soils are found on 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 hunters and gatherers and most of the final alignment falls within this zone.

It should be noted that the locations of these zones have not remained constant since the end of the Pleistocene because some zones have been subjected to extensive landscape modification. The most important factor in this landscape modification is post-Pleistocene sea level rise. Kraft et al. (1976) note that sea level has been rising along the Atlantic Coast for the past 12,000 years and this sea level rise has transformed the Delaware River of 10,000 B.C. into the current drowned estuary. Many old land surfaces have become submerged and the configuration of the Delaware River and Bay have changed dramatically. In terms of the study area, these effects would be most prevalent in the eastern half of the Mid-Drainage zone and the River Shore zone.

PREHISTORIC ARCHAEOLOGICAL RESOURCES

The following discussion of prehistoric cultural resources consists of two parts: a brief summary of the local prehistory, and a discussion of regional research questions that pertain specifically to Delaware's Coastal Plain with a listing of the classes of prehistoric archaeological sites which are most likely to contribute data pertinent to these research questions.

REGIONAL PREHISTORY

This summary of the regional prehistory is abstracted from Custer (1984a). 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.

Paleo-Indian Period (12,000 B.C. - 6500 B.C.) - The Paleo-Indian Period encompasses the time period of the final retreat of Pleistocene glacial conditions 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 in common. A mobile lifestyle moving among the game attractive environments is hypothesized with the social organizations being based upon single 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 appear 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 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. Adapations 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, but none are known from the study area. 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 sites 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 many 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 project area date to the Woodland I Period and the Mid-Drainage

zone, within which most of the alignment is located, 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.

RESEARCH QUESTIONS AND SITE SIGNIFICANCE

The following discussion of prehistoric research questions is drawn from general studies of Delaware prehistory (Custer 1984a; 1986), the state plan for the management of prehistoric cultural resources (Custer 1983), and local research questions noted in earlier studies of the Route 13 Corridor (Custer et al. 1984; Custer and Bachman 1986; Custer, Bachman, and Grettler 1986). Research questions associated with specific time periods are discussed first and then more general research issues are noted. In the discussions of research questions, sample sites from both the entire Route 13 Corridor and the specific final alignment are noted. Sites from the entire corridor are noted because they serve as examples of classes of sites which <u>may</u> be identified during the Phase I study of the final alignment. However, it should be understood that only those eligible sites located in the impact zone of the final alignment will be subjected to Phase III excavations.

Paleo-Indian Period

Paleo-Indian sites are relatively rare throughout Delaware and the Delmarva Peninsula and the state plan for the management of prehistoric archaeological resources notes that basic site recording and description are the main research goals for this time period (Custer 1983). It is also suggested that basic data recording and description be done in a problem-oriented framework. Existing Paleo-Indian site location models (Gardner 1977; Custer, Cavallo, and Stewart 1983), which stress poorly drained settings and high quality cryptocrystalline outcrops as foci of Paleo-Indian settlement, are the suggested research framework.

To date, no sites with fluted points have been found in any of the planning surveys. However, several sites produced late Paleo-Indian points, including Dalton/Hardaway, Kirk, and Palmer varieties (Table 4). It should be noted that none of the sites listed in the final alignment produced diagnostic Late Paleo-Indian artifacts. The planning survey of the northern study area discovered no Paleo-Indian sites; although three Kirk-like points were found at dispersed locations (Table 4). The survey of the southern areas yielded Paleo-Indian materials from 12 sites and 8 of these contained numerous specimens (Table 4). These multiple point finds indicate sites where activity was concentrated, as compared to dispersed hunting or procurement locales. Particularly interesting are the potential base camp sites (Table 4) which include seven from the Leitzinger/Chapman collection (Custer, Bachman, and Grettler 1986: Appendix II) and the single site comprising the Deneumoustier collection (Custer, Bachman, and Grettler 1986: Appendix III). These sites are primarily located in the Mid-Drainage and Mid-Peninsular Drainage Divide zones and appear to be somewhat similar to the Hughes Early Man Complex (Custer 1984a). Any of these sites would be considered to be potentially eligible for listing in the National Register of Historic Places. It is also highly likely that these sites will be associated with buried Pleistocene/early Holocene river edge swamp deposits similar to the Dill Farm Site (Custer and Griffith 1984). These types of sites would provide valuable paleoenvironmental data and would probably need to be investigated as a part of data recovery projects, should any be encountered in the survey of the final alignment.

TABLE 4

SAMPLE PALEO-INDIAN PERIOD SITES FROM ROUTE 13 CORRIDOR

Possible Base Camps		Possible Procurement Sites	
7K-C-86A	7K-C-88	7NC-H-39	7K-D-46
7K-C-86C	7K-C-90	7NC-H-73	7K-A-51
7K-C-87A	7K-D-21	7NC-J-105	7K-A-69
7K-C-87B	7K-C-344	7K-C-299	

With regard to site location data, the low density of Paleo-Indian sites in all of the survey areas is somewhat surprising. For example, it is somewhat surprising that no Paleo-Indian materials were recovered from the large areas surveyed along the Appoquinimink River. Although the Appoquinimink River drainage is outside the known, and predicted, concentrations of Paleo-Indian sites (Custer 1983:38-47), the occurrence of some kind of small procurement sites, such as 7NC-D-70 (Custer, Catts, and Bachman 1982), associated with a springhead or small swamp would be expected. It could be possible that older sites have been destroyed on the heavily eroded landscapes of the Appoquinimink, or Paleo-Indian site densities outside of the known and predicted concentration zones are truly quite low. Further detailed surveys are necessary to address this research issue.

Another research issue on Paleo-Indian site locations concerns Paleo-Indian utilization of bay/basin features. Bay/basin features have been recognized as important loci of archaeological sites for a number of years and many bay/basins are located within the final alignment. The first consideration of their role in prehistoric settlement subsistence systems was provided by Bonfiglio and Cresson (1978) who studied sites associated with bay/basin features in New Jersey. Ever since then their importance has been recognized in numerous overviews especially for the pre-3000 B.C. time period (Custer 1984a:58-59, 72; Kraft and Mounier 1982). Although most researchers agree about the importance of these sites for prehistoric peoples, there is not complete agreement as to their origin. Bonfiglio and Cresson (1978) feel that these features are of periglacial origin and refer to them as "pingoes". However, it is not clear that bay/basin features are truly periglacial features (Custer 1986). For one thing, bay/basin features are found not only in New Jersey, where they may be found within 50 km of the Pleistocene ice front, but they are also found as far south as the South Carolina Coastal Plain where they are referred to as "Carolina Bays". It is very unlikely that these more southern features, which appear to be somewhat similar in morphology to the New Jersey features (Rasmussen 1958), were formed under periglacial conditions with frozen soil and ground water. Furthermore, in a comprehensive study of bay/basins features in central and southern Delaware, Rasmussen (1958) rejected the hypothesis that they had a periglacial origin. However, Rasmussen was unable to effectively explain their origin by other geomorphological processes.

The current research on bay/basins in the Route 13 Corridor provided data on both human utilization of bay/basin features and their geomorphology. The various data gathered on the bay/basin feature's geomorphology shows that their configuration has changed dramatically over the course of the Late Pleistocene and the Holocene. Sedimentary data from the bay/basin features studied do not support the hypothesis that these features have a periglacial origin. If anything, the bay/basin sediments are more similar to those seen in sinkhole settings from the northern Delaware area (Custer and Griffith 1984). Probably the most that

can be said at present is that bay/basin features are open water-filled depressions that were acting as sediment and pollen traps at least since the end of the Pleistocene and through the Holocene. The most important point is that, no matter what their origin, these features were sources of fresh water which were very attractive for the game animals hunted by the prehistoric inhabitants of the Delmarva Coastal Plain throughout the Holocene.

The Route 13 planning survey showed some interesting patterns in human utilization of these bay/basin features. Probably the most interesting observation to make concerns the extent to which these features were used. A total of 148 bay/basin features were studied by either surface reconnaissance or subsurface testing. Of these, 128 features (90%) had associated archaeological sites. Diagnostic artifacts were found at 49 of these sites. Of these 49 sites, 5 have Archaic components, 38 have Woodland I components, and 5 have Woodland II components.

It is important to note that no Paleo-Indian components were discovered in association with these features during the Route 13 survey. In contrast, Bonfiglio and Cresson (1978:18) note that of 94 bay/basin features, 7 (7%) contained fluted point components in the New Jersey sample. There is no general shortage of Paleo-Indian fluted point sites in the upper Delmarva Peninsula and quite often these sites are associated with poorly drained, swampy settings (Custer 1984a:48-60; 1984d; Custer, Cavallo and Stewart 1983; Custer, Catts, and Bachman 1982). However, the known fluted point sites of the Delmarva Coastal Plain are associated with freshwater interior swamps fringing drainages within the Mid-Peninsular Drainage Divide, not bay/basin features. There are several explanations of this difference in Paleo-Indian utilization of bay/basin features between the Delmarva and New Jersey Coastal Plain. A simple explanation may be that bay/basin features are not large enough during the late Pleistocene in the Delmarva to be attractive hunting locales. This explanation could easily be tested by obtaining a series of radiocarbon dates on bay/basin sediments in a variety of settings where there are associated archaeological sites of different ages. A second explanation may be based on sampling factors. Although the Delmarva sample is large in number and, due to its random component, less biased than the New Jersey data, the New Jersey data comes from a wider geographic area than does the Delmarva sample which is drawn from a smaller, more concentrated area. If a sampling bias is involved, additional survey of bay/basin features in other areas of the Delmarva Peninsula should reveal associated Paleo-Indian sites and should be an important part of future field reconnaissance surveys.

Assuming that there are no sampling errors and that bay/basin features are present in the Delmarva Peninsula throughout the Late Pleistocene and early Holocene, additional behaviorial explanations of the differences between the New

Jersey and Delmarva data are necessary. The Paleo-Indian utilization of bay/basin features in New Jersey may be due to the fact that the bay/basin features of the New Jersey High (or Inner) Coastal Plain are often associated with either the cuesta, or other concentrations of secondary lithic resources (Cavallo 1981; Marshall 1982:24,32). Custer, Cavallo, and Stewart (1983) and Gardner (1974; 1977) have noted the important role of lithic resource locations in Paleo-Indian settlement patterns and the juxtaposition of the lithic resources and game-attractive hunting locales may have made the New Jersey bay/basin settings very attractive settlement locations during Paleo-Indian times. No similar juxtaposition of resources is seen in the Delmarva region (Custer and Galasso 1980; Custer 1984a:59) and this may be why there was little or no Paleo-Indian utilization of these features in Delaware. This explanation could be tested by looking for bay/basin locations in Delaware that may have hitherto unknown associated lithic sources. These features should have some signs of Paleo-Indian utilization if the above explanation is correct.

Archaic Period

As was the case for the Paleo-Indian Period, Archaic Period sites are not common in the local archaeological record. Nonetheless, a recent study (Custer 1986) has shown that there is a definite expansion in the number of site location types during the Archaic Period. Because there are few Archaic sites known, the main research question suggested by the state plan is basic site recording and description within a problem-oriented format (Custer 1983:134-135). A site location model provides one problem orientation and Gardner's (1978) model, which stresses interior swamp locations as Archaic site foci is an example.

The planning survey of the northern study areas (Custer and Bachman 1986) identified Archaic Period bifurcate points from 8 sites, which nearly doubled the number of known Archaic sites from the Delaware High Coastal Plain. The planning survey of the southern study areas (Custer, Bachman, and Grettler 1986) added 15 more sites from the Low Coastal Plain, 13 of which contained bifurcated-base or Stanly/Neville points. Concentrations of bifurcates were also recorded from several sites, all of which were from the large Leitzinger/Chapman and Deneumoustier collections. Sites with multiple bifurcate finds which have been classed as possible habitation sites are listed in Table 5 along with possible procurement sites. One of these sites (7NC-J-9a) falls within the final alignment (Figure 7).

Many of the Archaic Period sites located in the planning surveys are associated with bay/basin features and this association provides a potential local research question. Utilization of bay/basin features in the study area seems to have begun early in the Holocene. There are five bay/basins associated with sites with bifurcate-base points, which are the only really reliable indicators of the Archaic Period (Custer 1984a:61-62). The presence of a Kirk-like point at one of these bay/basin sites may indicate that the utilization of these sites

TABLE 5

SAMPLE ARCHAIC PERIOD SITES FROM ROUTE 13 CORRIDOR

Possible Base Camps	Possible Procurement Sites
7K-C-344	7K-C-211
7K-C-86A	7K-C-305
7K-C-86C	7K-D-46
7K-C-90	7NC-H-39
7K-J-105	7NC-G-56
	7NC-J-117
	7NC-H-60
	7NC-J-99

began quite late in the Paleo-Indian Period. Generally, the sites seem to be small, ephemerally utilized hunting/processing sites. Five sites may not seem like a large number; however, prior to the Route 13 surveys, only 79 sites with bifurcate points were recorded for the Delmarva Peninsula (Custer 1986). Of these, only 12 were located in the High Coastal Plain and only 7 Archaic sites in the entire Delmarva Archaeological Data System including adjacent areas of southeastern Pennsylvania, are associated with bay/basin features. The Archaic bay/basin sites from the Route 13 surveys are, therefore, an important addition to the Archaic site data base, and testing of bay/basin locations during the Phase I survey of the final alignment is an important research activity.

Because the Archaic Period of Delmarva prehistory is so poorly known, it is difficult to assess the meaning of the Archaic bay/basin sites. However, some observations can be made. The beginning of bay/basin utilization seems to occur at the same time as a series of rather dramatic environmental changes. During the period from 8500-6000 B.C. there is evidence from numerous sites indicating dry climatic conditions (Custer 1984a:47-48; Custer and Griffith 1984; Carbone et al. 1982). Environments seem to have changed from a mosaic of grasslands, swamps, boreal forests, and deciduous forests to a closed boreal forest with fewer poorly drained settings in interior areas. However, local sea level rise affected coastal water tables and increased the incidence of swamps in these areas. The presence of wind-blown sediments (Foss et al. 1978) and evidence pronounced changes in stream channel morphology (Custer and Griffith 1984:Figure 5) also indicate potential dramatic changes in the patterns of surface water availability. The beginnings of bay/basin utilization may be related to these environmental changes. It is possible that changes in stream channel morphology altered the distribution of swampy settings in the Mid-Peninsular Drainage Divide, as evidenced at the Dill Farm Site (Custer and Griffith 1984), and caused late Paleo-Indian and Archaic groups to seek out new swampy hunting stations, such as the bay/basin features. Another factor which may have been

contributed to a shift to new procurement sites locations, including bay/basins, during the Archaic Period is the fact that during late Paleo-Indian and Archaic times the emphasis on high grade cryptocrystalline lithic materials seems to have disappeared (Custer 1984a:59-60). If association of bay/basins and lithic sources was no longer a critical factor in site selection, then the bay/basin sites of the study area may have become a more attractive settlement option. Once these bay/basin procurement sites became part of the settlement pattern in interior areas, their utilization continued into warm-wet climatic conditions of the post-6000 B.C. time period (Custer 1984a:62-64).

The Archaic sites associated with stream settings seem to be similar to others described for the Delmarva Coastal Plain (Wise 1983; Kavanagh 1979; Custer and Galasso 1983; Galasso 1983) and are primarily small procurement sites. These sites probably represent hunting and procurement sites which support other base camp sites. Some of the larger base camp sites have been tenatively identified elsewhere in Delaware (Custer 1984a:69-72); however, none were identified in these surveys. It may be possible that there are no large Archaic base camps in the Coastal Plain areas away from the large interior swamps. Some of the Archaic sites found in this survey may be small base camps rather than procurement sites and the present survey methods were unable to distinguish the differences between the two site types. Both Wise (1983) and Galasso (1983) have suggested that the Delaware Coastal Plain Archaic settlement pattern is characterized by small habitation and procurement sites and Kraft and Mounier (1982) note similar patterns in the New Jersey Coastal Plain. Careful survey and excavation techniques should be used in future studies so that accurate estimates of Archaic site size and settlement can be developed. Archaic sites may indeed all be small, but this impression may be a result of biased and incomplete samples.

Woodland I Period

The state plan notes that the Woodland I Period is the best understood time period on the Delaware Coastal Plain (Custer 1983:135) and that it also has associated with it very diverse research questions. One of the major research questions involves the study of the processes by which local egalitarian societies were transformed into more complex ranked societies (Custer 1982; 1983:135) and the Route 13 study area transects the area where this transformation was most dramatic.

Woodland I Period sites comprise 56% of the 271 sites with identifiable components within the Route 13 Survey area and are the largest and most numerous sites of all time periods. All southern Delaware cultural complexes are represented and the survey data includes a large variety of tool types, lithic raw materials geomorphological settings, and site sizes. Woodland I sites are generally much larger than the preceding Paleo-Indian and Archaic Period sites and the surface collected artifact

assemblages exhibit a diversity of ceramic and lithic tool types, suggesting a broad range of activities took place. The largest sites are interpreted as macro-band base camps and are located primarily along the banks of the major streams. Smaller satellite sites are found at varying distances from the macro-band base camps and are thought to be micro-band base camps, procurement/staging sites, and procurement sites (Catts, Shaffer, and Custer 1986: Appendix III). The Route 13 survey has provided extensive data on Woodland I settlement patterns and intensive excavation of a series of both large and small sites should provide valuable information on this subject. The only site within the final alignment listed on the National Register (Carey Farm - 7K-D-3) is a Woodland I site.

A series of controlled comparisons among the macro-band base camps represents one method of studying and explaining the variety of site types present during the Woodland I Period. Similar methods are being used, with great success, in studying the emerging "formative" villages of Mesoamerica (Flannery 1976, 1982). Necessary prerequisites of such comparisons, however, are comparable classes of data. Therefore, an important research goal should be the examination of Woodland I macro-band base camps in order to develop comparable bodies of data on subsistence, house and storage features, technology, exchange, and social organization. Excavation of large areas at these sites is necessary for these studies in order to clearly delineate different functional areas, such as habitation areas, tool production areas, and storage and processing areas. Micro-band base camp and procurement sites should also be approached in a similar manner. Especially important are the macro-band base camp and procurement sites located in the vicinity of the micro-band base camps with the final alignment.. Example Woodland I macro-band base camps in the Route 13 Corridor which would provide pertinent data on these questions are listed in Table 6 along with examples of micro-band and procurement sites.

TABLE 6

SAMPLE WOODLAND I SITES FROM ROUTE 13 CORRIDOR

MACRO-BAND BASE CAMPS					
7NC-G-73	7NC-G-11	7NC-H-78	7NC-J-31	7NC-J-32	7K-A-10
7K-A-11	7K-C-211	7K-C-86A	7K-C-90	7K-C-344	7K-D-73
7K-D-33	7K-C-338	7K-D-25	7K-C-255	7K-C-267	7NC-J-105
7NC-J-110	7NC-H-39	7K-C-249			
MICRO-BAND BASE CAMPS					
7NC-J-147	7K-C-243	7K-C-87A	7K-C-299	7K-D-83	7NC-H-14
7NC-H-15	7NC-H-18				
PROCUREMENT SITES					
7NC-G-51	7NC-G-75	7NC-H-54	7NC-J-84	7NC-J-112	7NC-J-160
7K-C-247	7K-C-86E	7K-C-256	7K-D-82	7K-D-94	7NC-H-24

One of the most poorly understood, yet most provocative Woodland I cultural complexes is the Delmarva Adena complex, known from the spectacular mortuary/exchange centers at the Killens Pond, Frederica, and Saint Jones sites and a number of cache finds and isolated surface finds. Adena materials were surface collected at eight sites from the Route 13 Survey, including three sites from the Leitzinger/Chapman collection and in the single-site Deneumoustier collection. Sites 7K-C-94 (Dyke Branch) and 7K-D-8 and D-59 (Little River/Pipe Elm Branch) produced Adena bifaces and Coulbourn (ceramic-tempered) pottery, while 7K-D-33, 7K-D-69, and 7K-D-86 (Little River/Pipe Elm Branch) and 7K-C-344 (Hughes Crossing) yielded bifaces. Site 7K-D-86 contained a large medial section of an Adena biface manufactured from Flint Ridge (Ohio) chalcedony and Adena bifaces from the aforementioned 7K-D-69 were produced from the same material. In addition, 7K-C-230, on Alston Branch near Cheswold, produced a large utilized flake made from the same exotic raw materials. Unfortunately, none of these sites could be identified as to functional type.

It is unknown whether any of the Route 13 Corridor Delmarva Adena sites are equivalent to the mortuary/exchange centers of the Killens Pond, Frederica, and Saint Jones sites. But, even if they are not, they may prove instructive if they are habitation or procurement sites for the Adena culture. No single component Delmarva Adena macro-band base camps have ever been found (Custer 1984a:114) and none of the Route 13 Corridor sites appear to fall into that category. However, excavation of these kinds of smaller sites may produce valuable data on non-ideotechnic or non-sociotechnic Adena adaptation.

Besides Flint Ridge chalcedony, other exotic lithic materials are present in various site assemblages from the Route 13 survey. The use of steatite, argillite, rhyolite, and ironstone by prehistoric peoples has far-reaching implications for trade and exchange and group interaction in the Middle Atlantic region and these interactions seemed to reach their zenith during the Woodland I Period. All four of the above-named materials occur in the Route 13 survey and argillite is especially common from the Leipsic River south. A probable Woodland I site with large quantities of argillite and features was sampled at site 7K-C-255 on the south side of the Leipsic River. The Barker's Landing site on the lower Saint Jones River appears to be a large argillite reduction and processing center (Custer 1984a:109) and 7K-C-255 site could rival it in scope. Many more of these sites need to be studied in order to understand the behavior involved in the lithic exchange systems. Argillite was found at dozens of sites within the Route 13 Corridor and some of the most prominent are: 7NC-H-13, 7NC-H-39, 7K-C-211, 7K-D-69, 7K-C-338, and 7K-A-26. Although no large concentrations of rhyolite were encountered in the Route 13 Corridor, it is present at many sites, including 7NC-H-14, 7NC-J-105, 7K-D-69, 7K-C-291, 7K-C-338, and 7K-A-47. Ironstone bifaces and debitage were recorded from 7NC-J-103, 7K-C-118, 7K-C-125, 7K-C-211, 7K-C-236, 7K-D-33, 7K-C-313, 7NC-J-145, 7K-A-23, and

7K-A-61. Steatite was found in the Leitzinger/Chapman and Deneumoustier collections and at 7K-C-174 on Willis Branch in the Leipsic River drainage.

The Woodland I Period also coincides with certain poorly understood paleoclimatic changes. One of the hypothesized conditions is the so-called mid-postglacial xerothermic, or warm, dry period or periods occurring some time after 3000 B.C. These may have caused episodic, scattered vegetation denudation and redeposition of surface soils by aeolian transport as well as alterations in prehistoric pollen records. These landscape changes may have caused changes in the settlement/subsistence systems of prehistoric peoples which may be reflected in the archaeological record. Woodland I sites are abundant in the Route 13 Corridor and the survey presents an ideal opportunity to sample the prehistoric adaptation and associated paleoenvironments of a very large section of the Delaware Coastal Plain. Several sites found through the excavation of 1 x 1 meter test units, including 7NC-H-20, 7K-C-255, 7K-C-338, and 7K-F-143, have already been used as a basis for preliminary conclusions about conditions leading to aeolian soil transport (Custer and Bachman 1986; Ward and Bachman 1986). Other excavated sites from the Route 13 Corridor which have produced prehistoric materials in undisturbed contexts include 7NC-G-60, 7NC-G-62, 7NC-G-63, 7NC-J-27, and 7K-C-266. Geomorphologists, palynologists, pedologists and archaeologists working in concert would have an opportunity to test the above mentioned hypotheses and to make important regional predictions regarding eastern coastal plain adaptation by Woodland I peoples.

The study of bay/basin features is also important for the Woodland I Period because the time period of most intensive bay/basin utilization is the Woodland I Period. During the beginning portions of this time period, and possibly during later periods as well, the Delmarva Peninsula and Middle Atlantic region, in general, experienced the warmest and dryest climatic conditions of the entire Holocene (Custer 1984c). The mesic forests of the Archaic time period were replaced by open xeric oak-hickory woodlands and grasslands (Custer 1984a:89-91) and very dramatic changes in surface water availability occurred (Curry and Custer 1982). One of the major settlement pattern changes seen in the Coastal Plain area was the utilization of a wide variety of interior environmental settings on an ephemeral basis (Custer and Galasso 1983:12-14). The increase in bay/basin utilization during this time period may be part of this trend. The data from 7NC-H-20 indicate that in areas of multiple bay/basin clusters there may also be more permanent sites dating to the Woodland I Period.

Excavation of a sample of bay/basin sites over a wide area would provide extensive comparative data on the use of this type of setting through time and a test of the assumptions produced by the Blackbird bay/basin data. Example sites within the Route 13 Corridor which are closely associated with bay/basin features and which would yield data in good context are 7NC-H-20, 7NC-J-47,

7NC-J-54, 7NC-J-105, 7NC-H-39, 7NC-H-16, 7NC-H-17, 7NC-H-40, 7NC-J-93, 7NC-J-94, 7NC-J-95, 7NC-J-19, 7K-A-59, and 7K-C-132. These are sites of various sizes and tool assemblages and are a representative cross-section of bay/basin site settings throughout the Route 13 Corridor.

Woodland II Period

Woodland II settlement patterns in central Delaware are a topic of some controversy noted in the state plan (Custer 1983:137). For many years, numerous authors have suggested that there is a relative absence of Woodland II sites in southern New Castle County and northern Kent County. By the same token, up until 1980 the nature of the northern New Castle Woodland II occupations were also very poorly defined. Nonetheless, the southern New Castle County and northern Kent County area was viewed as a "buffer zone" or "fever belt" (Withoft 1984) separating two distinctive ethnic groups. The original Route 13 planning study analyzed extant artifact collections and noted numerous Woodland II sites in the supposed "buffer zone" making the whole concept somewhat invalid (Custer et al. 1984:220-221). The "discovery" of these sites was due to the fact that previous analyses had not recognized the Woodland II Minguannan ceramics in the collections because the type was not defined in the literature prior to 1981 (Custer 1981).

The discovery of Woodland II sites in the northern survey area reveals a similar bias in previous studies which caused Woodland II sites to be under-represented in the data base (Custer and Bachman 1986). Most of the Woodland II sites in the northern survey area, and all of the sites with Minguannan pottery, were discovered during subsurface testing of wooded areas dividing plowed fields from bluffs along the major drainages. The sites are small and appear along most of the major stream headlands studied. Furthermore, they are almost all unplowed and would have been, and were, missed in previous studies which focused primarily on surface survey of cultivated fields. Thus, there really is no absence of Woodland II sites in the study area and there is no need to invent a "buffer zone".

It can be noted that Woodland II sites in the study area are generally smaller than the Woodland II sites found farther south on the Delmarva Peninsula (Custer 1984a:157-171; Custer and Griffith 1986). However, the Woodland II sites of the study area fall well within the range of site sizes seen among Woodland II sites of the Minguannan Complex (Custer 1984a:155-157; Stewart et al. 1986).

It is interesting to note that, there seems to be a large area in Kent County where the three major Woodland II ceramic types overlap. Shell-tempered Townsend ceramics were found at the Bailey Farm (7K-A-10, A-26 and A-27) on the south bank of Duck Creek and at other sites in the Smyrna study area and at two sites in the Leipsic drainage. Minguannan ceramics were recovered from excavated test units in the Double Run drainage

southwest of the town of Magnolia. These facts serve to extend Minguannan and Slaughter Creek Complex boundaries far beyond their current limits, a prospect that would require verification by extensive subsurface testing. In addition, shell-and-grit-tempered Killens Ware sherds were found at various places between Smyrna and Magnolia. Radiocarbon dates on Slaughter Creek Complex Townsend Series ceramics range from A.D. 975 to 1370 (Custer 1984a:180-181) and no dates are available yet for Minguannan or Killens Ware ceramics. The physical extent of these ceramic types, their temporal placement, and cultural associations and/or juxtaposition are all questions which could be addressed by further data from the Route 13 Phase I and II survey. Example sites from the Route 13 Corridor which have produced a range of Woodland II ceramic types in good context include 7NC-G-62, 7NC-G-63, 7NC-J-47, 7K-A-10, 7K-A-26, 7K-A-27, 7K-A-74, 7K-C-195, the entire Leitzinger/Chapman collection (Custer, Bachman, and Grettler 1986: Appendix III), 7K-C-275, 7K-C-344, 7K-D-8, 7K-D-60, 7K-F-136, and 7K-F-137.

There seems to be little difference in site selection between Woodland I and II Period sites, except for the Woodland I emphasis upon bay/basin features in the Blackbird area. This implies that there was no Woodland II shift to agriculturally more productive soils and that the Woodland I intensive hunting/gathering subsistence pattern was continued into the Woodland II Period. Example Woodland II sites within the Route 13 Corridor which would yield good data on settlement patterns are listed in Table 7.

TABLE 7

SAMPLE WOODLAND II SITES FROM THE ROUTE 13 CORRIDOR

7NC-G-59	7NC-G-60	7NC-G-62	7NC-G-63	7NC-G-64	7NC-G-79
7NC-G-81	7NC-G-82	7NC-J-32	7NC-J-47	7NC-J-54	7NC-J-69
7NC-J-71	7NC-G-99	7K-A-10	7K-C-211	7K-C-249	7K-C-87A
7K-D-21	7K-C-344	7K-C-322	7K-D-60	7K-C-329	

Contact Period

Only one verified Contact Period site has ever been identified in Delaware and it is located outside of the Route 13 Corridor. Site 7NC-E-42 is situated on the White Clay Creek near Churchman's Marsh at Stanton, Delaware (Custer and Watson 1985). No suspected sites of this Period were found during the Route 13 surveys and any site found during future surveys would have the highest research value.

In conclusion, the Route 13 Corridor Planning Surveys have provided the opportunity to sample extensive areas of the Delaware Coastal Plain and gather data about all five of the major periods of Delaware prehistory. Existing models of

prehistoric adaptations appear to be not radically contradicted by the data collected from the 1984 and 1985 Route 13 surveys. At the same time, some alterations of the models may be necessitated by the data, while many new avenues of research have been opened. It is expected that the Phase I and II Route 13 archaeological survey will provide much new data to these ends.

HISTORIC ARCHAEOLOGICAL RESOURCES

The following discussion of historic archaeological resources consists of two parts: a brief summary of the local history and a discussion of regional research issues and the classes of historic archaeological sites which are most likely to contribute data pertinent to these research questions.

REGIONAL HISTORY

This overview is abstracted from Munroe (1978, 1984), Hoffecker (1973, 1977), Weslager (1961, 1967), Lemon (1972), Hancock (1932, 1947, 1976), Hudson (1969), Scharf (1888), and Bausman (1940, 1941).

The earliest colonial settlement in Delaware known as Swanendael ("valley of swans") was made at present Lewes in 1631 under the sponsorship of patroons of the Dutch West India Company for the purpose of whaling and raising grain and tobacco. This venture was privately financed, but it ended in tragedy because the all-male population was wiped out by the local Indians in a massacre in 1632. Farther north a group of Swedes in the employ of the New Sweden Company built Fort Christina in 1638 in what is now part of the present city of Wilmington establishing the first permanent European settlement in Delaware. The Swedish government supported the venture, and Fort Christina became the nucleus of a scattered settlement of Swedish and Finnish farmers known as New Sweden. Within a few years this Swedish settlement included a fort, church and small farming community.

The Dutch claimed the identical land -- from the Schuylkill River south -- by right of prior discovery, and in 1651 the West India Company retaliated by building Fort Casimir at New Castle in an attempt to block Swedish efforts to control commerce in the Delaware River. The Swedes captured this fort in 1654 and renamed it Fort Trinity. Rivalry between Swedes and Dutch continued, and the Dutch recaptured Fort Trinity in 1655, and also seized Fort Christina. As a result New Sweden went out of existence as a political entity due to lack of support from the homeland although the Swedish families continued to observe their own customs and religion.

In 1657 as a result of peaceful negotiations the City of Amsterdam acquired Fort Casimir from the West India Company, and founded a town in the environs of the fort called New Amstel. This was a unique situation in American colonial history -- a European city became responsible for the governance of an