 1.5 kilometers (almost one mile) along the east bank of the St. Jones River just south of the city of Dover (Figure 2, Plates 1 and 2). The Carey Farm Site had been the focus of some test excavations during the 1970s. Based on the rich deposits of artifacts and pit features recovered during these excavations, the site was nominated and listed on the National Register of Historic Places. The Island Farm Site was known primarily from surface collections, but was thought to have the potential to be as significant as Carey Farm.

A program of initial intensive testing of both sites was begun as early as 1985 when it became clear that the sites would be adversely affected by the construction in the new State Route 1 Corridor. The site survey and testing were carried out for the Delaware Department of Transportation by the University of Delaware Center for Archaeological Research to fulfill obligations under Section 106 of the Historic Preservation Act. Testing at both sites revealed that they contained intact archaeological pit features and abundant artifacts dating from many different time periods of Delaware's prehistory. Some of the pit features were identified as prehistoric pit houses, and both sites clearly had the potential to contribute important data for the study of prehistoric lifeways in Delaware.

When it became clear that both sites would be destroyed by road construction and borrow pit excavations, Phase III data recovery excavations were initiated. These excavations took place between June 1991 and February 1992. Data analysis and report preparation took place between March 1992 and May 1995. This report describes data from all stages of archaeological research at both sites.

Environmental Setting

The Carey Farm and Island Farm sites are located on the east bank of the St. Jones River, a tidal tributary of the Delaware River that drains much of central Kent County, Delaware. Both sites are located in the Low Coastal Plain physiographic province (Figure 3) which is underlain by sands of the Columbia Formation which have been extensively reworked by alluvial and aeolian erosion into a very flat and relatively featureless landscape (Delaware Geological Survey 1976). Elevation differences range up to 10 meters (30 feet) and these small differences are moderated by long and gradual slopes. River systems are tidal through most of their middle and lower reaches with extensive marshes found along their fringes, as is the St. Jones River in the vicinity of the study area. These riverine systems combine a wide variety of environmental settings and resources, and would have been especially attractive areas for human settlement in prehistoric times. Most of the interior areas of the Low Coastal Plain are well drained; however, there are some extensive freshwater wetlands in the interior.

PLATE 3

Marshes Along the St. Jones River Near the Carey Farm Site

The Carey Farm and Island Farm sites are located in the Mid-Drainage Zone (Figure 3), one of six physiographic zones of archaeological significance that have been defined for Delaware's Coastal Plain (Custer 1986a:13-17). Since the end of the Ice Ages 12,000 years ago, many of the physiographic zones have been subjected to extensive landscape changes. The most significant of these changes is sea-level rise. Kraft et al. (1976) note that sea-level rise along the Atlantic Coast during the past 12,000 years has transformed the Delaware River of 10,000 B.C. into the current drowned estuary. These landscape changes have been most prevalent in the eastern half of the Mid-Drainage Zone and the Delaware Shore Zone (Figure 3). A more detailed discussion of the effects of sea-level rise on the immediate environs of the Island Farm and Carey Farm sites is presented later in this section.

The Mid-Drainage Zone includes the central portions of all the Low Coastal Plain tributaries of the Delaware River (Figure 4), and these tributaries are fresh throughout the inland portion of the zone. Some tidal marshes and poorly-drained floodplains are found along the major drainages (e.g., Figure 2, Plate 3). Well-drained soils are found on the upper terraces of the drainages and on isolated headlands between the major drainages and their tributaries. The extensive combination of brackish and freshwater resources makes this zone one of the richest in Delaware for prehistoric hunters and gatherers.

PLATE 4

Wild Rice

The Carey Farm and Island Farm sites are located near the confluence of the St. Jones River and Isaac Branch. The course of the St. Jones River at this location is rather convoluted with several loops in the river surrounding isolated islands of wetlands (Figure 2). Some of these current features of the river are the result of modern deposition of soils that were eroded from adjacent agricultural fields after the advent of intensive agriculture in the St. Jones River drainage. Nonetheless, the extensive wetlands in the vicinity of the site were probably present at varied time intervals during the prehistoric past. The current marsh in the vicinity of the Island Farm and Carey Farm sites is classified by Daiber et al. (1976) as a "Transition Marsh" which contains plant species such as salt-marsh cordgrass, big cordgrass, giant reed grass, cattail, wild rice (Plate 4), marsh mallow, and numerous others. The varied composition of this marsh offers excellent conditions for wildlife food stocks, shelter, and nesting. The presence of edible plants such as wild rice, and the attractiveness of the marsh for animal food sources, not to mention fish and shellfish, makes the area especially attractive for human habitation.

Although not now present in the waters of the St. Jones River in the study area due to siltation, pollution, and parasitic diseases, oysters (Crassostrea virginica) were present during historical times (Maurer and Watling 1973) and were probably also present during the later prehistoric time periods. Salinity and temperature conditions in the river are well within the tolerance range of oysters (Daiber et al. 1976:429). Various fish species are present in the St. Jones River and were even more numerous in the past. Especially important were anadromous fish such as shad, alewife, herring, and sturgeon, which spend most of their life in salt water and return to freshwater, such as the upper St. Jones drainage, to spawn in the spring. Local historical records attest to these local fisheries' importance. For example, during the nineteenth century, the owner of the land that includes the Island Farm Site constructed a dam-like fish trap, called a weir, in the river. When upstream neighbors complained about the depletion of their anadromous fish catch, the weir's owner then mounted a small cannon near the weir to protect it (see discussion in Jamison et al. 1994). This dispute over the fish trap attests to the richness of fish resources in the St. Jones drainage.

The soils of the Island Farm and Carey Farm sites are all classified within the Sassafras series (Matthews and Ireland 1971). These soils, which had been farmed up to the time of the archaeological studies of the sites, are rather well drained. They are also subject to erosion, which was extensive in some site areas. Sassafras soils have developed in place from local Pleistocene deposits and there is no chance for buried landscapes to occur within them, unless aeolian erosion and deposition acted in the past to bury prehistoric landscapes. Such erosion and deposition have been documented for numerous locations on the Delmarva Peninsula (Foss et al. 1978; Ward and Bachman 1987; Custer and Watson 1987) and may have occurred within the study area. However, it is unlikely that any prehistoric landscapes in the study area were buried deeply enough by aeolian processes to escape post-depositional disturbance by plowing or erosion.

Paleoenvironments

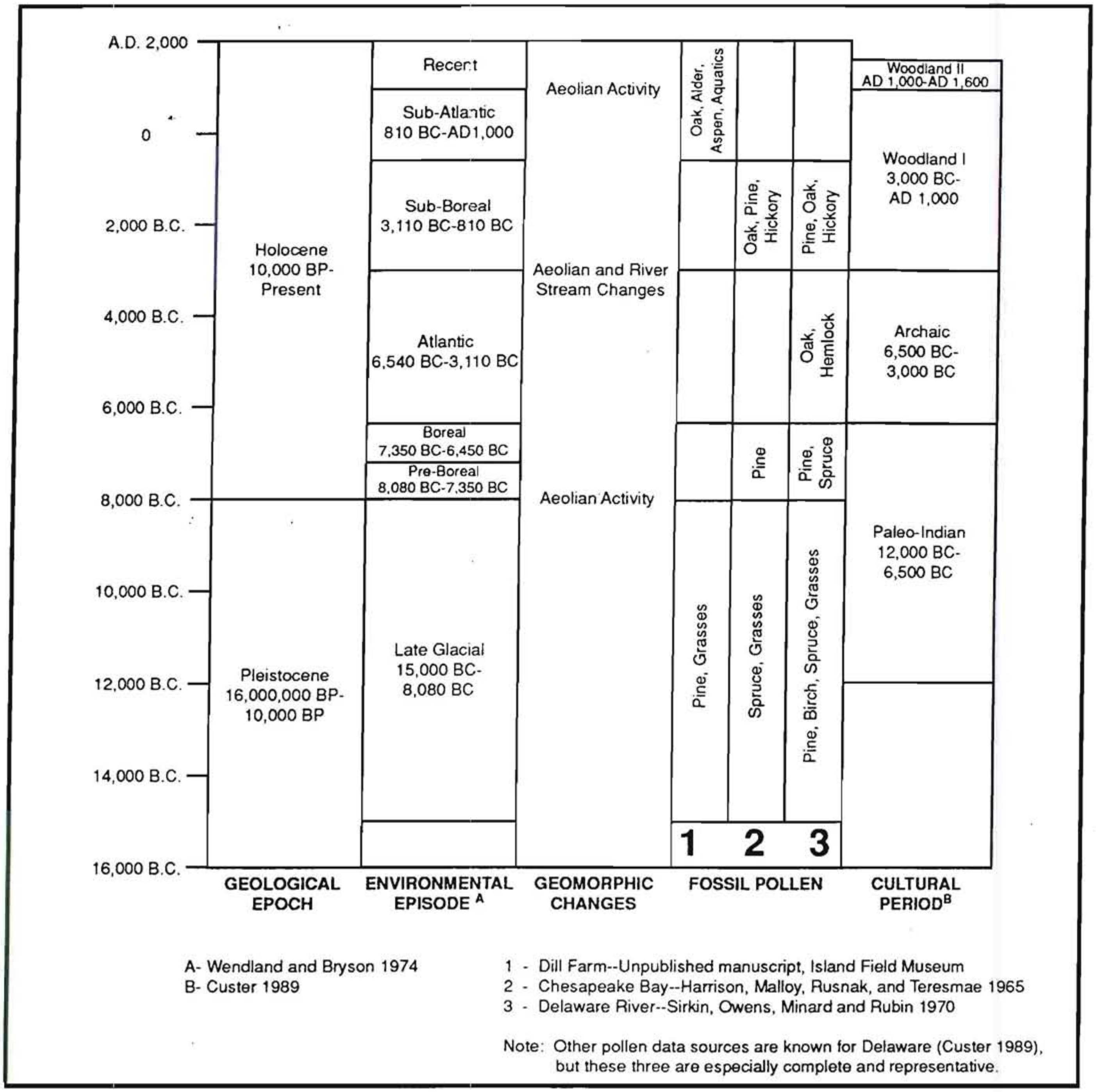
The modern agricultural environment of the Island Farm and Carey Farm sites is certainly different from the environments encountered by the sites' prehistoric inhabitants. However, even if we could remove the effects of modern agriculture and restore the forests that would have flourished in the region immediately prior to the arrival of European colonists, we would not necessarily have an accurate picture of the environments used by prehistoric groups in the past. Sea-level rise, which continued for several millennia, would have altered the riverine environments, and climatic change, which was quite dramatic at numerous times in the past, would have altered the forest composition. Consequently, it is necessary to consider past environments from both a regional and local perspective.

Comprehensive discussions of climatic and paleoenvironmental changes on the Delmarva Peninsula are contained in numerous sources (Custer 1984:30-37, 44-48, 62-64, 89-93, 154; 1986a; 1989:38-55; Kellogg and Custer 1994) and only a summary will be presented here. Climatic changes have taken place in the Middle Atlantic region over the 12,000-year period of human prehistory. These changes would have affected the growth, decline, and varieties of floral and faunal communities available in a given environmental zone during particular times. These effects would, in turn, have had an influence on human adaptation strategies.

A wide range of environmental studies, including climatology, pedology, hydrology, and fossil pollen analysis, have provided useful data for reconstructing past environments of the Delmarva Peninsula (Custer 1989). Models created from these studies can be applied to further understand prehistoric adaptations. The current geological period, the Quaternary Period, is divided into two epochs (Figure 5), the Pleistocene Epoch (16,000,000 B.P. - 10,000 B.P.) and the Holocene Epoch (10,000 B.P. - present). Studies have shown that within these epochs there are periods of climatic change which have had an impact on the settlement and subsistence strategies of prehistoric groups. Based on their analysis

FIGURE 5

Environmental Changes and Climatic Episodes



of fossil pollen data, Wendland and Bryson (1974) have developed an "episodic model" to explain discrepancies in the global geologic-botanic record. This model suggests that discrepancies in the pollen sequences may be a reflection of abrupt disturbances that changed relatively stable climates. Five environmental episodes have been postulated for the time between 15,000 B.C. and A.D. 1600 (Figure 5).

Studies of regional landscape modification have also identified periods of change in the environment. Two geomorphic processes have been linked to climatic changes (Knox 1983; Curry 1978, 1980; Curry and Custer 1982; Custer 1989). These processes are aeolian erosion and deposition of soils, and changes in river and stream systems (Figure 5). Deposition of aeolian, or windblown, soils indicate degrees of denudation of vegetation (Curry 1980; Curry and Custer 1982; Custer 1989). Three significant occurrences have been dated to the period of transition between the Pleistocene and Holocene epochs (Foss et al. 1978), the middle Holocene (Curry 1980; Ward and Bachman 1987), and the late Holocene (Custer and Watson 1985).

Changes in river and stream systems during the Holocene Epoch have been noted in the Middle Atlantic region (Curry and Custer 1982), and especially in central Delaware (Custer and Griffith 1984). Research on changes in waterway systems in other parts of North America and the Eastern Woodlands have been attributed to responses to storm and flood activities (Knox 1983). These activities have also been suggested as being responsible for changes in river and stream systems on the Delmarva Peninsula (Custer 1989). The various studies show that past environmental transitions coincide with one another and also with the cultural time periods of the Delmarva Peninsula (Figure 5). To fully understand the impact of these changes on prehistoric settlement and subsistence patterns, these environmental changes must be regarded in a spatial and temporal context.

The Pleistocene Epoch is characterized by the onset of cold conditions with recurring episodes of continental glaciation. The last glaciation consisted of a large ice sheet, the Laurentide, which covered most of the northeastern portion of the North American continent. The retreat of this ice sheet had a major influence on the climatic conditions of Delaware during the past 14,000 years. By ca. 12,000 B.C., the Laurentide ice sheet had retreated to just north of the headwaters of the Delaware River (Ogden 1977). During this later portion of the Pleistocene, or Late Glacial Episode, the Delmarva Peninsula would have been subjected to extensive frontal activity caused by the mixture of the cold air associated with the ice sheet and warm air from the south (Carbone 1976). This climate would have resulted in cloudy, wet, and cold-weather conditions on the Delmarva Peninsula.

After ca. 8500 B.C., the melting of the Laurentide ice sheet shifted air mass activities and increased moisture content in the atmosphere. The increase in moisture combined with the cold air of the diminishing ice sheet resulted in precipitation levels higher than those of the present (Carbone 1976). Other parts of the Middle Atlantic are thought to have once resembled tundra-like settings (Carbone 1976; Bernabo and Webb 1977), while in areas further south, the late Pleistocene was characterized by a mosaic of vegetational settings (Whitehead 1965; Brown and Cleland 1968; Custer 1989). Pollen data dating to this time from the Coastal Plain indicates that the Delmarva Peninsula probably contained grassland settings within a broader coniferous matrix (Figure 5). These grassland environments would have supported cold-weather megafauna and moose. Grassland areas would have been located in the low relief floodplains of the Delaware and Susquehanna rivers, which have since been inundated and buried by post-Pleistocene sea-level rise. High velocity winds generated by these open grasslands would have created aeolian transport and deposition at the interface of the broad coniferous forest stands. As the ice sheet retreated further north, its effects on the climate of the Delmarva Peninsula lessened.

Transition between the Pleistocene and the Holocene begins after 8000 B.C., during the Pre-Boreal and Boreal environmental episodes, when the ice sheet retreated north into Canada and temperatures increased due to solar warmth (Kellogg and Custer 1994). This transition between the end of the Pleistocene and the beginning of the Holocene is characterized by marked changes in floral environmental settings with the major effect being a reduction of open grassland environments and a spread of boreal woodland settings. The pollen data of this time from the Delmarva Peninsula reflect a replacement of spruce with pine. The reduction of grassland and forest interface settings lowered the carrying capacity for browsing and grazing species. As a result, poorly-drained swampy areas would have been focal points for animal populations including deer, elk, and moose.

By 6500 B.C., the beginning of the Atlantic Episode, temperatures from solar radiation reached a maximum and the cold- weather floral species shifted and faunal species migrated out of the Middle Atlantic region to areas further north (Kellogg and Custer 1994). This early part of the Holocene is marked by a general warming trend and an increase in precipitation. Grasslands diminished and the coniferous woods were replaced by the expansion of dense mesic forests of oak, hemlock, and pine (Figure 5). Swampy areas were distributed among poorly-drained areas such as the floodplains and bay/basin settings. These environments supported faunal species similar to species found today, such as deer and turkey. The Atlantic Episode of the Holocene Epoch is characterized by the stabilization of a continental climate with distinct seasonal differences in air mass distribution patterns, temperature, and precipitation (Custer 1989).

After the Atlantic Episode, the climates and environments of the Delmarva Peninsula became very complex. The Atlantic Episode was followed by the Sub-Boreal Episode (3110 B.C. - 810 B.C.) which is characterized first by warm and dry conditions and later by increases in precipitation and cooler temperatures. The early part of the Sub-Boreal has been called the mid-postglacial xerothermic, a period of warm and dry climate, which seems to have had a significant impact on the distribution of plant and animal resources of the Delmarva Peninsula. Pollen samples dating from this time show a decline in hemlock and an increase in hickory species suggesting that mesic forests of hemlock and oak were replaced by xeric forests of species such as hickory. In addition, grassland settings seem to have once again become widespread on the Delmarva Peninsula. During the Sub-Boreal, estuarine resources changed. Although sea-level was still rising, the rate of the rise had stabilized enough to support significant accumulations of estuarine resources.

By the Sub-Atlantic Episode, ca. 500 B.C., fluctuations in temperature and precipitation stabilized and conditions resembled those of the present. The variety of pollen data from the Delmarva Peninsula of this time indicate that environmental settings were able to support a wide range of mesophytic species. These environments also supported a variety of animal species and the dominant game animals at this time were deer and turkey. After 500 B.C., the rate of sea-level change stabilized and distributions of estuarine resources continued to expand.

As part of the archaeological studies of the Carey Farm and Island Farm sites, a detailed program of localized paleoenvironmental studies was undertaken and the results of one of these studies are described in Appendix I. Results of other studies are included in Kellogg and Custer (1994). This research consisted of excavation of drill cores and extraction of sediment samples from the wetlands adjacent to the St. Jones River and from the river bottom itself (Plate 5). Pollen, micro-organisms known as diatoms, and seeds preserved in the sediments, as well as the sediments themselves, were analyzed for information about local past environments. Organic material in the sediments was radiocarbon dated to provide chronological controls. The studies at the St. Jones River in the vicinity of the Carey Farm and Island Farm sites were also integrated with a larger study of the St. Jones River basin (Daniels 1993). This study was associated with archaeological studies undertaken by Edward

PLATE 5

Excavating Drill Cores

Heite at the Blueberry Hill Site (7K-C-107), which is located further north at an inland location within the drainage basin (Heite and Bloom 1995). Finally, all of the St. Jones River paleoenvironmental studies were part of a long-term paleoenvironmental research program developed by the University of Delaware Center for Archaeological Research and the Department of Geology as part of the large series of archaeological excavations undertaken within the State Route 1 Corridor (Kellogg and Custer 1994). A synthesis of this localized research with regard to the Carey Farm and Island Farm sites is presented below.

Sediments in the drill cores within the bed of the river and in adjacent marshes provide important data on the composition of the river and its associated wetlands over time (Appendix I). Three basic sediment types were encountered in the drill cores and each could be associated with a different wetland or riverine environmental type based on the work of Whallon (1989) and Pizzuto and Rogers (1992). Water salinity could be determined by identification of diatoms, preserved remains of microscopic creatures which are very sensitive to variation in water salinity. Peat deposits were associated with emergent wetlands, like those seen in the project area today and described above, in fresh to slightly brackish water conditions. Muds were associated with tidal estuaries in fresh to slightly brackish water. Sand/mud deposits were associated with non-tidal river channels and floodplains.

All of these sediment types were encountered in various stratigraphic combinations and varied thicknesses in the drill cores, and their relative positions revealed the varied riverine and estuarine marsh environments in the vicinity of the two archaeological sites. Using the radiocarbon dates from the cores, the following chronological sequence of marsh development was determined. Prior to 1650 B.C., there was a simple fluvial valley present in the vicinity of the Carey Farm and Island Farm sites. This fluvial valley would have resembled the present St. Jones River <u>north</u> of Dover, approximately five kilometers (three miles) upriver. Few if any wetland environments would have been present, although the floodplain may have been a poorly-drained woodland. A well-drained gallery forest probably bordered the bluffs overlooking the river.

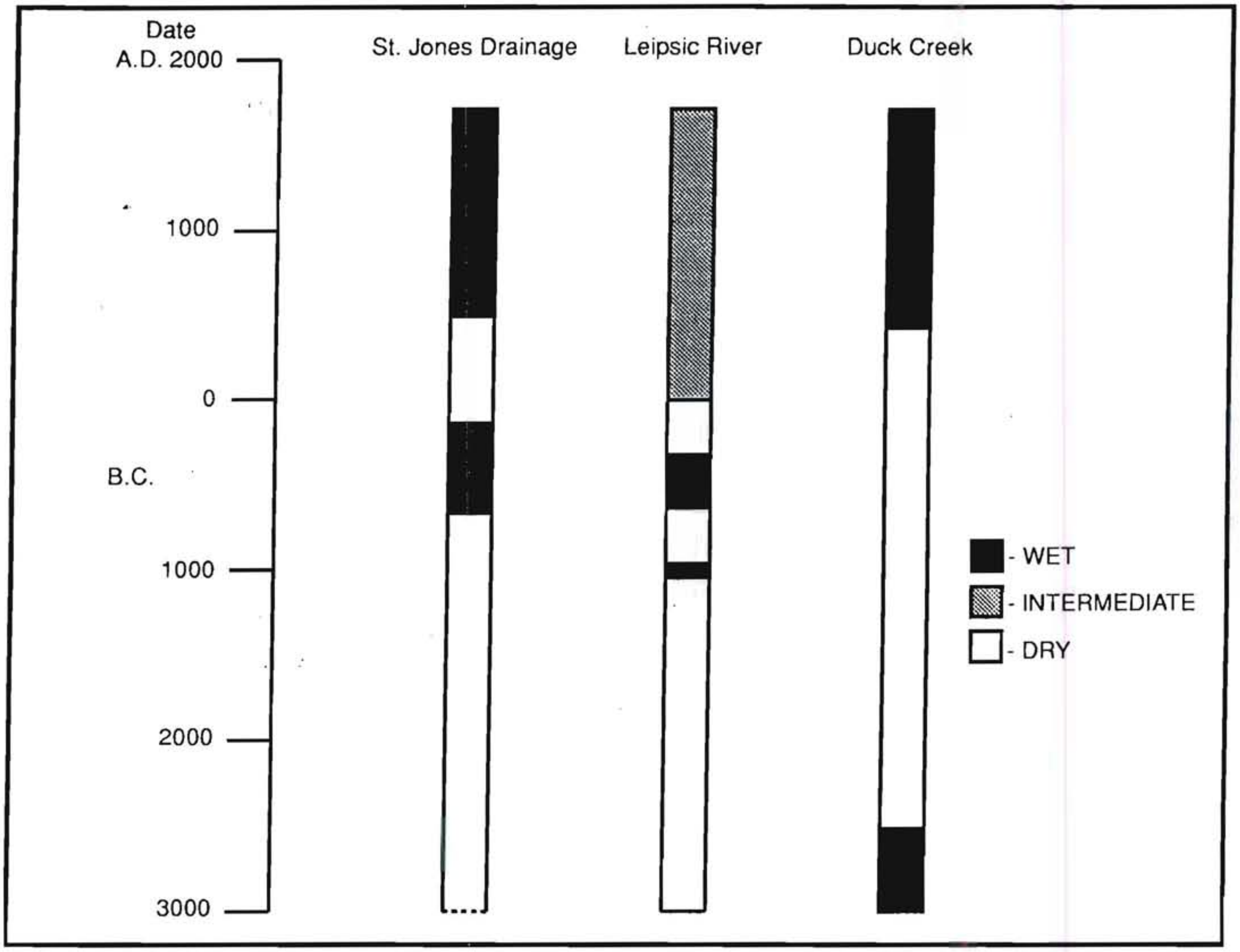
After 1650 B.C., a broad brackish water tidal estuary developed in the vicinity of the sites as a result of sea-level rise. This estuary would have been a rather broad expanse of open water, and can be envisioned as an extension, or "arm," of the Delaware Bay reaching inland along the course of the river. Narrow wetlands would have fringed this open estuary with gallery forests on the adjacent bluffs. Some similar environmental settings can now be observed <u>south</u> of the study area, downstream from Barker's Landing. This broad tidal estuary appears to have persisted in the vicinity of the sites until A.D. 600, and would have been a more productive environment for hunters and gatherers than the earlier fluvial valley. This kind of open estuary would have supported shellfish, particularly oysters, and some oyster remains were found in the pit features excavated at the Carey Farm Site.

Increased sea-level rise after A.D. 600 probably lowered the ability of the St. Jones River to carry sediments, and increased sediment deposition along the edges of the river provided a substrate for the development of broad tidal wetlands. The open water of the estuary would have been increasingly restricted in size, and the river probably assumed its modern configuration at that time. Although habitats for shellfish disappeared with the development of the tidal wetlands, there was an even greater species diversity and productivity in the new environmental setting. In sum, sea-level rise led to increased productivity of the river environments in the vicinity of the Carey Farm and Island Farm sites from 1650 B.C. up to the time of the appearance of European colonists in A.D. 1600. Significant increases in riverine environmental productivity within this trend occurred ca. 1650 B.C. and A.D. 600.

The work of Daniels (1993) focused on paleoclimatic changes within the St. Jones River drainage as a whole, and gives a sense of the climate changes that accompanied the riverine environmental changes noted above. From approximately 13,000 B.C. to 8800 B.C., relatively cold and wet climates occurred. The primary vegetation was a spruce-pine forest throughout the drainage with some deciduous gallery forests fringing the river. After 8800 B.C., the climate became significantly drier and warmer. Pine expanded at the expense of spruce and some hemlock was also present. Episodes of very dry

FIGURE 6

Wet and Dry Climates in Central Delaware



climates apparently occurred when vegetation was sufficiently reduced to allow the erosion and deposition of wind-blown, aeolian soils. Similar dry conditions and deposition of aeolian soils are reported for other parts of the Delmarva Peninsula (Webb 1990; Webb et al. 1994; Foss et al. 1978; Ward and Bachman 1987; Custer and Watson 1987) and these conditions may have been a regional climatic and environmental phenomenon.

Dry conditions, with some episodes of very intense dryness, continued until ca. 800 B.C., within the St. Jones basin. One or more pronounced periods of dry climatic conditions occurred between 6800 and 3700 B.C. In interior regions, some water-filled topographic depressions, known locally as "bay/basin features," apparently dried out on an annual basis and wind-blown soils were deposited within them. Patchy grasslands may have been present throughout the interior surrounded by forests dominated by pine and oak. Similar pine-oak forests with dry-adapted oak species can now be seen further south in areas of Sussex County with excessively well-drained soils. Forest fires were also apparently rather frequent, as evidenced by the presence of relatively abundant charcoal in some sediments (Brush 1994:90), and these forest fires were an integral part of the ecology of the pine component of the local woodlands. During these dry climatic intervals, the riverine settings would have been especially attractive locations for human settlements because fresh water would have been more readily available in these locations. Figure 6 shows a correlation of the St. Jones River drainage

FIGURE 7

Correlation of St. Jones River Drainage Climatic Conditions and Cultural Chronology

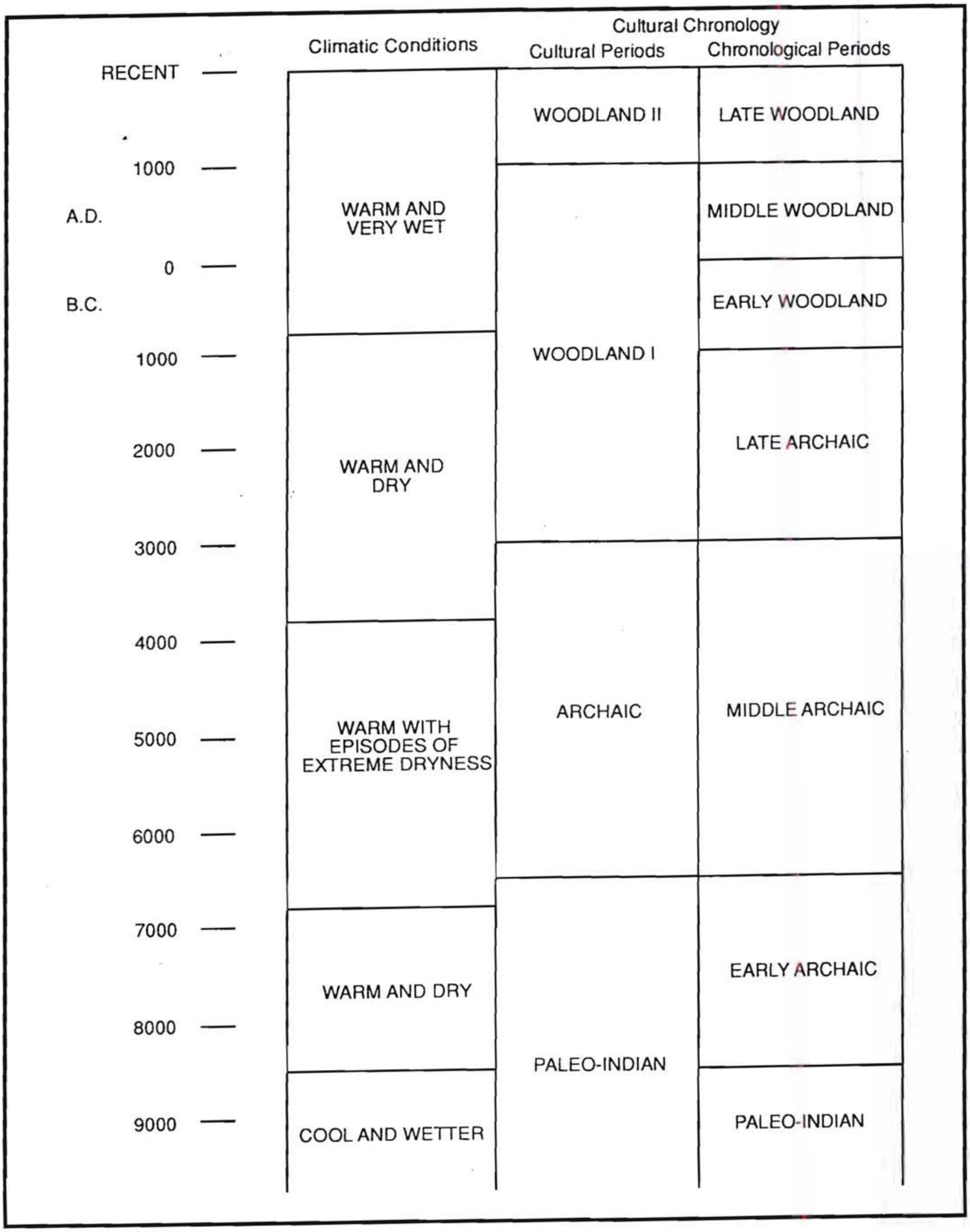
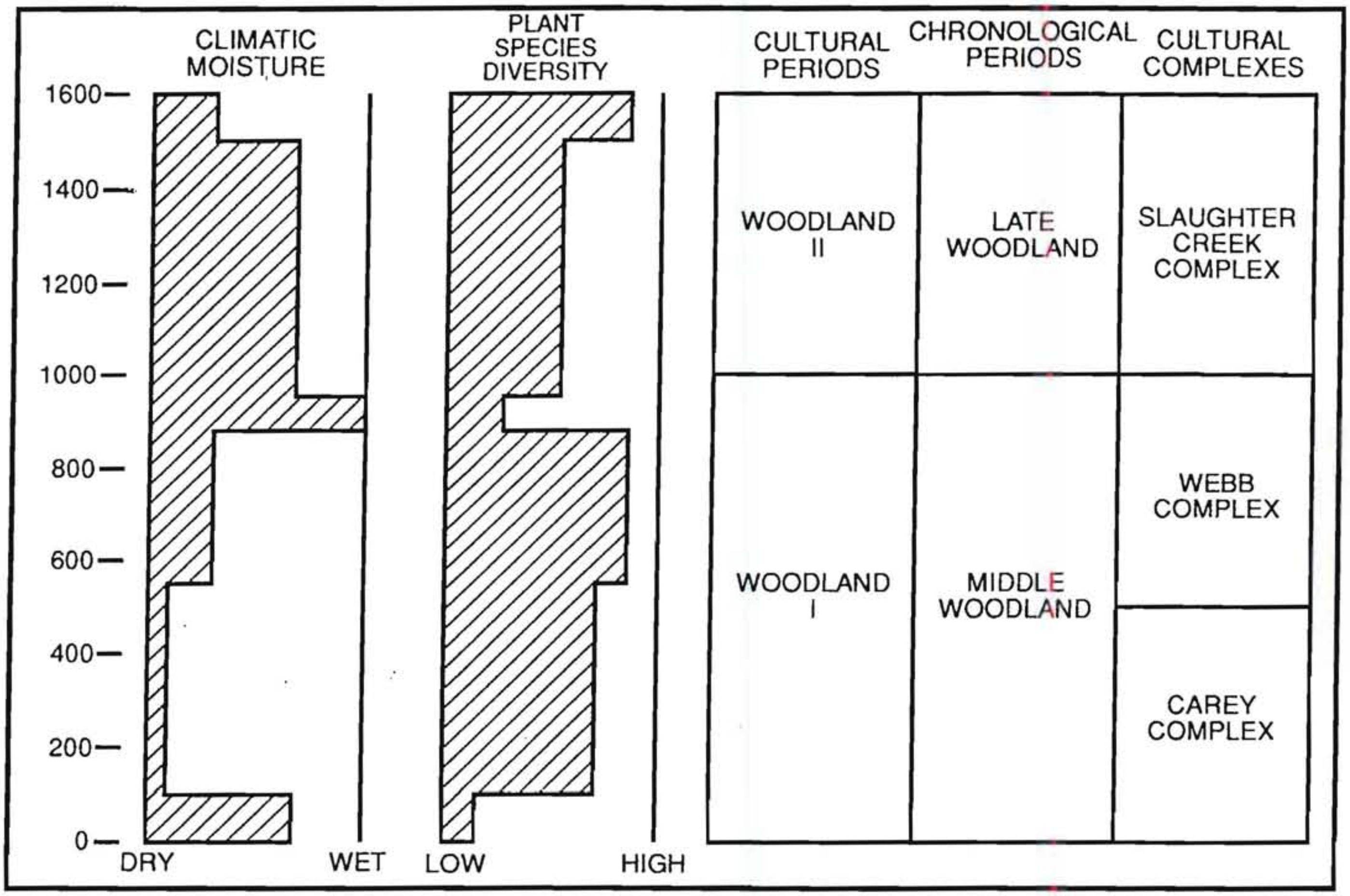


FIGURE 8

Climatic Moisture, Species Diversity, and Cultural Chronology



climatic data with data from other drainages investigated as part of the State Route 1 Corridor research program. The similarities in the diagrams suggest that there was little variability in climate change throughout central Delaware. Figure 7 shows a correlation of the climate changes in the St. Jones basin with the local prehistoric cultural chronology. These correlations will be discussed later in this report, but it can be noted here that many of the climate changes coincide with cultural changes revealed in the archaeological chronologies.

The data available to Daniels (1993) suggest that after 800 B.C., wetter and cooler climates prevailed, and relatively modern climates were present. However, Brush (1994) has been able to develop a rather detailed chronology of climate and environmental change in the vicinity of the Carey Farm and Island Farm sites using some non-traditional methods of paleoecological analysis. Rather than rely simply on pollen, which usually only allows the identification of plant remains at the genus level, Brush studied abundant seed remains from the St. Jones River cores and was thereby able to identify plants from the local level at the species level. By concentrating on changes in species adapted to either particularly wet, or particularly dry, conditions, she developed a detailed sequence of shifts between wet and dry climates for the time period between A.D. 0 and A.D. 1600 (Figure 8). Brush (1994:92-95) also notes that her sequence fits well with paleoclimatic data from other parts of Eastern North America, as well as with paleoclimatic proxy data from ice core studies in Greenland.

A related topic discussed by Brush (1994:94) is plant species diversity in the vicinity of the Carey Farm and Island Farm sites. Figure 8 includes her species diversity data along with the local cultural chronology. The interesting pattern in these data is the fact that species diversity seems to be inversely related to climatic moisture. When moisture is high in times of wet climates, species diversity is low because the plant communities are dominated by the plants tolerant of wet conditions. Apparently, for the St. Jones River drainage, the plant communities composed of species tolerant of wet conditions have fewer numbers of species with greater numbers of individuals within each species. As environments become drier, wet adapted species are replaced by those adapted to the dry conditions and the number of different species increases. This kind of change is seen in the local paleoenvironmental data at ca. A.D. 100 and again at A.D. 900. Species diversity then tends to decrease again as wet adapted plants are replaced by dry adapted plants, but in general, the xeric communities have greater diversity than the hydrophytic communities. In other words, there are more different species with fewer numbers of individual organisms per species.

In sum, the paleoenvironmental data indicate that there were pronounced changes in riverine and terrestrial environments in the vicinity of the Carey Farm and Island Farm sites during the time span of their prehistoric occupation. The most critical changes were probably the development of the rich estuarine wetlands over time, the sporadic intervals of dry climates, and the changes in species diversity that occurred during the climatic oscillations between wet and dry environments. Understanding the effects of these environmental changes on human settlement of the study area was an important component of research at these sites and will be discussed later in this report.

Regional Prehistory

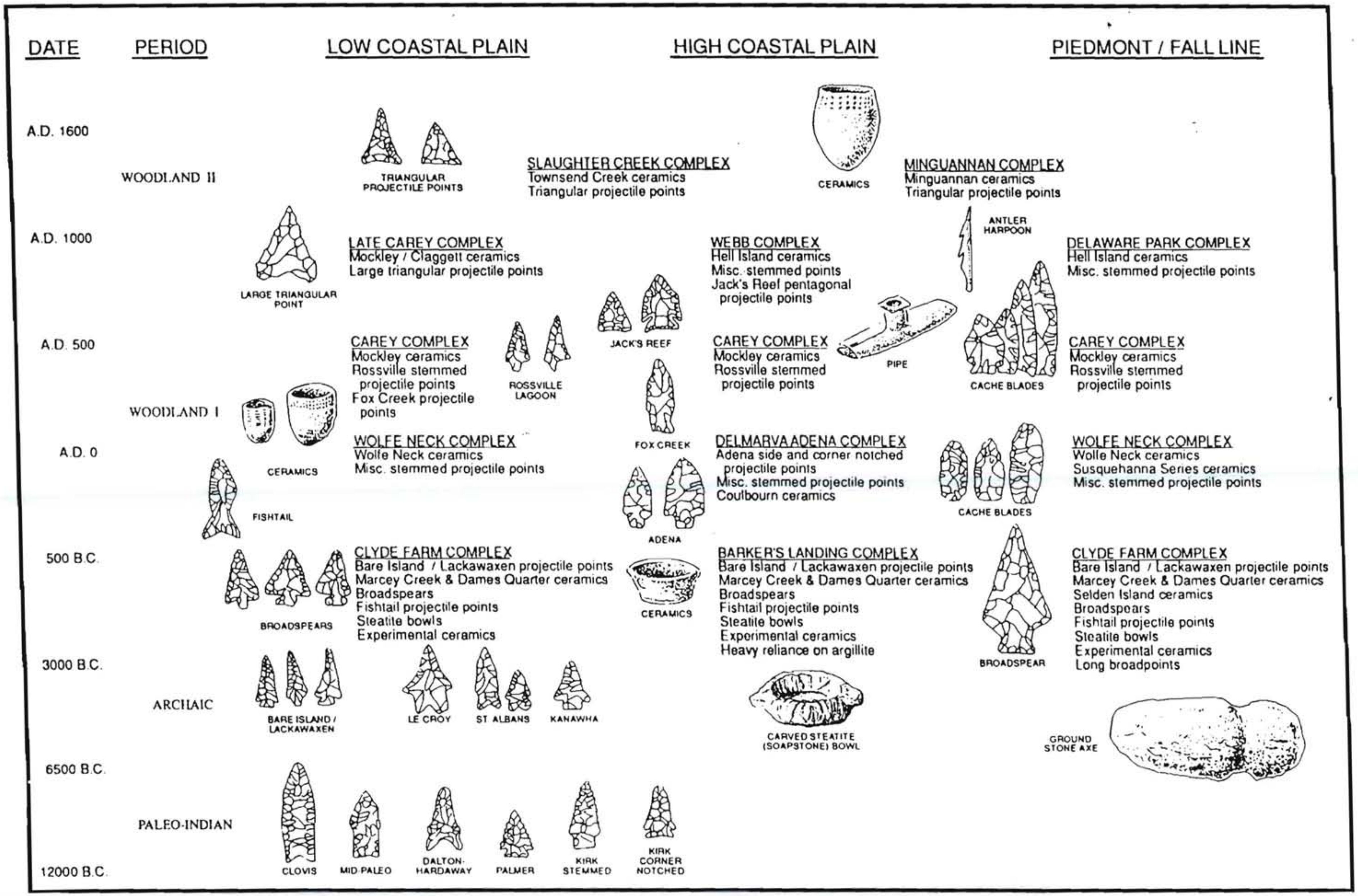
This summary of the regional prehistory is abstracted from the work of Custer (1984, 1986a, 1986b, 1989, 1994a, 1994b). The prehistoric archaeological record of the Delaware Coastal Plain can be divided into four large blocks of time: The Paleo-Indian Period (ca. 12,000 B.C. - 6500 B.C.), the Archaic Period (6500 B.C. - 3000 B.C.), the Woodland I Period (3000 B.C. - A.D. 1000), and the Woodland II Period (A.D. 1000 - A.D. 1650). A fifth time period, the Contact Period may also be considered and spans from A.D. 1650 to A.D. 1750, the approximate date of the final Indian habitation of Delaware in anything resembling their pre-European Contact form. Each of these periods is described below and the attributes of particular cultural complexes are described and illustrated in Figure 9.

<u>Paleo-Indian Period</u> (12,000 B.C. - 6500 B.C.). The Paleo-Indian Period encompasses the time period of the final retreat of Pleistocene ice sheets from Eastern North America and establishment of more modern Holocene environments. The distinctive feature of the Paleo-Indian Period is an adaptation to the cold, and alternately wet and dry conditions at the end of the Pleistocene and the beginning of the Holocene. This adaptation was primarily based on hunting and gathering with hunting providing a large portion of the diet. Hunted animals may have included now-extinct megafauna and moose. A mosaic of deciduous, boreal, and grassland environments would have provided a large number of productive habitats for these game animals in central Delaware and watering areas would have been particularly good hunting settings.

Tool kits of the people who lived at this time were oriented toward the procurement and processing of hunted animal resources. A preference for high quality lithic materials is noted in the stone tool kits and careful resharpening and maintenance of tools is common. A mobile lifestyle moving among the game attractive environments is hypothesized with the social organizations being based upon single

FIGURE 9

Cultural Complexes of Delaware



and multiple family bands. Throughout the 5500 year time span of the period, the basic adaptation remains relatively constant with some modifications being seen as Holocene environments appeared at the end of the Paleo-Indian Period.

Numerous Paleo-Indian sites are noted for the Delaware Coastal Plain. Most of the sites are associated with poorly- drained swampy areas and include the Hughes Paleo-Indian Site Complex near Felton.

Archaic Period (6500 B.C. - 3000 B.C.). The Archaic Period is characterized by a series of adaptations to the newly emerged full Holocene environments. These environments differed from earlier ones and were dominated by mesic forests of oak and hemlock. A reduction in open grasslands in the face of warm and wet conditions caused the extinction of many of the grazing animals hunted during Paleo-Indian times; however, browsing species such as deer flourished. Sea-level rise is also associated with the beginning of the Holocene in Delaware. The major effect of the sea-level rise would have been to raise the local water table, which helped to create a number of large interior swamps. Adaptations changed from the hunting focus of the Paleo-Indian to a more generalized foraging pattern in which plant food resources played a more important role. Large swamp settings apparently supported large base camps. A number of small procurement sites in favorable hunting and gathering locales, such as bay/basin features, are known from Delaware's Coastal Plain.

Tool kits were more generalized than earlier Paleo-Indian tool kits and showed a wider array of plant processing tools such as grinding stones, mortars, and pestles. A mobile lifestyle was probably common with a wide range of resources and settings utilized on a seasonal basis. A shifting band level organization which saw the waxing and waning of group size in relation to resource availability is evident. Known sites include large base camps such as the Clyde Farm Site in northern Delaware and smaller processing sites located at a variety of locations and environmental settings.

Woodland I Period (3000 B.C. - A.D. 1000). The Woodland I Period can be correlated with a dramatic change in local climates and environments that seem to be part of events occurring throughout the Middle Atlantic region. A period of shifting wet and dry climates lasts from ca. 3000 B.C. to 1000 B.C. and in some areas mesic forests were replaced by xeric forests of oak and hickory. Grasslands also again became common. Some interior streams dried up; however, the overall effect of the environmental change was an alteration of the environment, not a degradation. Continued sea-level rise and a reduction in its rate also made many areas of the Delaware River and Bay shore the locations of large brackish water marshes which are especially high in productivity. The major changes in environment and resource distributions caused a radical shift in adaptations for prehistoric groups. Important areas for settlements include the major river floodplains and estuarine swamp areas. Large base camps with fairly large numbers of people are evident in many settings in the Delaware Coastal Plain, such as the Barker's Landing, Coverdale, Hell Island, and Robbins Farm sites. These sites seem to have supported more people than previous base camp sites and may have been occupied on a year-round basis. The overall tendency is toward a more sedentary lifestyle.

The tool kits show some minor variations as well as some major additions from previous Archaic tool kits. Plant processing tools become increasingly common and seem to indicate an intensive harvesting of wild plant foods that may have approached the efficiency of agriculture by the end of the Woodland I Period. Chipped stone tools changed little from the preceding Archaic Period; however, broad-blade, knife-like processing tools became more prevalent. The addition of stone, and then ceramic, containers is also seen. These items allowed the more efficient cooking of certain types of food and may also have functioned for storage of certain surplus plant foods. Storage pits and semi-subterranean houses are also known for the Delaware Coastal Plain during this period from the numerous sites.

Social organizations also seem to have undergone radical changes during this period. With the onset of relatively sedentary lifestyles and intensified food production, which might have produced occasional surpluses, incipient ranked societies began to develop as indicated by the presence of 1) extensive trade and exchange in lithic materials for tools as well as non-utilitarian artifacts, 2) caching of special artifact forms and utilization of artifacts manufactured from exotic raw materials. The data from cemeteries of the Delmarva Adena Complex (ca. 500 B.C. to A.D. 0), such as the Frederica Adena Site and the St. Jones Adena Site (Thomas 1976), indicate that certain individuals had special status in these societies and the existence of a simple ranked social organization is hypothesized. Similar data from the Island Field Site show that these organizations lasted up until A.D. 1000, although they may not have always been present throughout all of the Woodland I Period. In any event, by the end of the Woodland I Period a relatively sedentary lifestyle is evident in Delaware's Coastal Plain. It should also be noted that the greatest number of archaeological sites in the St. Jones River drainage date to the Woodland I Period and the Mid-Drainage Zone, within which most of the State Route 1 alignment is located, and is the focus of most of the important sites of this period.

Woodland II Period (A.D. 1000 - A.D. 1650). In many areas of the Middle Atlantic, the Woodland II Period is marked by the appearance of agriculture food production systems; however, in the Delaware Coastal Plain there are no clear indications of such a shift. Some of the settlements of the Woodland I Period, especially the large base camps, were also occupied during the Woodland II Period and very few changes in basic lifestyles and overall artifact assemblages are evident. Intensive plant utilization and hunting remained the major subsistence activities up to European Contact. There is some evidence, nonetheless, of an increasing reliance on plant foods and coastal resources throughout the Woodland II Period in the study area. Social organization changes are evidenced by a collapse of the trade and exchange networks and the end of the appearance of elaborate cemeteries.

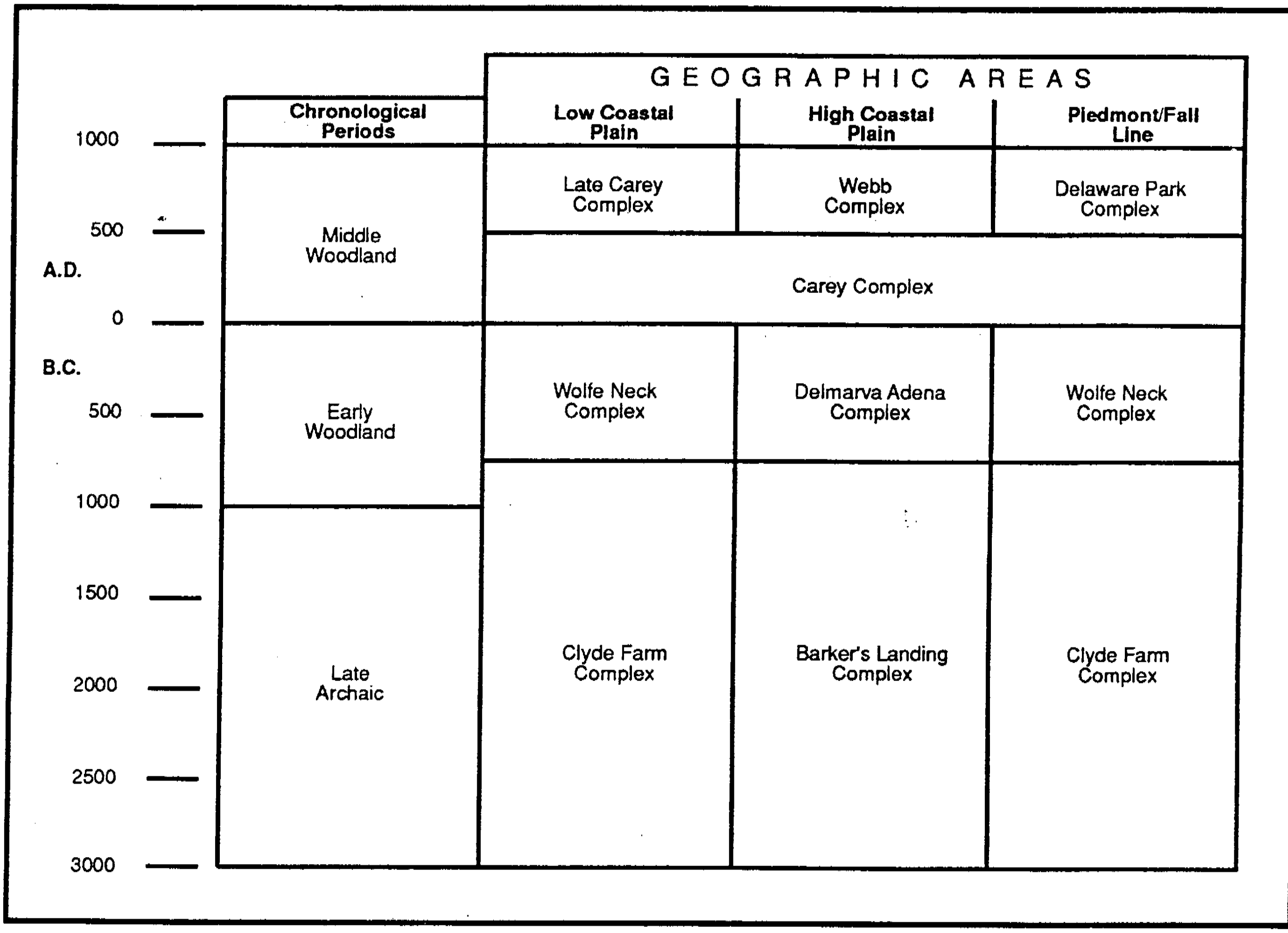
Contact Period (A.D. 1650 - A.D. 1750). The Contact Period is an enigmatic period of the archaeological record of Delaware which begins with the arrival of the first substantial numbers of Europeans in Delaware. The time period is enigmatic because no Native American archaeological sites that clearly date to this period have yet been discovered in Delaware. A number of sites from the Contact Period are known in surrounding areas such as southeastern Pennsylvania, nonetheless. It seems clear that Native American groups of Delaware did not participate in much interaction with Europeans and were under the domination of the Susquehannock Indians of southern Lancaster County, Pennsylvania. The Contact Period ends with the virtual extinction of Native American lifeways in the Middle Atlantic area except for a few remnant groups.

Woodland I Chronology in Central Delaware

During the course of the preparation of this report, an overview of currently available data on the Woodland I Period was produced under the sponsorship of the Delaware State Historic Preservation Office (Custer 1994a). This overview revised the cultural chronology of the Woodland I Period and proposed a series of research questions to use in studies of Woodland I Period sites. Because the bulk of the prehistoric occupations of the Carey Farm and Island Farm sites date to the Woodland I Period, a special attempt was made to include the findings of the new overview in this report. A later section of this report will discuss the research questions, and this section will present the new chronology and describe some of the diagnostic lithic and ceramic artifacts used in its preparation.

FIGURE 10

Traditional Woodland I Chronology

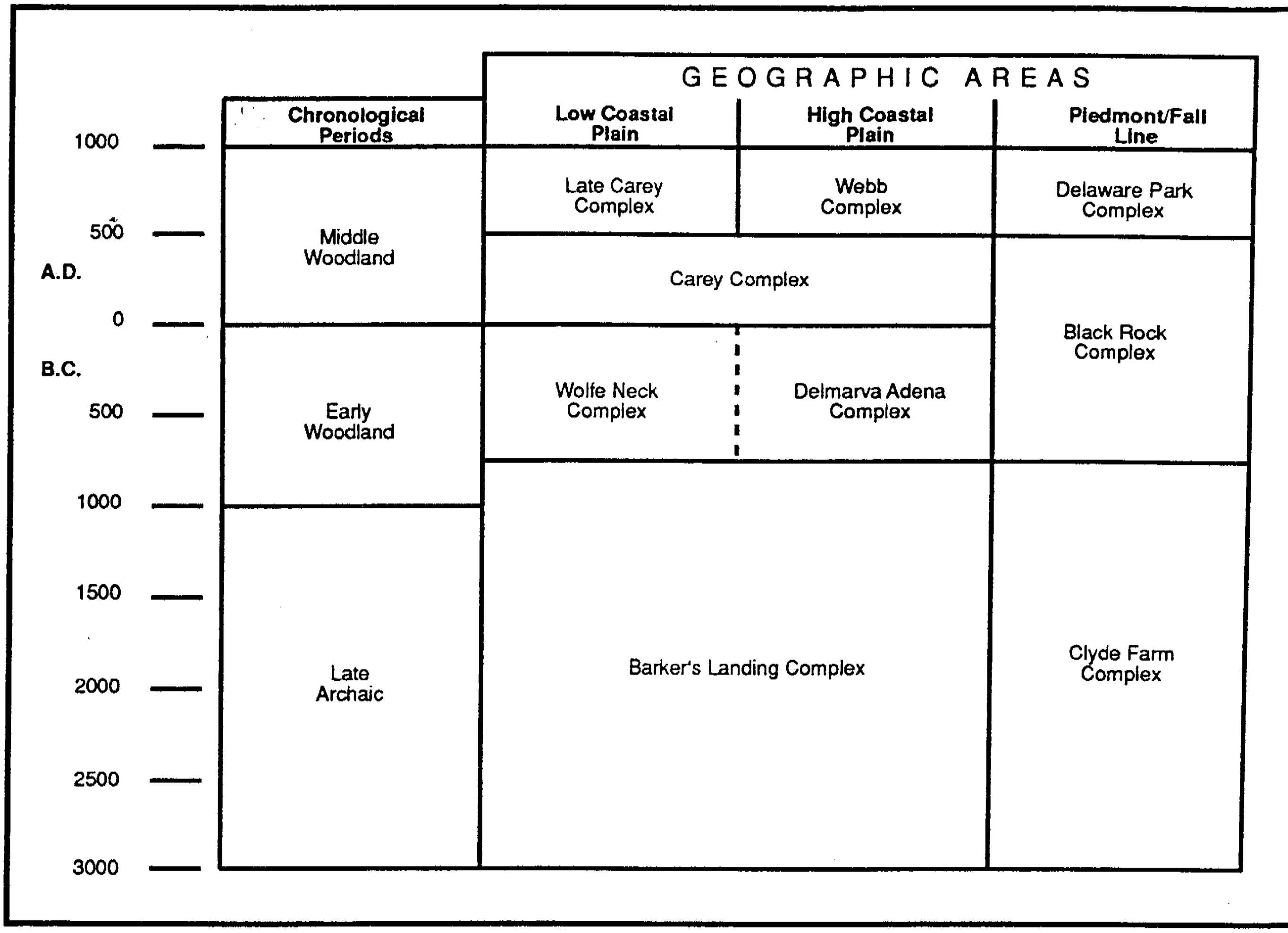


The Woodland I cultural chronology that was used in previous studies of prehistoric archaeological sites in the State Route 1 Corridor (e.g., Custer and Silber 1994; Custer, Hoseth, Silber, Grettler, and Mellin 1994) was developed in 1980 and published in the first state plan for the management of prehistoric archaeological resources (Custer 1986a). This chronology recognized a series of smaller cultural "complexes" that divided the 4000 year-long time span of the Woodland I Period into a series of smaller chronological and geographic units (Figures 9 and 10). A series of diagnostic lithic and ceramic artifacts were associated with each complex (Figure 9). The complexes had spatial and temporal limits, and denoted areas and time periods that were characterized by similar adaptations and lifeways. The complexes can also be correlated with traditional chronological periods (Late Archaic, Early Woodland, Middle Woodland) used in other parts of the Middle Atlantic region (Gardner 1982; Custer 1994b). These traditional chronological periods are noted in Figure 10 and will be referenced in the following discussion.

For some of the complexes, such as the Delmarva Adena Complex, it was possible to provide definitions that were relatively tightly delimited in space and time with rather distinctive diagnostic artifacts. However, other complexes, such as the Clyde Farm Complex, spanned very long time intervals and did not always have particularly distinctive diagnostic artifacts. Furthermore, the traditional definitions of the complexes stressed the special nature of the middle section of the Delmarva Peninsula, including the study area, and tended to separate it from surrounding parts of the region. For example, the traditional chronological scheme has the Barker's Landing and Delmarva Adena complexes clearly separated from the Clyde Farm and Wolfe Neck complexes which border it to the north and the south (Figure 10).

FIGURE 11

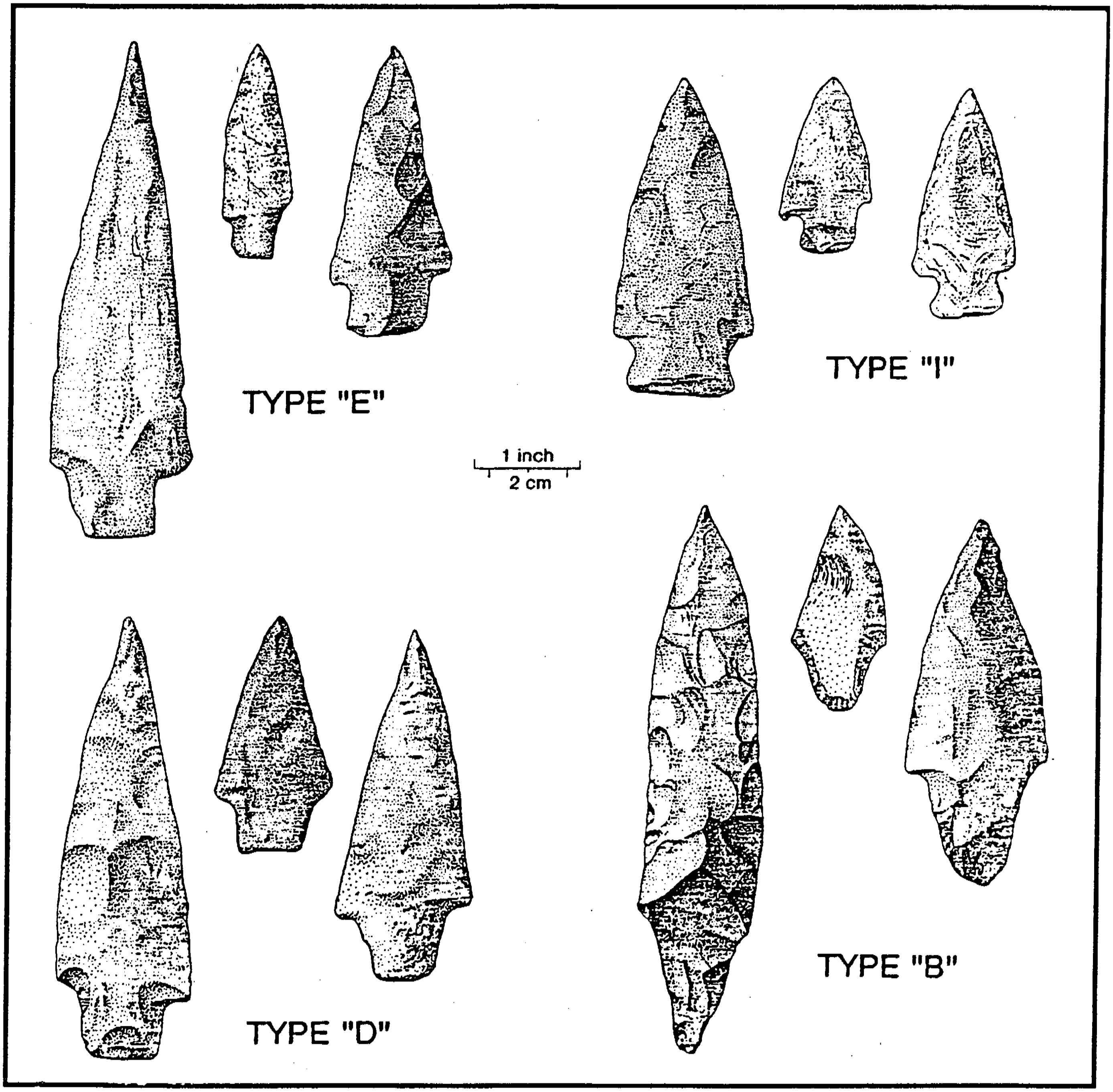
Spatial Adjustments to Traditional Woodland I Chronology



Recent research has shown that some of the spatial and temporal limits of the traditional complexes shown in Figure 10 need to be revised and Figure 11 shows the necessary spatial adjustments. One major change is needed for the Late Archaic Barker's Landing and Clyde Farm complexes. Recent surveys and excavations of a number of sites in southern Delaware (Custer and Mellin 1991, 1989, 1987) have shown that Late Archaic sites of the southern Delaware Low Coastal Plain are more similar to those of the Barker's Landing Complex than the Clyde Farm Complex (Custer 1994a:20). Therefore, the Barker's Landing Complex is extended into that area. Similarly, research in southeastern Pennsylvania (Custer 1995) has shown that Early Woodland and initial Middle Woodland sites of northern Delaware, which had been lumped in with the southern Wolfe Neck and Carey complexes (Figure 10), are really more similar to sites in southeastern Pennsylvania that have been grouped together into a Black Rock Complex (Custer 1995). Finally, recent research (Custer and Mellin 1991, 1989, 1987) has shown that both the Delmarva Adena and Webb complexes extend further south into the Low Coastal Plain than previously thought, and their boundaries have been adjusted in Figure 11.

Recent research also allows the development of a finer-grained chronology than the one shown in Figures 10 and 11, especially regarding the Clyde Farm and Barker's Landing complexes. Many of the projectile points associated with the Woodland I Period are stemmed and notched points of various shapes and sizes, and it can be difficult to identify temporally diagnostic styles among them (see discussion in

FIGURE 12
Stemmed Point Types

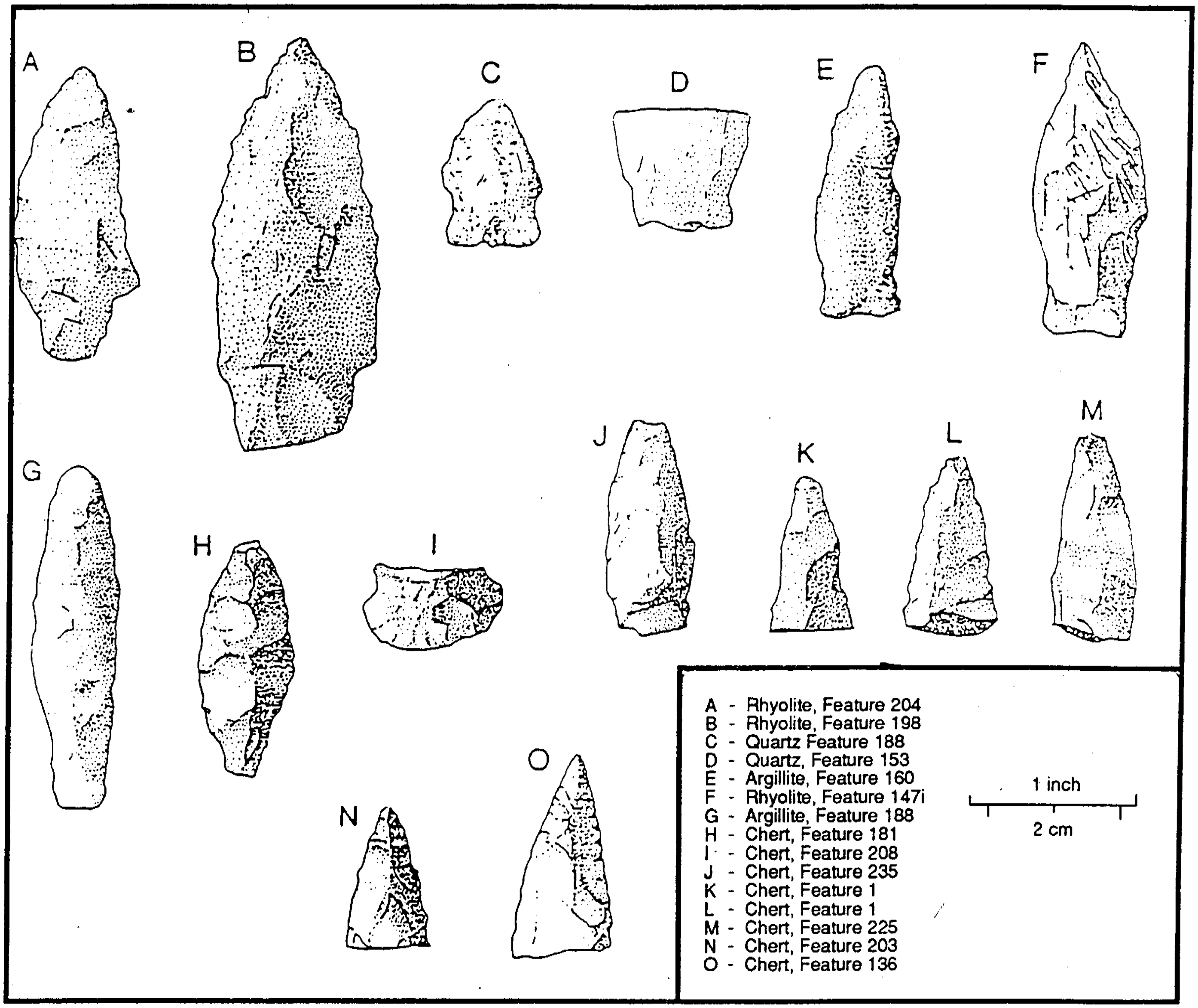


Evans and Custer 1990). However, recent research (Custer 1995) with collections originally excavated by Kent (1970) at the Piney Island Site, a stratified river island site in the Lower Susquehanna Valley, allows the development of a chronology for these artifacts.

Figure 12 shows large, medium, and small examples of the four main types of stemmed points defined by Kent (1970) based on analysis of collections from throughout the central Middle Atlantic region. These point types were present in stratified contexts at Piney Island and were associated with

FIGURE 13

Early Woodland Projectile Point Assemblage from the Snapp Site (7NC-G-101)



Middle Archaic - Early Woodland dates. Type I points were most numerous in the oldest strata dating to the Middle and Late Archaic time periods. Types D and E were most prevalent during the Late Archaic Period, and Type B points were most common in strata dating to the Late Archaic/Early Woodland transition where they were associated with broadspear forms.

The stemmed point types depicted in Figure 12 also show up at sites in Delaware. For example, Figure 13 shows an Early Woodland projectile point assemblage from the Snapp Site (7NC-G-101) in the northern Delaware Coastal Plain (Custer and Silber 1994) and this assemblage includes one Type D point (Figure 13A) and three Type E points (Figure 13B-D). Also included in this assemblage are fishtail points (Figure 13E-F) and the basal section of a large side-notched point (Figure 13I) that is

FIGURE 14

Presence/Absence of Projectile Point Types at Various Middle Atlantic Sites

Site	Date	Projectile Point Types							
		Type B Stem	Type D Stem	Type E Stem	Type I Stem	Fishtail	Small Side Notched	Large Side Notched	Hellgrammite
Rosenkrans	600 B.C.	x	x	x	--	x	x	x	--
Faucett-Orient Component	810 B.C.	--	--	--	--	x	--	--	--
Snapp	1200-700 B.C.	x	x	x	--	x	x	x	--
Williamson	1300-800 B.C.	x	x	x	x	x	x	x	x
Clyde Farm	1000 B.C.	x	x	--	x	x	x	--	--
Piney Island Upper Component	2000-2200 B.C.	x	x	x	x	--	--	--	--
Hawthorn	2250 B.C.	x	x	x	x	--	x	x	--
Piney Island Middle Component	2200-2800 B.C.	x	x	x	x	--	--	--	--
Faucett-Lackawaxen Component	3400 B.C.	--	x	x	x	--	x	--	--
Piney Island Lower Component	3700-500 B.C.	--	x	x	x	--	--	--	--

very similar to the Hariokake Side-notched type defined by Hummer (1991:151-152) for the Delaware River Valley and dated to ca. 1300 - 800 B.C. The remainder of the points shown in Figure 13 are difficult to characterize due to breakage and weathering, but they do show that a number of narrow-bladed forms were also used at this time.

The projectile point assemblages from the Piney Island and Snapp sites were compared to assemblages from other comparably dated sites to see if regional chronological patterns of projectile point use can be identified (Custer 1994a:28-34). Figure 14 shows the presence and absence of a series of different projectile point types at various Middle Atlantic archaeological sites. The sites are arranged from youngest to oldest in Figure 14, and they date from the Late Archaic through initial Early Woodland times. Figure 14 clearly shows that a variety of projectile points were made and used during this time period. Figures 15 and 16 show the projectile point associations and chronologies that resulted from a seriation analysis of data on projectile point frequencies (Custer 1994a:28-34) and these chronological sequences and associations were used to refine the culture complex chronology for central Delaware (Figure 17).

FIGURE 15
Projectile Point Associations

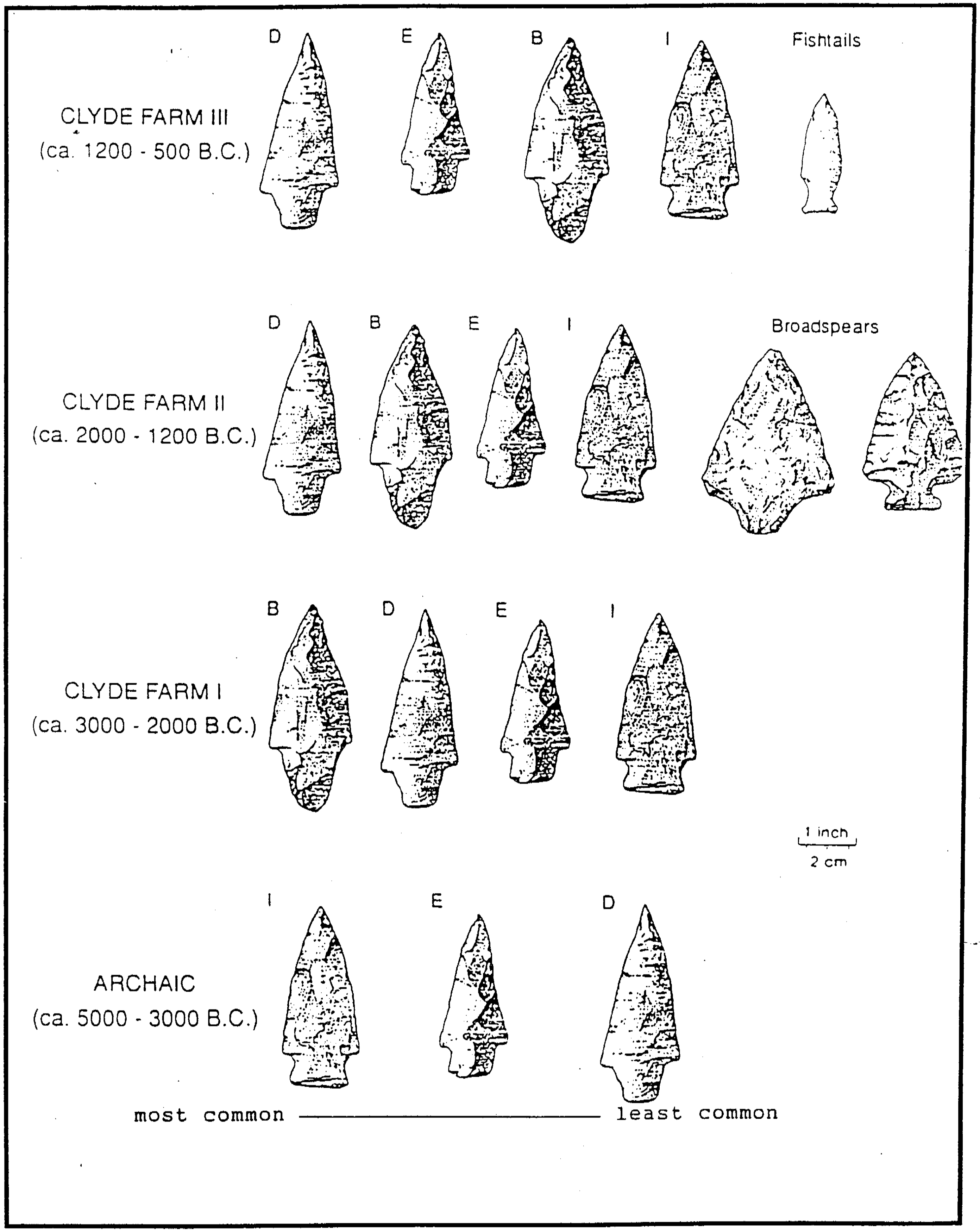


FIGURE 16
Summary Late Archaic Point Chronology

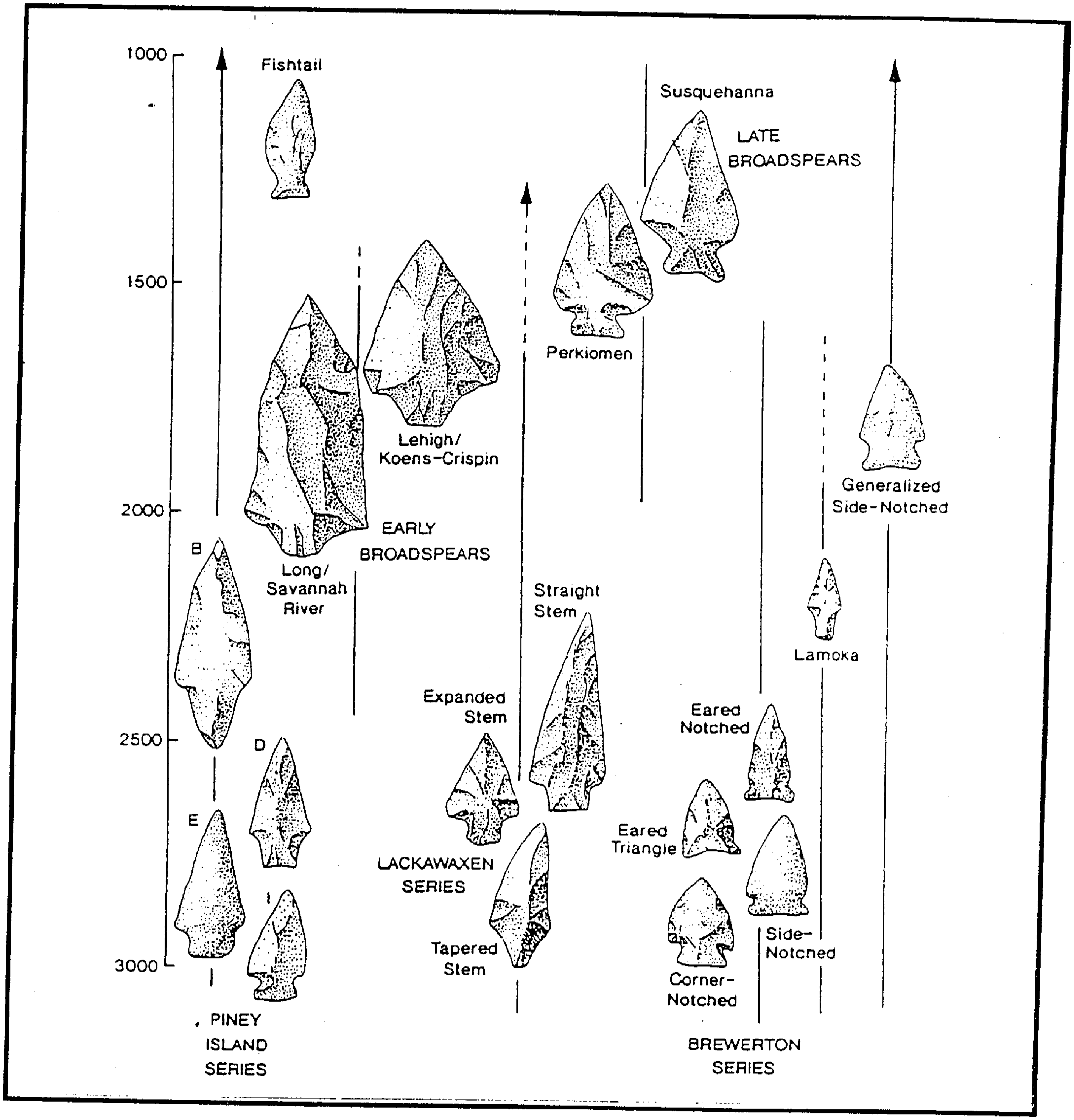
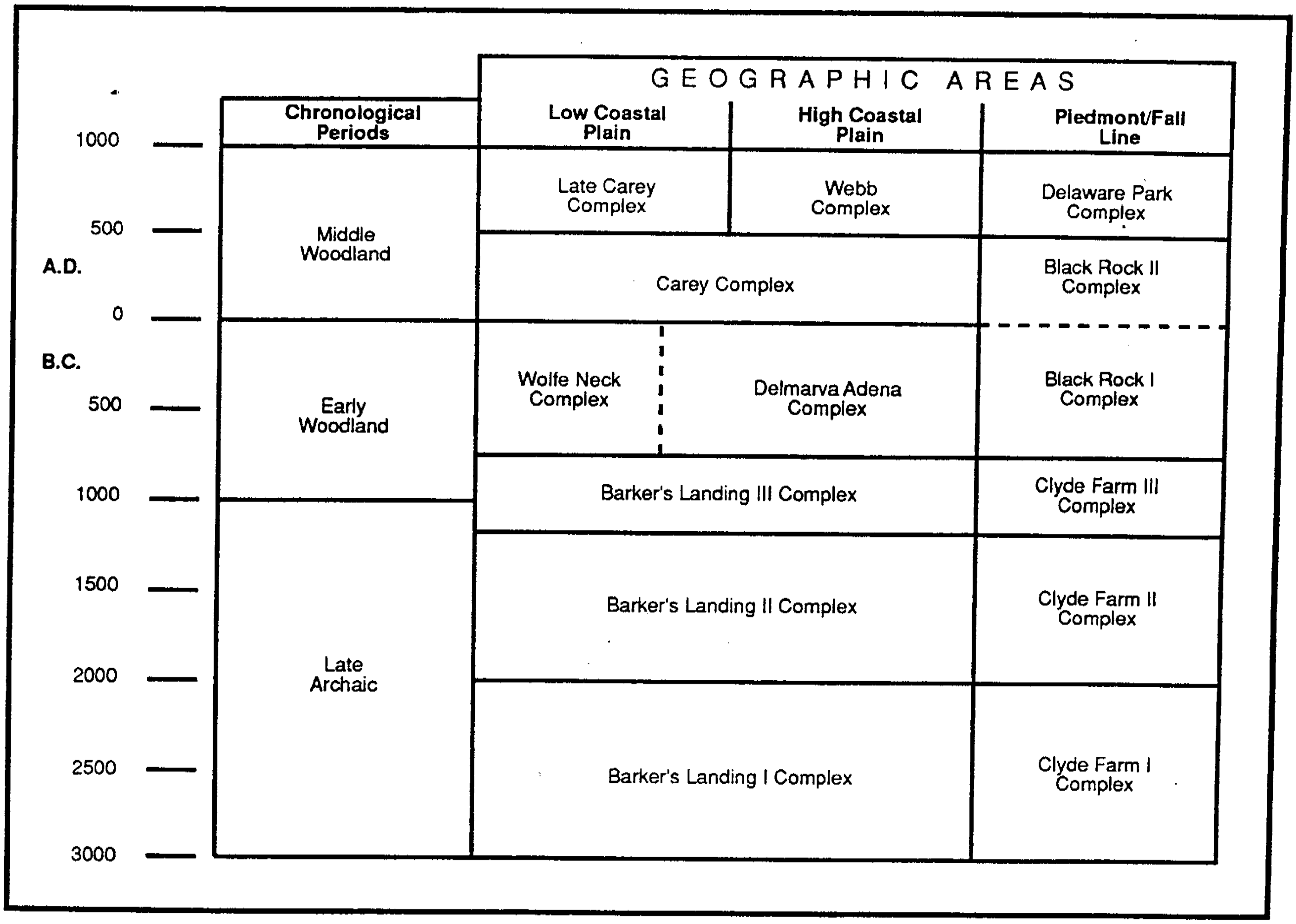


FIGURE 17

Revised Woodland I Chronology



The associations depicted in Figures 15 and 16 show that the Clyde Farm and Barker's Landing complexes, which include the same range of projectile point types, and which heretofore had been treated as single chronological units, can be divided into three separate chronological units which are noted in Figure 17. The revised chronology shown in Figure 17 allows a more detailed ordering of Late Archaic and Early Woodland cultures within the Woodland I Period.

Ceramics also have played an important role in defining chronological periods within the Woodland I Period. Figure 18 shows the basic Woodland I regional ceramic chronologies for the Delmarva Peninsula region and Table 1 lists the major attributes of the ceramic types. The data in Table 1 are derived from summary descriptions in Custer (1989:167-176; 1995), and the original type descriptions are included in Artusy (1976), Griffith (1982), and Wise (1975a, 1975b). Figure 19 provides a summary of trends in ceramic technologies and Figure 20 depicts the distributions of ceramic temper types. There are few, if any, changes in these distributions since their original publication.

FIGURE 18

Woodland I Ceramic Chronology

Date	Lower Delmarva	Southern Delaware	Central Delaware	Middle Eastern Shore	Northern Delaware	Upper Eastern Shore	Southern Pennsylvania
1000							
600	Claggett	Claggett	Hell Island	Hell Island	Hell Island	Hell Island	Hell Island
A.D. 0	Mockley	Mockley	Mockley	Mockley	Mockley	Mockley	Mockley
B.C. 400	Wilgus/ Accokeek	Wilgus Coulbourn Nassawango	Wilgus Coulbourn Nassawango	Coulbourn	↑	Coulbourn	↑
700	Wolfe Neck	Wolfe Neck	Wolfe Neck	Wolfe Neck	Wolfe Neck	Wolfe Neck	Susquehanna Vinette I
1200	Dames Quarter Marcey Creek	Seldon Island Dames Quarter Marcey Creek	Dames Quarter Marcey Creek	Dames Quarter Marcey Creek	Seldon Island Dames Quarter Marcey Creek	Seldon Island Dames Quarter Marcey Creek	Seldon Island Hare Plain Marcey Creek
2000	Soapstone Bowls						

TABLE 1

Woodland I Ceramic Attributes

Ceramic Type	Temper	Surface Treatment	Vessel Shape and Construction
Marcey Creek	steatite	smoothed	flat-bottomed/modeled
Ware Plain	crushed rock	smoothed	flat-bottomed/modeled
Dames Quarter	gneiss; hornblende	smoothed	flat-bottomed/modeled
Seldon Island	steatite	cord-marked	conoidal/coiled
Wolfe Neck	crushed rock	cord-marked/ net-marked	conoidal/coiled
Accokeek	crushed rock	cord-marked	conoidal/coiled
Vinette I	crushed rock	interior/exterior cord-marked	conoidal/coiled
Susquehanna	crushed rock	cord, fabric, and net-marked	conoidal/coiled
Nassawango	crushed rock and clay	cord-marked/net-marked	conoidal/coiled
Coulbourn	clay	cord-marked/net-marked	conoidal/coiled
Wilgus	crushed shell and clay	cord-marked/net-marked	conoidal/coiled
Mockley	crushed shell	cord-marked/net-marked	conoidal/coiled
Claggett	crushed shell	cord-marked/net-marked	conoidal/coiled
Hell Island	grit/sand	cord-marked/net-marked	conoidal/coiled

FIGURE 19

Trends in Woodland I Ceramic Technology

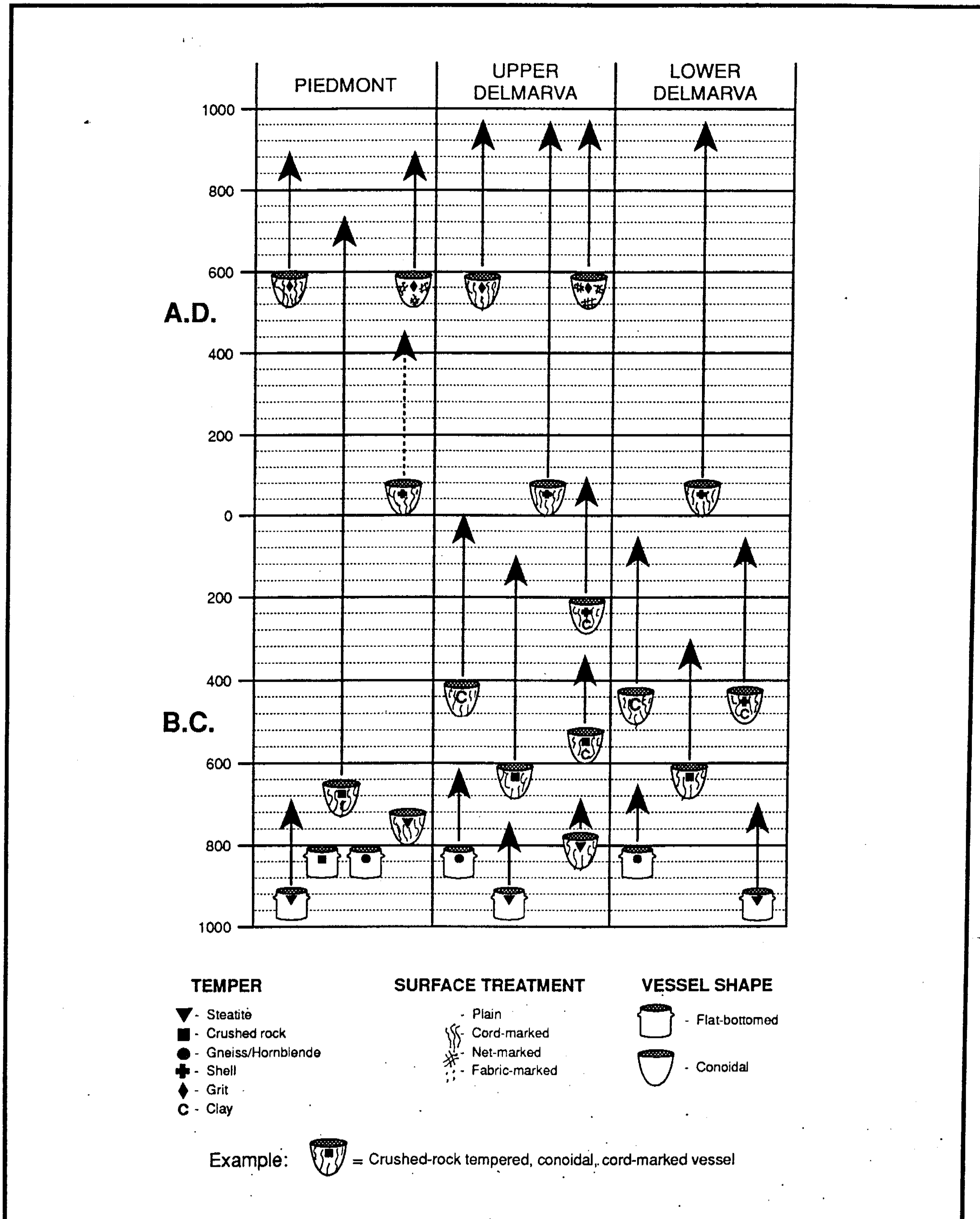
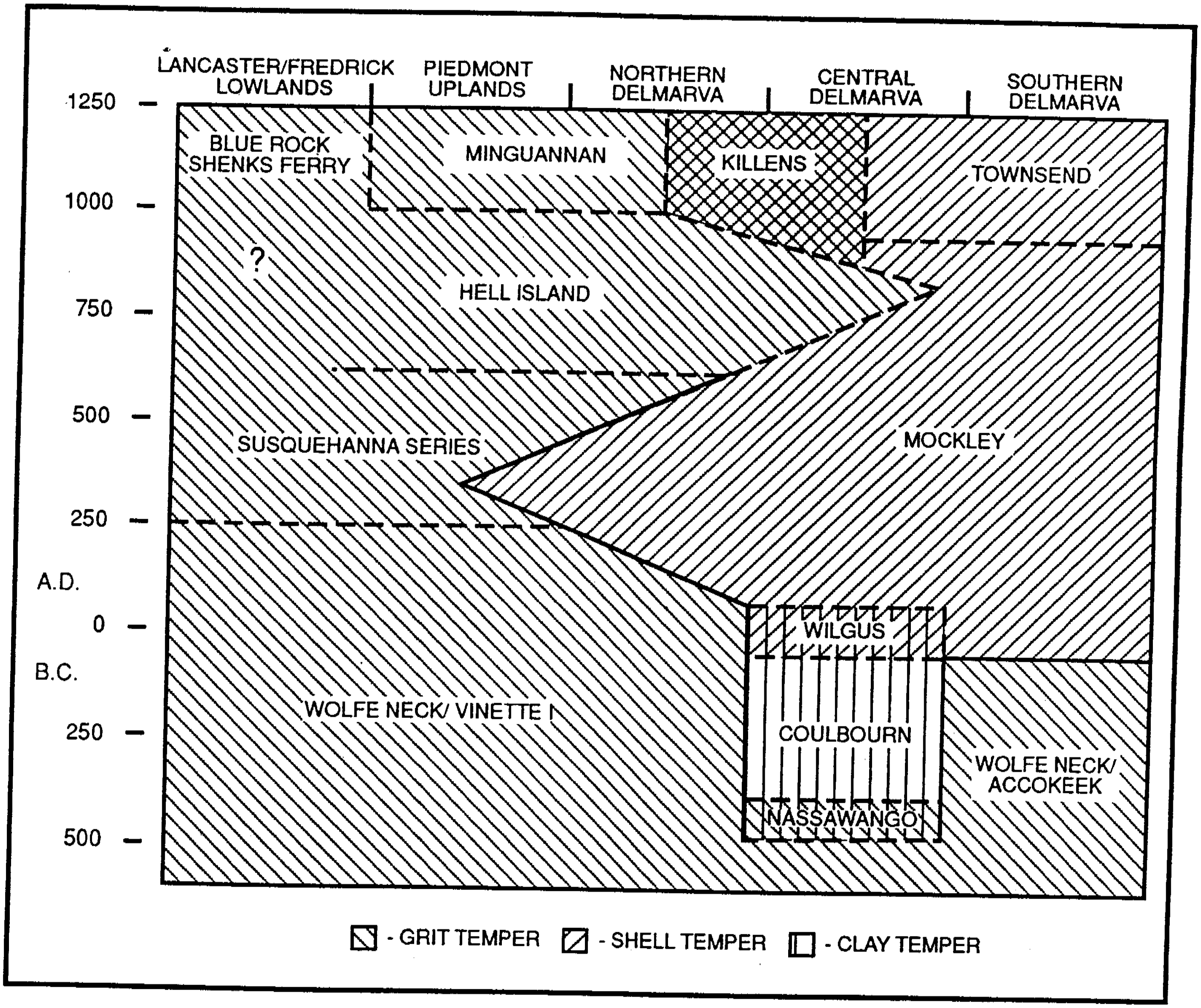


FIGURE 20
Distribution of Ceramic Tempers



The varied data on ceramic distributions through time and space can be combined to refine the initial lists of diagnostic artifacts associated with the Woodland I complexes. Table 2 shows the revised lists of diagnostic artifacts for the revised culture complexes shown in Figure 17. The chronological organizations in Figure 17 and Table 2 will be used in the remainder of this report.