INTRODUCTION

The purpose of this report is to describe the final archaeological investigations at the Snapp Site (7NC-G-101, N-12117), in southern New Castle County, Delaware (Plate 1, Figure 1). The Snapp Site was discovered during the 1987 Phase I archaeological survey of the Chesapeake and Delaware Canal bridge replacement section, Odessa segment of the State Route 1 Corridor, New Castle County, Delaware (Hodny, Bachman, and Custer 1989). The site was initially identified as a dense surface scatter of prehistoric artifacts. Because of the large size of the site, the presence of numerous stone artifacts, and an abundance of fire-cracked rock observed during the Phase I survey of the Snapp Site, Phase II excavations were recommended and consequently conducted in 1991. Phase II excavations showed that intact subsurface features were present and the site was considered to be eligible for the National Register of Historic Places (Kellogg et al. 1994). The Snapp Site was considered to be especially significant because the subsurface pit features appeared to be the remains of prehistoric houses, fireplaces, and trash pits from the Woodland I Period (ca. 3000 B.C. - A.D. 1600). Excavation and study of such features provides invaluable insights into prehistoric lifeways and only archaeological studies can gather this important information. Furthermore, no sites like the Snapp Site have ever been identified and excavated in southern New Castle County and only a few have been extensively studied on the entire Delmarva Peninsula. Therefore, the Snapp Site was considered to be very likely to produce important archaeological data of regional significance. Because of the Snapp Site's significance, the recommended alternatives were to avoid and preserve the site. If avoidance was not possible, Phase III data recovery excavations were recommended.

Phase III excavations of the Snapp Site were conducted by the University of Delaware Center for Archaeological Research (UDCAR) during the summer and fall of 1991 for the Delaware Department of Transportation (DelDOT) and the Federal Highway Administration (FHWA) under Section 106 of the National Historic Preservation Act of 1966 and Section 138 of the Federal Highway Act to recover significant archaeological data as per 36CFR 800 .4c and the "Advisory Council's "Treatment of Archaeological Properties: A Handbook." Funding for the Snapp Site project was provided for by the Delaware Department of Transportation and the Federal Highway Administration.

Environmental Setting

The Snapp Site is located on a gently sloping field, southwest of the St. Georges Bridge, which spans over the Chesapeake and Delaware Canal (Plate 1, Figure 2). The construction of the Chesapeake and Delaware Canal, which is located directly north of the site (Plate 1, Figure 2), radically changed the local geography and topography. Figure 3 shows historical maps of the region from 1850 and 1881 when the canal was present in an early less extensive form. These maps also show the local drainage, St. Georges Creek, when it still retained some of its original form. The 1850 map is especially interesting because it shows the Snapp Site located on a bluff overlooking the broad estuarine lower segment of St. Georges Creek. Plate 2 shows the location of the site in relation to two stream channels to its east and west. Both streams drain swampy woodlands and their confluences with the original St. Georges Creek probably were not far apart.

Figure 4 shows a reconstruction of the probable topographic setting of the Snapp Site prior to the canal's construction. The site would have been located on a point of land bounded to the east and west by poorly-drained freshwater woodlands and to the north by the broad embayed estuary of lower St. Georges Creek. The proximity of freshwater wetlands and estuarine settings makes the Snapp Site setting very rich in natural food sources and it would have been an especially attractive area for settlement by prehistoric hunters and gatherers.

There is no doubt that the Snapp Site is adjacent to modern transportation routes (Plates 1 and 3), but it is also located on a prehistoric transportation route. The Chesapeake and Delaware Canal was constructed at its present location primarily due to the fact that the headwaters of St. Georges Creek, which flows from west to east into the Delaware drainage, and the headwaters of Back Creek, which flows from east to west into the Chesapeake drainage and along which the western extent of the canal is located, are very close together. Just as these two drainages provided a suitable corridor for the canal during historic times, they would have provided an easy route for prehistoric groups crossing between the Chesapeake and Delaware drainages. It would have been relatively easy for prehistoric travelers to travel up either drainage by canoe, and then portage the short distance separating the two drainages. Thus, in addition to being located in a productive natural environmental setting, the Snapp Site was also located on a prehistoric transportation route.

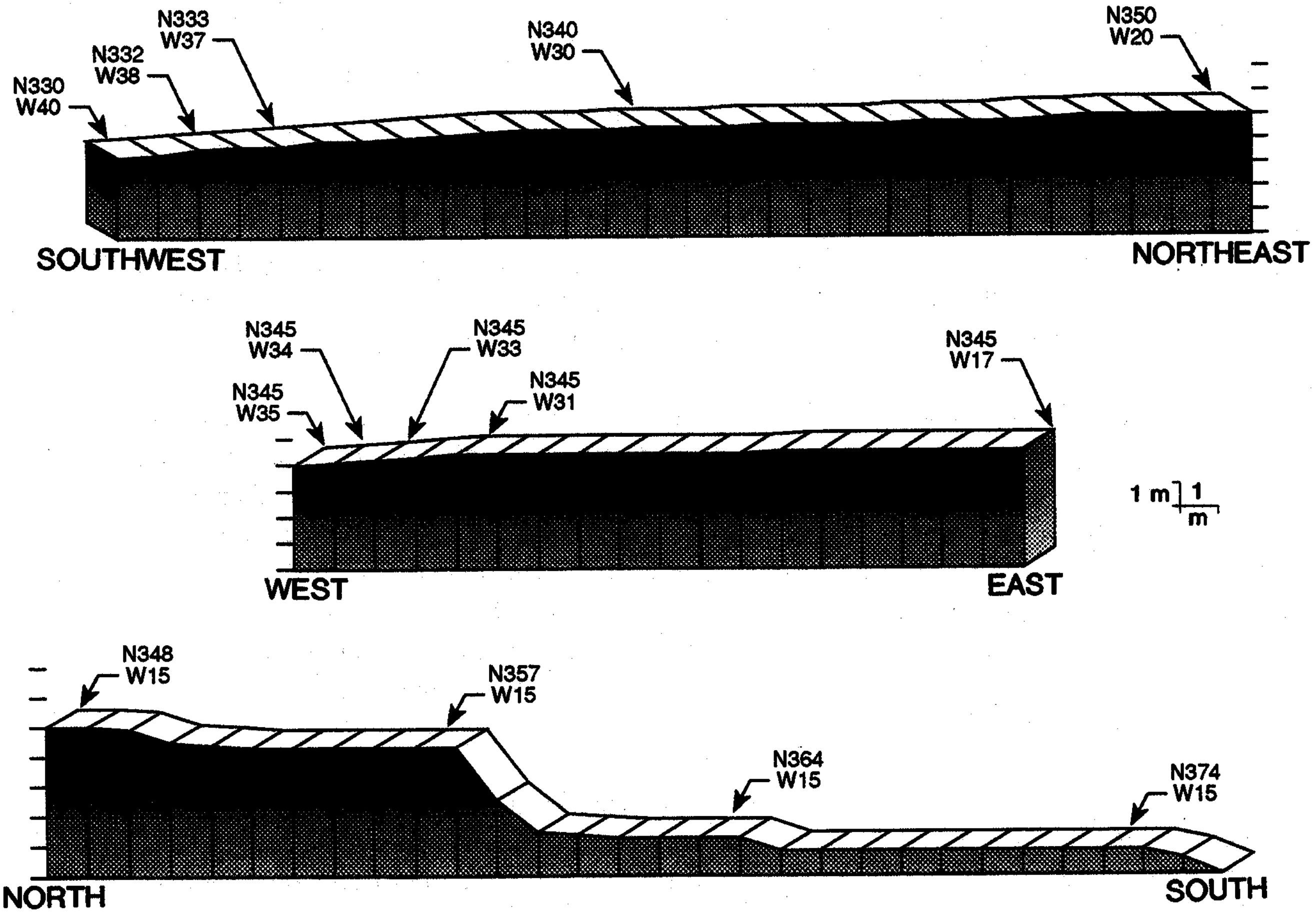
From a regional perspective, the Snapp Site is located in the Upper Coastal Plain, and lies on the boundary between two physiographic zones; the Mid-Drainage Zone and the Bay Coast Zone (Figure 5). Characterized by extensive combinations of brackish and freshwater resources, the Mid-Drainage Zone is one of the richest physiographic zones in Delaware. Located between the Bay Coast and Mid-Peninsular Drainage Divide Zones, the Mid-Drainage Zone contains central sections of all Coastal Plain tributaries of the Delaware River (Custer 1989:27, 30-31). The modern tidal limit along the drainages marks the center of the zone and the major drainages and their tributaries are fresh throughout the inland half, or western half, of the zone. Some tidal marshes and poorly drained areas exist on isolated headlands between the major drainages and their tributaries (Custer 1984; Custer and DeSantis 1986).

The Bay Coast Zone includes remnant terraces of the Delaware River as well as various tidal marshes that fringe both the Delaware River and the Delaware Bay. These marshes can be found throughout the zone and often extend well up the Bay Shore and river drainages. The soils of these marshes are generally poorly drained. Pockets of well drained soils can be found at higher elevations. Many of the soils in this zone are well drained silts (Custer 1989:27, 30).

Since the end of the Pleistocene, many of the physiographic zones have been subjected to extensive landscape changes. As a result, the boundaries between the various zones have not remained constant. The most significant of these changes is post-Pleistocene 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 Bay Coast Zone.

The physiographic location of the Snapp Site, on the transitional boundary between the Mid-Drainage and Bay Coast Zones, is pertinent to interpretation of the site. The availability of both estuarine and marine resources increased the value of the location of the site to prehistoric populations. A wide variety of hunted and gathered resources could be collected in the general region around the site just as a wide range of resources was available within the immediate area of the site.

The Snapp Site itself consisted of two areas (Plate 4). The majority of the site is located within a gently sloping cultivated field. Soils at the site were predominately Matapeake silt loams (Matthews and Lavoie 1970). However, field observations of exposed Pleistocene gravels at or near the surface indicated that the soils have been subjected to severe erosion. A smaller portion of the site extended into a woodlot to the northwest of the field. In this woodlot were a series of natural and man-made terraces which extended from the northern end of the field to the canal (Figure 6). The smallest and southernmost terrace consisted of fill. The northernmost field was a dirt access road which ran the length of the Canal (Plate 4). The two middle terraces were larger with steeper slopes. Test excavations and spoon probe testing during Phase II revealed undisturbed, well developed soil profiles. These observations indicated that these terraces originated naturally. Both terraces are most likely remnants of ancestral stream terraces of the former St. Georges Creek. East and west of the field and woodlands the land surface drops sharply to ephemeral stream gullies and low swampy areas (Plate 2). Natural landscape features thus formed the site's eastern, western, and northern boundaries; however, the southern boundary of the site was defined by the extent of prehistoric artifacts. In total, the site area was approximately 1.2 hectacres (3 acres).


N330
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N357
W15
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N374
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NORTH
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Paleoenvironments

In order to better understand prehistoric lifeways in Delaware, it is necessary to study the dynamics of past physical environments of the Delmarva Peninsula. A wide range of environmental studies, including climatology, pedology, hydrology, and fossil pollen analysis have provided useful tools for reconstructing past environments and the following discussion is based on recent summaries (Custer 1989; Kellogg and Custer 1994). Models created from these studies can be applied to further understand prehistoric adaptations. The current geological period, the Quarternary Period, is divided into two epochs, the Pleistocene (16,000,000 B.P. - 10,000 B.P.) and the Holocene (10,000 B.P. - present) (Figure 7). Studies have shown that within these epochs are periods of climatic change which have had impact on the subsistence strategies of prehistoric groups. Based on their analysis 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 data sequence may be a reflection of abrupt environmental disturbances that divide time periods of relatively stable climates. Five environmental episodes have been established in the time between 15,000 B.C. and A.D. 1600 (Figure 7).

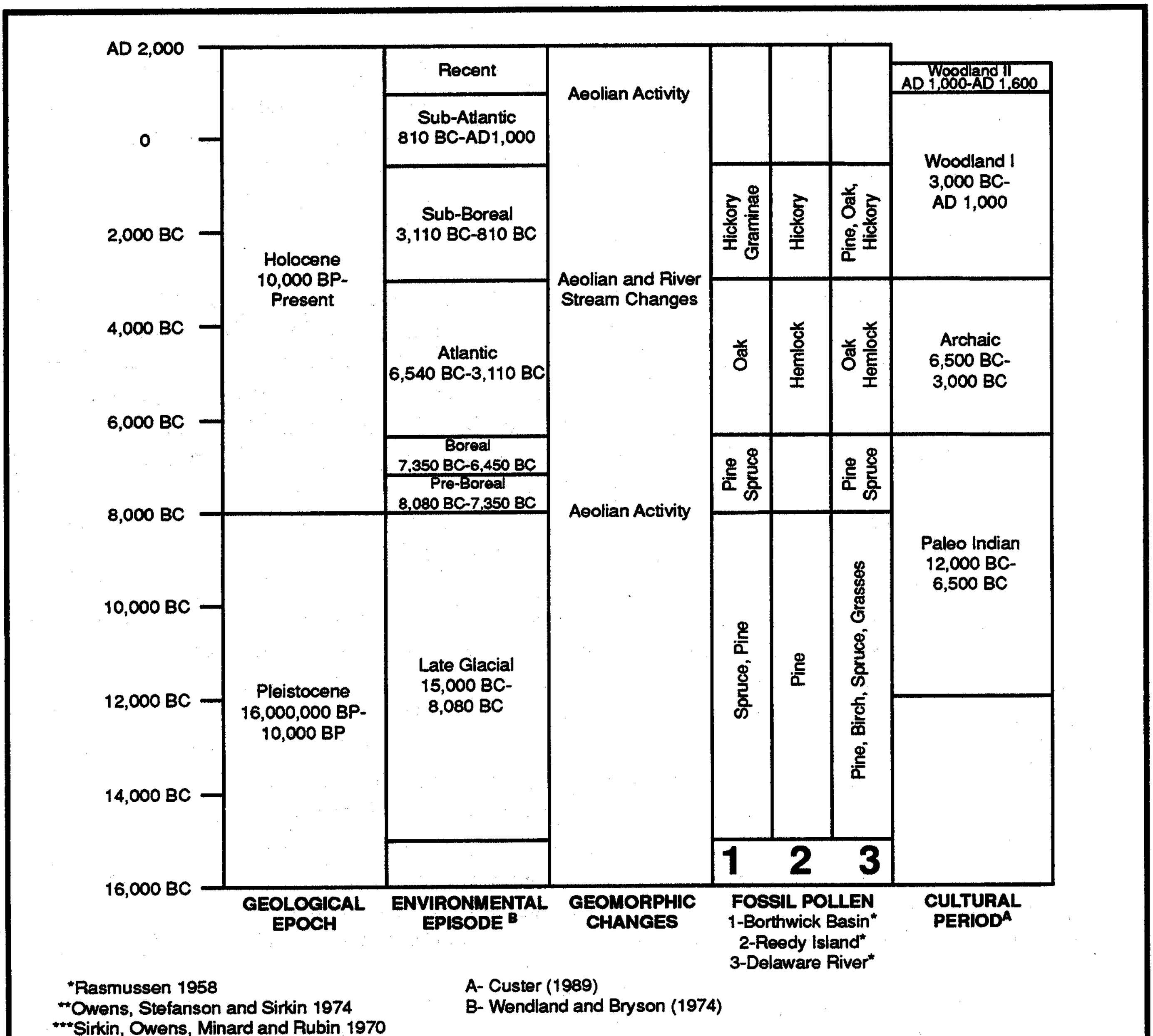
Studies of regional landscape modification have also identified periods of change in the environment (Figure 7). Two geomorphic processes have been linked to climatic changes (Knox 1983; Curry 1978; Curry and Custer 1982; Custer 1989; Kellogg and Custer 1994). These processes are aeolian deposition/erosion of soils, and changes in river and stream systems. Deposition of aeolian, or windblown, soils indicates degrees of denudation of vegetation (Curry 1980; Curry and Custer 1982; Custer 1989). Three significant occurrences have been dated to the transitional period from the Pleistocene to the Holocene (Foss et al. 1978), the Middle Holocene (Curry 1980), 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 7). To fully understand the impact of these changes on prehistoric settlement patterns, these environmental changes must be regarded in a spatial and temporal context.

The Pleistocene is characterized by the onset of colder 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 continent. The retreat of this ice sheet was most influential on the climatic conditions of 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 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

FIGURE 7

Environmental Changes and Climatic Episodes Changes from Ca. 15,000 B.C. to 1600 A.D.



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 indicate that the Delmarva Peninsula probably contained grassland settings within a broader coniferous matrix (Figure 7). These grassland environments would have supported cold weather megafauna and moose. Grassland areas would have been located in the low relief flood plains 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 depositions 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 began after 8000 B.C., with the Pre-Boreal and Boreal environmental episodes, when the ice sheet retreated north into Canada and temperatures increased due to solar warmth. 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 from this time on 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 beginnings of the Atlantic Episode, temperatures from solar radiation reached a maximum and the cold weather floral and faunal species migrated out of the Middle Atlantic region to areas further north. 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 hemlock, oak, and pine. Swamp areas were distributed among poorly drained areas such as the floodplains and bay/basin settings. These environments supported fauna 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.

After the Atlantic Episode, the climates and environments of the Delmarva Peninsula are complex and have been subjected to many interpretations. 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 followed by increases in precipitation and cooler temperatures. The early part of the Sub-Boreal Episode has been called the "Mid-Postglacial Xerothermic," which seems to have had a significant impact on the distribution of plant and animal resources of the Delmarva Peninsula. The pollen data dating from this time shows a decline in oak and an increase in hickory species. These data suggest that the 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 wide spread on the Delmarva Peninsula. During the Sub-Boreal, estuarine resources change. Although sea level was still rising, the rate of change seemed to have been stable 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. The dominant game animals of this episode were deer and turkey. After 500 B.C., the rate of sea level change stabilized and estuarine resources continued to accumulate.

Regional studies of past environments can also be applied to reconstruct the past environment of the Snapp Site area. The decline in sea-level rise has probably been most influential in shaping the current setting of this area. During the Late Glacial Episode, the site may have been either a dense forest of spruce and/or pine. By the onset of the Holocene (Pre-Boreal, Boreal episodes), the spruce pine mixtures would have been replaced by pine-spruce mixtures. The general warming replaced the coniferous forests with dense hardwood forests of oak, pine and hemlock. The terraces and floodplains of the St. Georges Creek may have supported many species found in the area today. However, the St. Georges Creek and other nearby drainages were probably not stable enough to support development of estuarine resources.

The most dramatic changes of the site area probably occurred during the transition between the Atlantic and Sub-Boreal episodes. After the Mid-Postglacial Xerothermic, the oak species of the forests declined as hickory species predominated. Grasslands may have also emerged at or near the site area. As sea-level rise stabilized, estuarine resources in the floodplains and marshy areas of the St. Georges Creek and other nearby drainages began to accumulate. The floodplains of these waterways and the mixed forests of hickory, oak and pine were ideal settings to support a wide range of faunal species. By the middle of the Sub-Boreal Episode, the environment probably closely resembled the environment prior to the construction of the canal in 1841.

Regional Prehistory

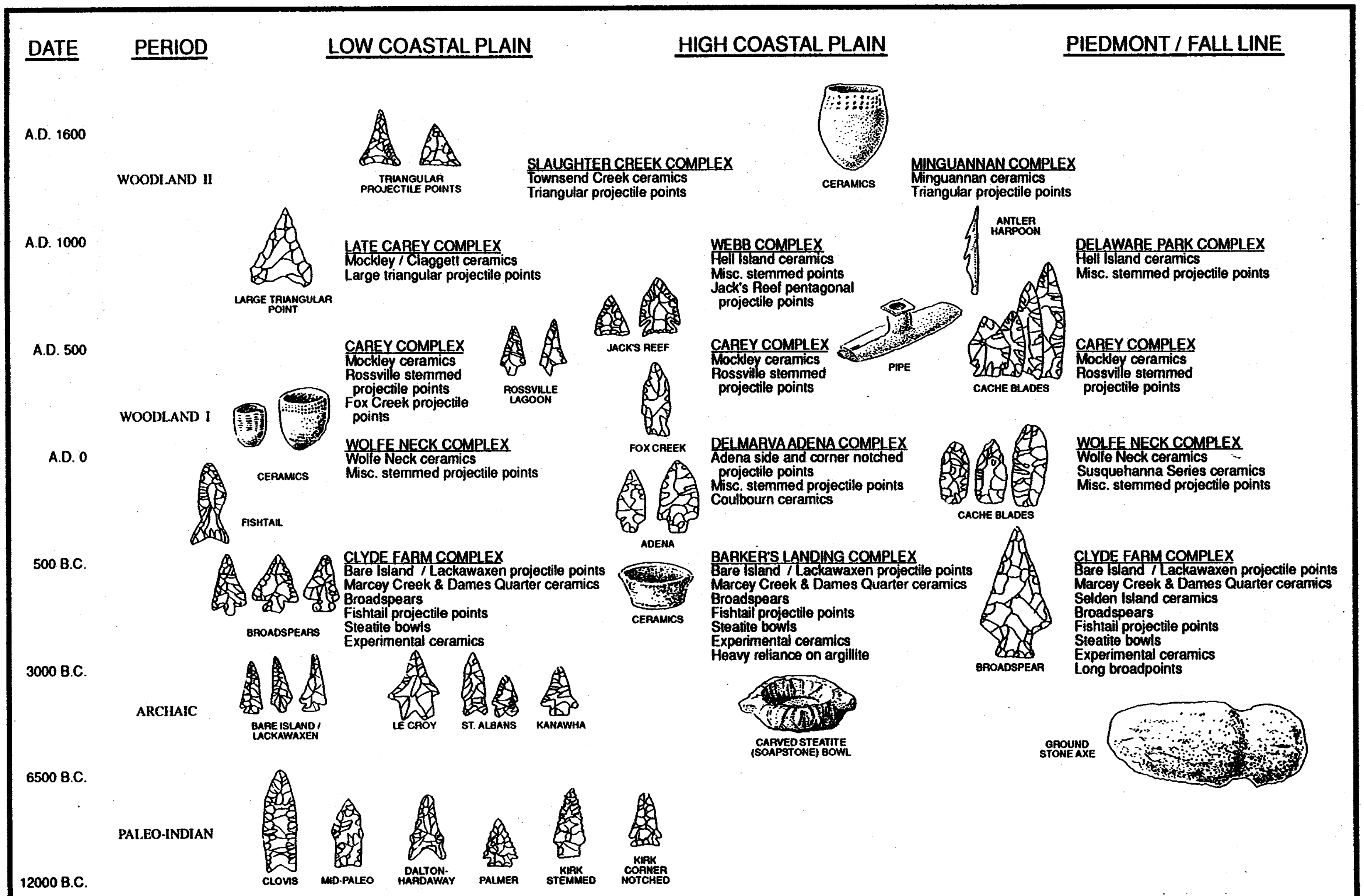
The following summary of regional prehistory has been abstracted from the work of Custer (1986, 1984, 1989). The prehistory of the Delaware Coastal Plain is divided into four periods: the Paleo-Indian Period (12,000 B.C. - 6500 B.C.), the Archaic Period (6500 B.C. - 3000 B.C.), the Woodland I Period (3000 B.C. - A.D. 1000), and the Woodland II Period (A.D. 1000 - A.D. 1650). A fifth time period, the Contact Period, from A.D. 1650 to A.D. 1750, marks the final phase of occupation by Native American groups in Delaware in anything resembling their Pre-European Contact form (Figure 8).

Paleo-Indian Period (ca. 12,000 B.C.- 6500 B.C.). The Paleo-Indian Period encompasses both the final retreat of Pleistocene glacial conditions from eastern North America and the subsequent establishment of more modern Holocene environments. The distinctive feature of the Paleo-Indian Period is an adaptation to climatic changes; from the cold climate of the end of the Pleistocene to the alternatively wet and dry climate marking the beginning of the Holocene. Paleo-Indians practiced a hunting and gathering subsistence in which animal food resources comprised a major portion of their diet. Hunted animals may have included now extinct megafauna and moose. A mosaic of deciduous, boreal, and grassland environments in central Delaware would have provided numerous productive habitats for such animals. Watering areas would have been particularly good hunting settings.

Tool kits of Paleo-Indian groups were oriented toward the procurement and processing of hunted animal resources. Preferences for high quality lithic materials are apparent in flaked stone tool kits. Careful resharpening and maintenance of tools was common. Mobile groups of single and multiple family bands are hypothesized to have focused on game attractive environments for settlement. Throughout the 5,500 years of this time period, the basic adaptive lifestyle remains consistent with some modifications being seen as Holocene environments appeared at the end of the Paleo-Indian Period.

Numerous Paleo-Indian finds are noted in Central Delaware. These finds are usually made on well-drained knolls adjacent to poorly drained areas. Unfortunately, all finds are also surface find spots and shed little light on Paleo-Indian lifeways on the Delmarva Peninsula. The Hughes Paleo-

FIGURE 8
Cultural Periods of Delaware



Indian Complex (sites 7K-E-10, 7K-E-24, and 7K-E-33), produced several varieties of fluted and notched points from sites which are well-drained areas adjacent to various swampy settings (Custer 1984:58). Bay/basin features are also hypothesized to have attracted Paleo-Indian groups; however, no clear association has been observed.

Archaic Period (6500 B.C. - 3000 B.C.). The Archaic Period is characterized by the complete emergence of the Holocene environment in central Delaware. Mesic forests of oak and hemlock predominated in the Holocene climate while grasslands diminished. Consequently, many of the grazing animals, hunted during Paleo-Indian times, became extinct while browsing species such as deer flourished.

The beginning of the Holocene in central Delaware is also associated with a rise in sea level. This rise resulted in a rise in the water table, creating numerous large interior swamps. Adaptations shifted from the hunting focus of the Paleo-Indian Period to a generalized foraging pattern in which plant food resources played a more prominent role. Swamp settings, such as Churchman's Marsh in northern Delaware, supported base camps, as indicated by archaeological excavations at the Clyde Farm Site. Numerous small procurement sites in favorable hunting and gathering locales are recorded in central and southern Delaware.

Differences between the adaptive subsistence patterns of the Archaic Period and the Paleo-Indian Period are also reflected in the tool kits. In addition to the introduction of plant processing tools such as grinding stones, mortars, and pestles, Archaic tool kits were more generalized than those of their Paleo-Indian precursors. A mobile lifestyle was still practiced, with a wide range of resources and environmental settings utilized on a seasonal basis. A shifting band level of organization, which saw the waxing and waning of group size in response to seasonal resource availability, is evident.

Woodland I Period (3000 B.C. - A.D. 1000). The Woodland I Period coincides with dramatic local climatic and environmental shifts. These shifts seem to be part of larger scale changes occurring throughout the Middle Atlantic region at this time. The emergence of pronounced warm and dry conditions caused the mesic forests to be replaced by xeric forests of oak and hickory and once again grasslands became common. Although some interior swamps disappeared, the overall effect of these changes was not a degradation, but rather an alteration of the environment. The continued rise in sea level, although at a reduced rate, created many large brackish marshes around the Delaware River and Bay Shore. These marshes were especially high in productivity.

These changes in environment and resource distributions brought about a radical shift in adaptations for prehistoric groups. Important areas for settlements included the major river floodplains and estuarine swamp/marsh areas. Large base camp sites have been identified at several of these types of environmental settings in central Delaware. Some of these large base camp sites include the Barker's Landing, Coverdale, Hell Island, and Robbins Farm sites. These sites seem to have been occupied by larger groups than those occupying Archaic base camp sites and may have been the loci of year-round habitations. Overall, the Woodland I Period tended toward a more sedentary lifestyle compared to the former periods.

Woodland I tool kits also reflected the practice of a more sedentary lifestyle. Chipped stone tool assemblages changed little from the preceding Archaic Period, although more broad-blade, knife-like processing tools became prevalent. Plant processing tools became more common. These types of tools indicate intensive harvesting of wild plant foods which may have approached the efficiency of agriculture by the end of the Woodland I Period. The addition of stone, and later ceramic, vessels is also seen. These containers enabled more efficiency in the cooking of certain foods and may have also functioned as storage containers for surplus plant foods. Storage pits and house features from the Woodland I Period have also been identified in Northern Delaware at sites such as Clyde Farm and Delaware Park.

Social organization also changed radically during this period. The onset of relatively sedentary lifestyles and intensified plant harvesting yielded occasional surpluses and may have instigated the development of incipient ranked societies. Indicators of this development include evidence of extensive trade and exchange of lithic materials to be used in tool manufacturing as well as for non-utilitarian artifacts, and caching of special artifact forms.

Woodland II (A.D. 1000 -A.D. 1650). In many areas of the Middle Atlantic, the Woodland II Period is characterized by the appearance of agricultural food production systems. However, this shift in subsistence strategy is not apparent in the Coastal Plain of Delaware (Custer and Cunningham 1986:24). Occupation of many Woodland I settlements, especially the large base camps, continued throughout the Woodland II Period, with few changes in basic lifestyles (Stewart, Hummer, and Custer 1986). Intensive plant utilization and hunting remained the basic subsistence activities up to European Contact. Similarly, no major changes are evident in social organization during this period in central Delaware.

Contact Period (A.D. 1650 - A.D. 1750). The arrival of the first substantial number of Europeans marks the beginning of the Contact Period. Due to the paucity of known archaeological sites clearly dating from this time, this period remains enigmatic for Delaware. Site 7NC-C-42 in northern New Castle County and the Dragon Run Site (7NC-G-104) are the only sites with Contact components yet investigated in Delaware (Custer and Watson 1985; Kellogg et al. 1994). These sites' small size, impoverished assemblage of European goods, and persistence of aboriginal lithic technologies contrast with the larger Contact sites of neighboring southeastern Pennsylvania and elsewhere. It seems clear that Native American groups of Delaware did not participate in much interaction with Europeans and were under the virtual domination of the Susquehannock Indians of southern Lancaster County, Pennsylvania. The Contact Period ended with the virtual extinction of Native American lifeways in the Middle Atlantic area with the exception of a few remnant groups.

PREVIOUS RESEARCH

Phase I Survey

The Snapp Site (7NC-G-101) was identified during a Phase I archaeological survey of the Chesapeake and Delaware Canal section, Odessa segment of the State Route 1 Corridor, New Castle County, Delaware (Hodny, Bachman, and Custer 1989). The primary purpose of this Phase I survey was to locate and identify archaeological sites which would be affected by the Proposed Relief Route and a total of 12 prehistoric and historical site loci were identified. The Snapp Site was one of nine sites recommended for Phase II testing.

Over 200 fire-cracked rocks, a quartz biface, a chert core, a hammerstone, and a ground stone tool fragment were observed during the Phase I pedestrian survey of the plowed field south of the C & D Canal. Because of the large size of the site, the presence of tools, and the quantity of fire-cracked rock observed during the Phase I survey, Phase II excavations of the field were recommended to better define the boundaries of the site. Artifact counts of Phase I survey are presented in Table 1.

Phase II Test Excavations

Phase II testing of the Snapp Site was conducted in 1991 (Kellogg et al. 1994). This initial survey consisted of the excavation of 80 shovel test pits in order to better define the site limits, and the later excavation of 12 1 x 1 meter square test units (Plate 4). During this initial stage of Phase II testing, additional tools and fire-cracked rock were recovered (Table 1) and six possible features were identified. Three of the six features were excavated and identified as storage or refuse pits. In addition to bifaces and debitage, two diagnostic artifacts were recovered from these excavations. A single sherd of steatite tempered ceramics dating to ca. 1200 B.C. to 700 B.C. (Custer 1989:168-169) was recovered from one of the features. Another feature contained an argillite contracting stem point that probably dates to the Woodland I Period. Both diagnostic artifacts suggested a Woodland I occupation of the site.

The final stage of Phase II investigations at the site consisted of a one percent excavated sample of plow zone soils, and also selective testing of intact soils in the woodlot areas north and west of the plowed field. The primary goals of these excavations were to determine density distributions of prehistoric artifacts, to collect a sample of the types of artifacts present at the site, to identify the potential of additional subsurface features, and to identify the potential of intact cultural deposits. To achieve these goals, seven additional shovel tests pits were excavated in the woodlot northwest of the field and an additional 59 1 x 1 meter square test units were excavated at 10 meter intervals across the site (Figure 9, Plates 4 and 5). Test unit excavations yielded six stemmed and notched projectile points of chert, argillite, and jasper. All of these projectile points dated to the Woodland I time period (3000 B.C. - A.D. 1000). Other artifacts recovered included early and late stage bifaces, flake tools, non-modified utilized flakes, debitage and large quantities of fire-cracked rock (Table 1). Eight more potential features were also identified.

TABLE 1
Prehistoric Artifact Counts from Phase I and II Studies

	PHASE I	PHASE II FIELD	PHASE II WOODLOT	PHASE II TOTAL
FLAKES (CORTEX)				
Quartzite		20(5)	5	25(5)
Quartz		66(6)	8(3)	74(9)
Chert		453(70)	41(3)	494(73)
Jasper		259(50)	52(12)	311(62)
Rhyolite		4		4
Argillite		16	3	19
Ironstone		1		1
Chalcedony		100(11)	8(3)	108(14)
Other			4	4
UTILIZED FLAKES (CORTEX)				
Quartzite			1	1
Quartz		2		2
Chert		3		3
Jasper		4(2)	6	10(2)
FLAKE TOOLS (CORTEX)				
Chert		1		1
Jasper		1(1)		1(1)
WOODLAND I POINTS (CORTEX)				
Chert		2		2
Jasper		1		1
Argillite		2		2
Other		1		1
EARLY STAGE BIFACE REJECTS (CORTEX)				
Quartz	1(1)			
Chert		1	1	2
Jasper		1	1(1)	2(1)
LATE STAGE BIFACE REJECTS (CORTEX)				
Chert		2		2
OTHER BIFACES (CORTEX)				
Quartz		1	1	2
Jasper		2		2
Chalcedony		2		2
Other		1		1
MISC. STONE TOOLS (CORTEX)				
Hammerstone	1			
Ground stone tool	1			
SHATTER (CORTEX)				
Quartzite		1	1(1)	2(1)
Quartz		5(1)	4(1)	9(2)
CORES (CORTEX)				
Quartz		2(1)		2(1)
Chert	1(1)	1(1)		1(1)
Jasper		1		1
FIRE-CRACKED ROCK				
Count	200	1014	108	1122
Weight (kg)	10.6	51.27	8.6	59.87
TOTAL	204(2)	1970(145)	241(27)	2211(172)

Seven shovel test pits were excavated to better assess the limited areas of intact soils in the woodlot north and west of the field (Plate 4). Specifically, these soils were identified in the vicinity of N270 W30 and from N320 W19 to N355 W30 (Figure 9). Excavations in these areas indicated that the intact soils were present in the woods north of the site and were approximately 20 centimeters thick. The soils consisted of a clayey loam to silty clay soil appearing directly below the humus. Prehistoric artifacts were collected from these soils. In sum, the results of the Phase II investigations tentatively identified the Snapp Site as a macro-band base camp of the Woodland I Period, as indicated by the presence of pit features, diagnostic artifacts, and the large variety and quantity of artifacts recovered.

Research Design

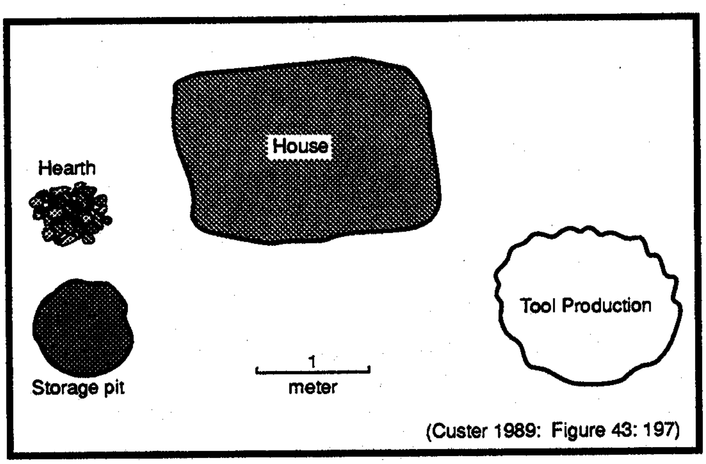
Basic data description was the major goal of Phase III archaeological research at the Snapp Site. Although small sections of other prehistoric base camps have been excavated (e.g., Clyde Farm Site - Custer, Watson and DeSantis 1985), only one other base camp in northern Delaware, the Delaware Park Site (Thomas 1981), has been subjected to large-scale intensive excavations and data analysis. At the time of the Snapp Site excavations, personnel from UDCAR were also in the process of excavating and analyzing data from other similar large base camps in Kent County, Delaware (Leipsic Site, Pollack Site, Carey Farm Site). At all of these sites, basic data description was a primary goal; however, the gathering and analysis of data was focused on current ideas about the roles of base camps in central Delaware prehistoric settlement patterns (Custer and Cunningham 1986; Custer and Bachman 1986; Custer, Bachman, and Grettler 1987).

Current models of Woodland I Period settlement in the Delaware Coastal Plain (Custer 1984, 1989) suggest that large base camps provide the residential focus for regional settlement of numerous social groups. From these base camps, prehistoric groups would have made a series of forays to outlying procurement sites to hunt and gather resources needed to support populations residing at the base camps. The presence of subsurface storage features is considered to indicate that the occupations of the sites spanned more than one season of the year. One of the major research goals of this project was to determine the intensity and duration of settlement at the Snapp Site in order to see if it was indeed used in such a manner.

In order to understand the duration of the habitation of the Snapp Site and its role in regional settlement patterns, considerable emphasis was placed on understanding the structure and contents of the features at the site. Research at other base camp sites in northern Delaware (Clyde Farm Site - Custer, Watson and DeSantis 1987) and in central Delaware (Leipsic Site (7K-C-194A - Custer, Riley, and Mellin 1994), have discovered the presence of "household clusters," or residential locales, at these sites during Woodland I times. "Household clusters" consist of a house structure with associated storage, refuse, and other features (Winter 1976). At the Clyde Farm site (7NC-E-6A), excavations of a 35 square meter area identified a household cluster (Figure 10) containing a platform hearth, numerous storage pits and a pit house (Custer, Watson and DeSantis 1985, Custer 1989). Analysis of physical characteristics of subsurface features at the Snapp Site was designed to facilitate understanding the variability of these household clusters and their components.

FIGURE 10

Household Cluster from the Clyde Farm Site (7NC-E-6A)



(Custer 1989: Figure 43: 197)

Many of the cultural changes characteristic of the Woodland I Period have been related to climatic changes that occurred during the Middle Holocene (3000 B.C. - 800 B.C.) (Custer 1989; Kellogg and Custer 1994). Drier climatic conditions with cyclical changes in temperature and moisture produced shifts in both the nature and distribution of varied food resources during this time span. Therefore, another major goal of our research was to determine the subsistence strategies practiced by the inhabitants of the Snapp Site during this climatic shift.

The contents of the subsurface feature soils at the site provided valuable information on prehistoric subsistence patterns. Ecofacts recovered from flotation offer a means to determine floral and faunal resource availability and seasonal occupation of the site. Ecofact analyses also have the potential to determine possible dietary patterns of the former inhabitants of the site. Other artifacts provide information on subsistence and subsistence related activities performed at the site. Study of stone tools and their attributes help to identify food preparation activities as well as tool manufacturing and maintenance activities at the site. Variations in lithic materials of stone tools allow the study of lithic raw material procurement and group movement patterns also associated with the food quest. Ceramic industries are also well represented at the site and provide further information on food cooking and storage strategies. Ceramic analyses also allow for study of ceramic manufacturing technologies.

The final goal of research at the Snapp Site was to use the information gained from excavations of the Snapp Site to evaluate current models of settlement patterns, subsistence strategies, and technologies of prehistoric cultures of Delaware. Management plans for the prehistoric cultural resources in Delaware have defined geographical Study Units to predict probabilities of occurrence of varied types of archaeological sites (Custer 1986). Models of settlement patterns have also served as a basis for defining the boundaries of these areas. The location of the Snapp Site within these Study Units can be considered to generate predictions of occupations of the site that might be present during different time periods.

The Snapp Site area falls within a Paleo-Indian Period Study Unit which has little known information for predicting Paleo-Indian site locations (Figure 11). The Phase I and Phase II test excavations did not recover any diagnostic artifacts that date to the Paleo-Indian Period (Table 1). However, given the environmental setting of the site, especially its proximity to a cobble bed lithic source, it is somewhat likely that this area may contain Paleo-Indian sites related to raw lithic material procurement (Figure 11).

The Snapp Site also falls within an Archaic Period Study Unit which has little known information (Figure 12). No diagnostic artifacts that date to the Archaic Period were recovered during Phase I or Phase II excavations of the Snapp Site (Table 1). However, the site's location along the banks of the St. Georges Creek resembles many of the kinds of environmental settings predicted to contain Archaic base camp and procurement sites of the Archaic Major Drainage Study Unit (Figure 12).

Management plans for prehistoric cultural resources in Delaware (Custer 1986) indicate that the Snapp Site is located within a Study Unit, the Interior Zone, which has moderate potential for containing Woodland I archaeological sites (Figure 13). In the Interior Zone, Woodland I macro-band base camps are expected to be located on major terraces of drainages or at well drained headlands adjacent to swamps/marshes. Micro-band base camps in this Study Unit are predicted to occur near low order tributaries or at confluences of tributaries. Procurement site locations are expected to be in swampy floodplains of the major and minor drainages and on alluvial fans associated with swamps, bogs, and lithic sources (Custer 1986) (Figure 13). The environs of the Snapp Site contain these kinds of environments. The six Woodland I projectile points (Table 1) and the presence of subsurface features in the cultivated field at the Snapp Site indicate that the site was the location of a Woodland I base camp (Kellogg et al. 1994). The site's environmental setting along the banks of the St. Georges Creek is also characteristic of predicted Woodland I base camp locations.

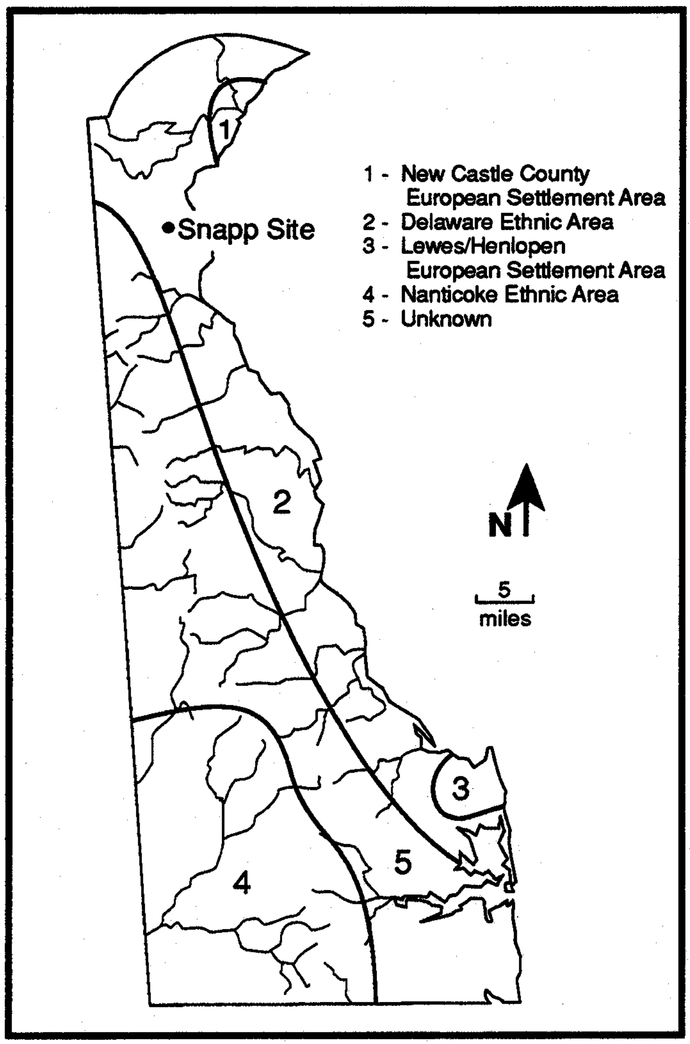
No diagnostic artifacts were recovered from Phase I or Phase II testing of the woodlot area of the Snapp Site. However, the proximity of the woodlot to a known Woodland I site and its physiographic setting suggests high probability of a Woodland I occupation in the Snapp Site woodlot as well. The relationship of the woodlot to the field or the function of this area was not determined during Phase I or Phase II testing, but was investigated during Phase III excavations.

Study Units for the Woodland II Period are the same as those of the Woodland I Period (Figure 14). The similarities between the Woodland I and varying Woodland II predictive models (Figure 14) support observations that many of the Woodland I base camp locations may have continued to be occupied into the Woodland II Period. The Phase I and Phase II test excavations at the Snapp Site did not recover any diagnostic artifacts that date to the Woodland II Period (Table 1). However, it is possible that the site may contain base camp occupations that date to the Woodland II Period.

The potential for sites dating to the Contact Period in the Snapp Site area is difficult to discern. Site type and site location expectancies for this period would be very much like the Woodland I and Woodland II Period predictions (Figure 13 and Figure 14); however, site expectancies decrease through time after the first contacts until the mid-eighteenth century. The Snapp Site is located in the Delaware Ethnic Study Unit (Figure 15) and any Contact Period materials recovered would pertain to the Lenape. Phase I and Phase II test excavations did not reveal any information which suggested a Contact Period occupation of the site. However, a small Contact component was encountered at the nearby Dragon Run Site (Kellogg et al. 1994). The high probability of the site area for Woodland I and Woodland II occupations also allows a slight possibility for a Contact Period occupation of the site.

FIGURE 15

Contact Period Study Units



The site chronology and site stratigraphy of the Snapp Site will also be used to examine spatial and temporal variations in settlement patterns in Delaware prehistory. Comparison of the Snapp Site to other known Woodland I sites in Delaware will provide information on variations in subsistence strategies and settlement patterns within the Woodland I Period. Comparison of the Snapp Site to sites dating to other cultural periods will enable further understanding of adaptations of prehistoric populations to changes in environment and resource availability through time. Most importantly, archaeological data recovered from the site can be used to strengthen predictive models used in management plans for prehistoric cultural resources in Delaware.

Research Methods

After the plow zone excavations, the site was mechanically stripped and flat shoveled in order to identify subsurface cultural features (Plate 6). Features were bisected and excavated in halves to check for stratification. All feature soils were hand excavated (Plate 7) and the soils screened through 1/4-inch mesh. At least one 5-liter flotation or soil sample was collected from each feature. Additional flotation and/or soil samples were collected from unusual or interesting soils within the feature fill.

Extensive test unit excavations (Plate 8) were also conducted in the woodlot north of the Snapp field (Plate 4). The primary purpose of these excavations was to identify undisturbed archaeological deposits that could be associated with the materials in the plowed field, and to collect data to better understand the function and occupations of this area of the site. The results of the woodlot excavations will be presented in their own section.

All artifacts were washed and marked in accordance with the procedures developed by the Delaware Bureau of Museums. Lithic artifacts were cataloged by raw material and functional types. All tools, samples of debitage, and soil samples were processed for potential blood and bone collagen residues following protocols developed by UDCAR (Custer, Ilgenfritz, and Doms 1988). Edge wear analyses using high and low power magnification were also conducted to help clarify activities undertaken at the site. To better understand stone tool manufacturing, bifaces were sorted following Callahan's (1979) categories of biface reduction. The presence or absence of cortex on lithic artifacts was noted in order to study use of local cobbles for tool manufacturing.

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PLATE 6
Excavations at the Snapp Site

PLATE 7
Excavating a Feature

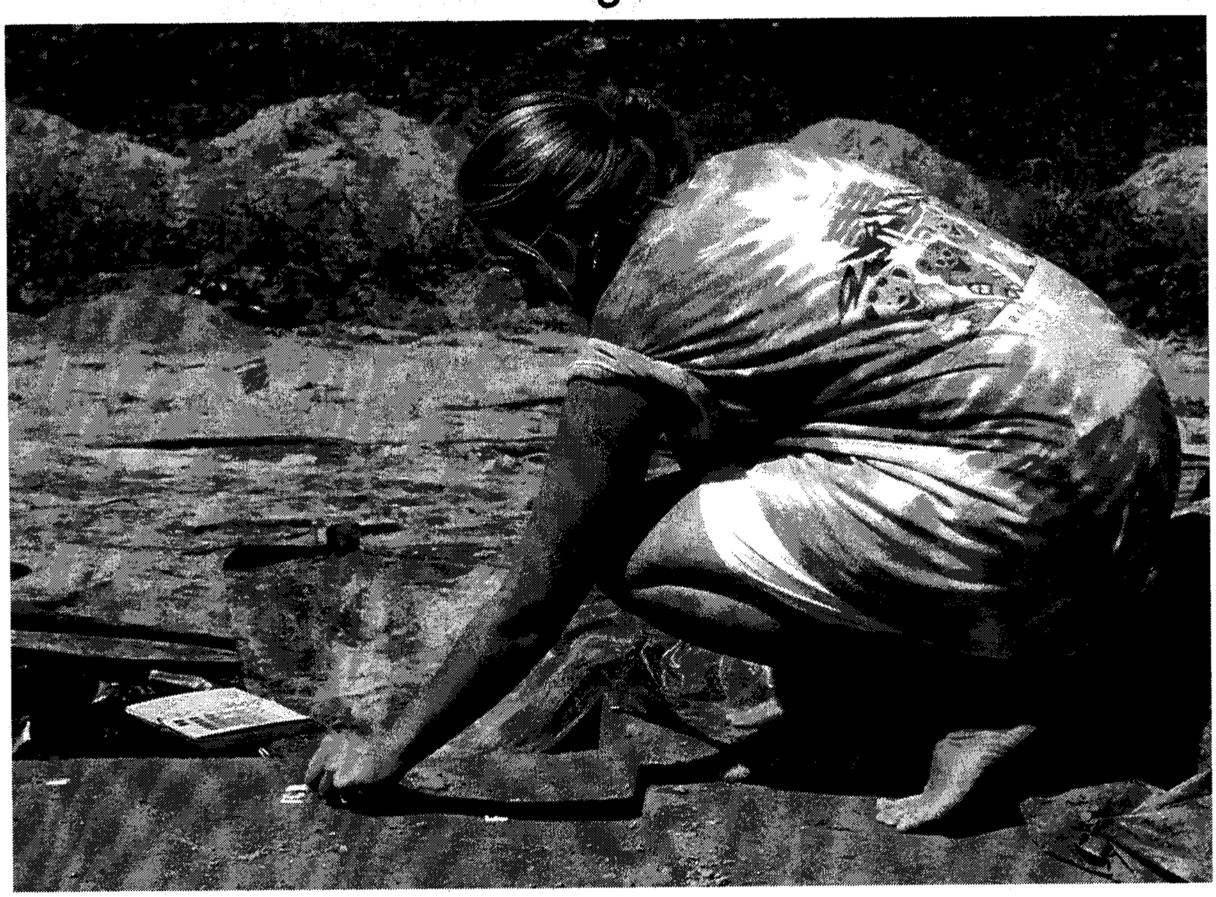

PLATE 8

Test Unit Excavations in Woodlot

Ceramics were cataloged by the major cultural types noted for Delaware (Custer 1989). To analyze form variability of ceramics, identifications of surface treatments and tempering components were noted. Latex molds of cordage impressions were created to study textile industries. Remending of ceramic sherds was conducted to better determine dimensions of the original vessels. All fire-cracked rock was categorized by size, counted, and weighed. Refits of fire-cracked rock fragments were also conducted to provide information about stone heating activities at the site.

Soil samples were flotated through water driven tanks to recover artifacts and ecofacts smaller than 1/4-inch in size. Artifacts from these samples were cataloged in similar manners to the artifacts mentioned above. All charred seeds were identified using low and high power magnification. All faunal remains were identified. Carbon samples were weighed and selected for radiocarbon dating. Plotted distributions of selected artifacts and ecofacts from the assemblage were generated to better assess components of the site.