IV

RESEARCH DESIGN

A. INTRODUCTION

This chapter presents a discussion of the research design that was developed to guide the data gathering, analysis, and interpretative efforts of the study. The research design was structured to address several information needs, or themes, that are widely used in prehistoric archaeology. These themes include chronology, subsistence, settlement patterns, intrasite patterning, technology, and environmental adaptation. In addition to these issues of general interest in regional prehistory, the research design must also focus on questions of a more site-specific nature such as local geomorphology and site formation processes.

B. PROBLEM ORIENTATION AND RESEARCH CONTEXT

1. *Chronology*

The chronology theme pertains to the basic temporal units of prehistory. The Phase I and II investigations provided evidence that the site was used or occupied repeatedly during the Archaic and Woodland periods, roughly bracketing the period from circa 6500 BC to AD 1650. It was expected that the data recovery program would provide a much larger sample of culturally diagnostic artifacts and hence enable construction of a site-specific chronology that could be compared to the regional chronological sequence.

Any discussion of prehistoric chronology must address the various chronological schemes advanced by different archaeologists working in Delaware, the Middle Atlantic region, and the broader Eastern Woodlands culture area. Custer (1984, 1986a) has divided the prehistory of Delaware into four periods: (1) the Paleoindian period (ca. 12,000 BC - 6500 BC), the Archaic period (ca. 6500 BC - 3000 BC), the Woodland I period (ca. 3000 BC - AD 1000), and the Woodland II period (AD 1000 - AD 1650). The Paleoindian, Archaic, and Woodland periods or developmental stages are widely used throughout the Middle Atlantic and Eastern Woodland regions.

Custer, following Gardner (1974), extends the Paleoindian period to include the corner-notched and side-notched phases represented by Palmer and Kirk points, and argues for a 6500 BC terminal date for the Paleoindian period. Most archaeologists outside the Middle Atlantic region consider Clovis points and closely related forms (e.g., Dalton points) as the principal diagnostic artifacts of the Paleoindian period, and use a terminal date of approximately 8000 BC for the beginning of the Archaic period.

Archaeologists in the region have traditionally divided the Archaic into Early, Middle, and Late subperiods, but there is much disagreement regarding bracket dates for the Early and Middle subperiods. The initial use of Site 7S-F-68 is represented by Palmer and Kirk points, which were made during the period circa 7800-6000 BC, an interval that corresponds roughly to the Early Archaic subperiod. The site assemblage also includes a group of bifurcate-based points, which were made between 7000 and 5300 BC. Many archaeologists include the bifurcate-based points in the Early Archaic period, although Gardner (1987) and his students (e.g., Stewart 1990) consider the bifurcate-based points as Middle Archaic artifacts. Others place the bifurcate phase in the Early Archaic, as is more commonly done in the Southeast, and bracket the Middle Archaic to the interval from circa 6000 BC to 4000 BC. In Delaware, Custer (1984, 1986a) places the bifurcate-based points at the beginning of the Archaic, abandoning the traditional use of the Early, Middle, and Late subperiods, and subsuming what most archaeologists consider Late Archaic into his Woodland I period.

Basic information regarding the prehistoric cultural sequence in the Delmarva Peninsula area is scant, particularly for the Archaic period. Basic questions of chronology need to be resolved by obtaining additional radiocarbon dates and from stratigraphic excavations, and questions of subsistence and settlement pattern must be based on intensive site excavations.

As traditionally defined, the Archaic period represents the longest chronological unit of human occupation in the eastern United States, but very little is known about cultural development during the several millenia that followed the end of the most recent ice age. Caldwell's (1958) primary forest efficiency model posits a period of increasing familiarity with the environment which allowed more efficient exploitation of seasonally abundant food resources and which ultimately permitted an increase in population and greater social complexity. Following this model, the Archaic has been viewed traditionally as a period of gradual, steady population increase.

The various Archaic period chronologies have led to a degree of confusion that prevents critical examination

of the model of steady population increase during the Archaic. The results of excavation at the Indian Creek Site, an Archaic gathering camp in Prince Georges County, Maryland, indicate that an interval of depopulation occurred during the 5000-4000 BC period (LeeDecker et al. 1991). The interval of site abandonment at Indian Creek appears to correspond to a regional depopulation during the Middle Archaic, as there are almost no radiocarbon dates from archaeological sites in the region that fall in that period, and projectile point types that are dated to this period are very scarce (Gleach 1987). Elsewhere in the Middle Atlantic Coastal Plain, Steponaitis (1980) and Wanser (1982) have noted an apparent scarcity of components dating to the 6000-5000 BC interval.

The issues relating to the regional Archaic chronology cannot be examined fully in the context of a single site excavation, but it was believed that the excavations at Site 7S-F-68 could provide additional information about this issue. Because the site's period of use spans what is traditionally defined as the Middle Archaic, the data recovery program provided an opportunity to examine Archaic population trends.

In Delaware, Custer (1984, 1986a) has identified a number of changes in technology, subsistence, and settlement for the Archaic period (ca. 6500 BC - 3000 BC), interpreted as gradual human responses to the emergence of full Holocene environmental conditions. Custer's model indicates that the onset of warm, wet conditions resulted in the extinction of certain cold-adapted grazing animal species and favored the expansion of browsing animals that flourish in such settings, such as deer. The Holocene environmental changes also facilitated the development of inland swamps and wetland areas, and human populations shifted from the more hunting-oriented foraging pattern of the Paleoindian period to one in which plant foods became a more important part of their economies. In southern Delaware, large swamp habitats such as Cedar Swamp and Burnt Swamp would have served as locations for the first large residential base camps, possibly occupied by several different family groups.

Associated with these larger group camps are more numerous and smaller procurement sites located in various settings that would have been favorable for hunting and gathering activities during different seasons of the year (Custer 1984, 1986a). The location of Site 7S-F-68 suggests that it would have served as a procurement site related to a settlement system that included base camps located at the margins of large wetland areas.

Based upon palynological and geomorphological data from the Middle Atlantic region, Custer's Woodland I period (ca. 3000 BC - AD 1000) has been described as a time of "dramatic change in local climates and environments" in which "a pronounced warm and dry period" (i.e., a mid-postglacial xerothermic) began at approximately 3000 BC and persisted to approximately 1000 BC (Custer and Bachman 1984). During that period, the mesic oak-hemlock forests of the Archaic were replaced by more drought-resistant (xeric) oak and hickory forests and more abundant grasslands. Although these conditions resulted in the loss of some interior streams, continued sea level rise resulted in the creation of highly productive and large brackish water marshes in the coastal zone. In essence, the xerothermic episode is hypothesized to have effected shifts in the distributions of plant and animal species and the establishment of new resource-rich settings in some areas of the state.

These shifts in climate, environmental conditions, and resource distributions are believed to have led to radical changes among resident prehistoric Native American populations, including a trend toward greater sedentism and more complex social organization. Major river floodplains and estuarine swamp habitats became the primary resource zones and the locations of large residential base camps occupied on a multi-seasonal or year-round basis. A number of these sites have been investigated in northern Delaware, including the Delaware Park Site, the Clyde Farm Site, the Crane Hook Site, and the Naamans Creek Site. In southern Delaware, there was an increase in the utilization of shellfish in the coastal areas, concurrent with an inland shift in the locations of macroband base camps along the tidal drainages. Within the Mid-Peninsular Drainage Divide zone, there is little evidence that site distribution patterns changed from the preceding Archaic period (Custer 1986a). The continuity in use of Site 7S-F-68 during the Archaic and Woodland periods suggests some similarity in the settlement and subsistence patterns during both periods.

The tool kits of Woodland I groups were generally similar to those of the Archaic, but with the addition of such items as heavy woodworking tools, soapstone and ceramic containers, broad-bladed points, and netsinkers. The increased abundance of plant processing tools over the preceding period suggests more intensive utilization of plant foods, which may have approached the level of productive intensification by the end of the Woodland I period. The presence of nonlocal lithic materials such as argillite, rhyolite, and soapstone is interpreted as an indication of incipient regional trade and exchange networks. The pit features and soapstone and ceramic vessels are viewed as items that facilitated more efficient food preparation and storage of surplus foods.

The Late Woodland or Woodland II period (ca. AD 1000 - AD 1650) within the Middle Atlantic region is marked primarily by the development of horticulture and increased sedentism. During this period, villages became larger and more permanent and tended to be located adjacent to areas with easily worked floodplain soils. Interregional trade and exchange systems appear to have diminished during this period. In southern Delaware, the Slaughter Creek complex is defined by the presence of Townsend ceramics, triangular projectile points, large macroband base camps and possibly fully sedentary villages with numerous food storage features. Most major sites assigned to the Slaughter Creek complex have been identified in the Delaware Shore, Mid-Drainage, and Coastal/Bay physiographic zones. Current Slaughter Creek complex settlement models indicate that the Mid-Peninsular Divide zone would have been used for special resource procurement sites (Custer 1986a).

2. *Subsistence*

The subsistence theme deals primarily with dietary composition and food procurement strategies. Archaic cultures in the eastern United States are generally characterized by a subsistence economy that combined hunting of game animals and gathering of plant foods. Archaeologists have used the notion of the Archaic period or developmental stage since the 1930s, and it has generally been applied to cultures that lack agriculture, fired clay ceramics, and permanent settlements. The beginning of the Archaic stage generally coincides with the onset of modern (Holocene) climatic conditions at the end of the Pleistocene glacial episodes (Custer 1990).

It is generally believed that human populations gradually increased during the Archaic period. Caldwell (1958) developed the model of "primary forest efficiency," which posited an increasing familiarity with the environment that allowed more efficient exploitation of seasonally abundant food resources within various micro-habitats of the eastern deciduous forest biome. Cleland's (1976) "focal-diffuse model" has also been widely used for interpretation of the changes in prehistoric subsistence patterns in eastern North America. Paleoindian technologies, characterized by a tool kit that seems oriented quite narrowly toward exploitation of herd animals, are viewed as focal adaptations; the ensuing Archaic adaptations, as evidenced by a greater variety of site types and tool kits, are seen as diffuse adaptations, with a subsistence base that included a broader variety of floral and faunal resources. Food production, best exemplified by the intensive use of corn and other domesticates during the Late Woodland period, is seen as a Late Focal adaptation, according to Cleland's model.

Archaeological techniques are generally suited to the reconstruction of subsistence patterns by direct identification of dietary refuse such as bone or botanical material. However, the preservation of bone and botanical material is unusual for open sites in the Middle Atlantic Coastal Plain. Faunal remains (bone and shell) have been recovered more frequently than plant foods, but this is possibly because sophisticated techniques for the recovery of floral remains are not in general use. Little is known of Archaic subsistence patterns in southern Delaware, and models (Custer 1984) are based largely on site location information and artifact assemblages. For the Woodland I period in Delaware, there is direct evidence of the use of shellfish, fish, and unspecified plant foods, as well as various fauna. Custer (1984, 1986a) has argued that the principal difference in the Archaic and Woodland lifeways is in social organization, rather than subsistence, although he suggests that the more sedentary settlements of the Woodland I period were based on changes in subsistence.

Because of the paucity of direct subsistence information in the Delmarva Peninsula and the surrounding Middle Atlantic region, a context for interpretation of subsistence behavior at Site 7S-F-68 must be developed by reference to a few sites scattered throughout the Middle Atlantic region and broader Eastern Woodland area. The earliest regular use of Site 7S-F-68 occurred during the Early Archaic, as represented by Palmer, Kirk, and various bifurcate-based points that are widely found throughout eastern North America.

The Early Archaic period was well represented at the Indian Creek Site in Prince Georges County, Maryland (LeeDecker et al. 1991), based on the recovery of Palmer, Kirk, and various bifurcate-based points. Flotation samples from the site contained 63 taxa, representing a wide variety of fruit, tubers, starchy seeds, nuts, shoots, and leaves. Nearly all of the charred, native botanical specimens represent species of known ethnographic use. Bone preservation at the site was virtually nil, owing to extremely acidic soils, but the site was interpreted as a gathering camp occupied during the spring, summer, and fall when plant foods would have been at their maximum availability. Residue analysis of the Indian Creek Site lithic assemblage suggested a faunal exploitation strategy that emphasized large game species (deer and bison/elk) but also included various other animals such as rabbit, bear, porcupine/beaver/squirrel, canines, fowl, fish, and rodents.

The Eva Site in Benton County, Tennessee, was utilized throughout the Archaic period. This site contained an abundance of fauna (deer, bear, raccoon, opossum, beaver, rabbit, muskrat, turkey, turtle,

drumfish, etc.) but no archaeobotanical material was recovered. Analysis of the dietary remains indicated a heavy dependence on deer during the Early Archaic, but that the Late Archaic diet was supplemented by a wider variety of mammalian species as well as mollusc (Lewis and Lewis 1961).

An Archaic site with an extensive bifurcate point tradition was excavated at Rose Island, along the Little Tennessee River in eastern Tennessee (Chapman 1975). The Rose Island Site was interpreted as a base camp for one or more bands that occupied the site from the summer through the early winter. Subsistence data at the Rose Island Site were admittedly quite meager, and were supported by direct archaeological evidence only for the fall. Identifiable plant food remains associated with the bifurcate phase occupation at the Rose Island Site were limited to hickory nut, acorn, and honey locust seeds; of these, hickory nut and acorn comprised 99 percent of the total sample by weight (Chapman 1975).

The recovery of archaeobotanical remains is, in large measure, dependent on the application of flotation recovery techniques. Flotation recovery has been successful at a few Middle Atlantic sites, leading some investigators (e.g., Kauffman and Dent 1982) to challenge the prevailing view that Paleoindian and Early Archaic subsistence behaviors were almost wholly dominated by hunting. Botanical data present a unique set of interpretive problems, and it does not necessarily follow that all seeds, charred or otherwise, recovered from archaeological contexts represent plants that were consumed or intentionally used by the site inhabitants (Holt 1991; Keepax 1977; Minnis 1981; Moeller 1986; Smith 1985).

Relative to the Middle Atlantic region, botanical remains have been more frequently reported from sites in the Southeast and Midwest, particularly from rockshelters and deeply buried sites. Because the Archaic tradition encompasses the entire Eastern Woodlands area, it is assumed that archaeobotanical data from the Southeast and Midwest are in some measure applicable to the Middle Atlantic. Yarnell and Black (1985), using data from 60 sites in the Southeast, have compiled an important database pertaining to the prehistoric use of plant foods. First, there is widespread evidence that nuts (hickory, walnut, acorn, etc.), greens (e.g., purslane and pokeweed), fleshy fruits, small grains, and seeds were used throughout the Archaic and Woodland periods. Seed-to-nutshell ratios (computed as the number of seeds per 100 grams of nutshell) showed a steady increase through the Archaic, Early Woodland, and Middle Woodland periods, but dropped during the Late Woodland. Yarnell and Black also observed that the seeds of plants used for greens (purslane and pokeweed) declined after the Middle Archaic, while the numbers of small-grain-forb seeds (e.g., chenopod and amaranth) increased significantly during the Late Archaic and Woodland periods. Given these trends, they suggest that forb-grain utilization during the Late Archaic may have derived from the initial use of plants as greens (Yarnell and Black 1985).

At many sites with Early and Middle Archaic occupations, the complete absence of food remains is typical (e.g., Starbuck and Bolian 1980), and investigators must rely on indirect evidence to interpret subsistence behavior. For example, excavations at the deeply stratified St. Albans Site in Kanawha County, West Virginia, have produced indirect evidence that plant foods may have been an important element of Archaic subsistence strategy. In particular, the recovery of hoes or grubbing tools in association with Kirk and Kanawha levels suggests that plant foods were at least a dietary supplement during the Early Archaic period (Broyles 1971).

Late Archaic subsistence patterns are better understood than those of the Early and Middle Archaic, and existing models indicate reliance on a broader diversity of species as well as greater reliance on riverine resources. In the Outer Coastal Plain of the Middle Atlantic, shellfish gathering became increasingly important during the Late Archaic, and the shell middens found in the region's coastal areas and estuarine zones were first exploited intensively during the Late Archaic. Exploitation of riverine resources is also thought to have intensified in the Coastal Plain during the Late Archaic (Custer 1984; Gardner 1987; Waselkov 1982).

One of the hallmarks of the Woodland period is the introduction of agriculture, but there is little evidence in the Middle Atlantic region that cultivated foods played a significant role in the diet prior to the Late Woodland or Woodland II period. Although cultivated plants did assume greater importance during the Late Woodland, hunting and gathering of wild foods continued to overshadow food production (Custer 1984, 1986a). At the larger Woodland sites in Delaware, storage features are quite common, and the artifact assemblages frequently contain plant food processing tools, but there is only scant evidence of domesticated plants. A large trash pit excavated at the Wilgus Site (7S-K-21), a macroband base camp occupied during the Woodland I and Woodland II periods, contained large mammal, fish, reptile, and wild plant remains (Custer 1984, 1986a).

Recently developed techniques for the identification of residues on the surfaces of stone tools have raised the expectations of archaeologists that much new subsistence information may be forthcoming. The results

in this area have not yet matched initial expectations, however, and there is much uncertainty regarding the utility of these techniques for archaeological analysis. A large-scale lithic residue analysis program for the Indian Creek Site collection has highlighted the difficulties archaeologists face in the interpretation of lithic residue test results (LeeDecker et al. 1991). In that analysis, a two-stage approach was utilized. The first level of testing was a simple presence/absence test. This was followed by test procedures designed to determine species. The results of the program have called into question common notions regarding stone tool form and function. Selection of the lithic specimens that were submitted for testing was guided to a large degree by the assumption that tools such as projectile points and formalized scrapers would yield the greatest amount of subsistence information. More than 500 specimens were tested at the Level I (presence/absence) stage, and this sample of the assemblage was heavily biased toward inclusion of formal tools. The remainder of the sample consisted of debitage, some of which was included as a control sample and some of which was selected because of size and formal characteristics that suggested potential use as expedient tools. The unexpected result of the analysis was the infrequency of blood residue on formal tools (points and scrapers) and the large amount of debitage that tested positive for residue.

Although the Indian Creek Site results suggest that visual inspection is not adequate to identify expedient tools in a lithic assemblage, it is important to appreciate that the processes by which animal residues might come in contact with a given lithic specimen extend beyond the slaying and butchering of an animal. Any tool or debitage discarded in an area that was subsequently used for butchering might come in contact with blood from a slain carcass and ultimately yield a positive test result. Therefore the assumption that all lithic specimens that yield positive residue test results were used as tools is no more erroneous than the assumption that a positive reaction for a particular species implies cultural use of that species. The reagents used in the Level II analysis actually detect the presence of specific immunoglobulins which are present in all body fluids (blood, sweat, and tears) and tissues (Newman 1990), so that the term "blood residue test" is somewhat misleading. Specific positive tests might reflect nothing more than the presence of animal urine, which might have been deposited on the surface of a stone tool without any human intervention.

3. *Settlement Patterns*

The settlement pattern theme pertains to a culture's adaptation to the environment, as viewed from a regional perspective. Settlement patterns are perhaps best viewed from the perspective of cultural ecology, a theoretical framework that seeks to understand specific cultural features and adaptive patterns, with particular attention to those aspects of culture that are closely related to the utilization of the environment (Steward 1955:36-37). The cultural ecology approach is particularly well suited to the study of prehistoric cultures, because many important aspects of these cultures are closely related to the biophysical environment.

In Delaware, Archaic and Woodland settlement patterns are generally characterized by seasonal movements through a series of habitats that provided various plant and animal foods at different times of the year. Different settlement types, distinguished by the group size and activities, were established during the annual round. Therefore, an examination of settlement patterns requires an understanding of the environment, including the regional distribution of microhabitats where important plant or animal food species may be clustered at certain seasons of the year.

Custer's (1984, 1986a) Archaic settlement pattern model includes macroband base camps, microband base camps, and procurement sites. The Woodland I settlement pattern is similar to the Archaic model in that it includes the same types of sites, but the Woodland I macroband base camps are much larger than the Archaic macroband base camps. The Woodland II settlement system also includes the same three basic site types, but there are several distinct models that assume different seasonal movement between environmental zones. For the Mid-Peninsular Drainage Divide zone, only procurement sites and microband base camps are predicted, as macroband base camps would have been located in the coastal zone or along the lower reaches of major drainages (Custer 1986a).

Many archaeological settlement pattern studies in Delaware and the Middle Atlantic region have been based on regional surveys and museum collections, so that while there is some understanding of the varying use of specific resource zones, the understanding of some specific site types is relatively limited. The models constructed from these studies are robust in the sense that they are derived from large data sets, but they suffer from the fact that very few sites have been excavated to an extent sufficient to render them understandable in the context of their immediate environmental setting. This is particularly true for the Archaic period and for small Woodland sites.

In the Middle Atlantic region, the most comprehensive settlement pattern studies have been completed by William M. Gardner and his associates. The principal focus of Gardner's research has been the

Paleoindian and Early Archaic periods. Based on extensive research in the Shenandoah Valley of Virginia, Gardner has suggested that a significant shift in the settlement pattern occurred during the Early Archaic period, accompanying the shift to notched projectile point forms (Kirk and Palmer types). The most notable aspect of this change was the appearance of processing stations along floodplain margins (Gardner 1974:24). Gardner has interpreted the appearance of these processing stations with respect to changing environmental conditions that occurred during the early Holocene, specifically the replacement of the late Pleistocene regime by a mixed coniferous-deciduous forest. The mixed coniferous-deciduous forest would have supported a broader variety of exploitable plant and animal species, particularly along the margins of inland swamps and bogs, and these microenvironments were quite favorable for the hunter-gatherer populations of the Early Archaic.

Excavations at the Fifty Site (44WR50) have provided the basis for much of Gardner's interpretation of Early Archaic settlement and subsistence patterns. This site was located adjacent to a backswamp area along the South Fork of the Shenandoah River, and it contained a sequence of stratified Early Archaic living floors and activity areas (Carr 1974). The backwater swamp adjacent to the site would have supported a diversity of edible wildlife species, including small mammals, waterfowl, and plant foods, and this habitat was believed to have been the primary attraction for the Early Archaic groups that inhabited the site. However, the Fifty Site did not contain well-preserved faunal or floral remains, and the interpretation of the site as a food processing station was based primarily on a lithic tool assemblage that contained large chopping and scraping tools. These tools (large utilized flakes and bifaces) were described as implements that would have been used for butchering migratory waterfowl and various mammalian species. Although no plant food remains or plant food processing tools were recovered, it was reported that the environmental conditions of the site area were favorable for exploitation of both plant and animal foods (Carr 1974).

In the Delmarva Coastal Plain, Custer has observed that the most significant adaptive change associated with the beginning of the Archaic is a difference in the choice of site locations. In the Delmarva region, this settlement shift is seen as an increased emphasis on the swamp and marsh habitats that developed at the beginning of the Atlantic climatic episode. Custer notes that the settlement shift is perhaps most apparent in the Piedmont, Valley and Ridge, and Great Valley regions of the Middle Atlantic, where there is an increased use of upland sites. Custer defines three principal site types: macroband base camps, microband base camps, and procurement sites. Macroband base camps, the largest settlements, were located at the emerging swamp and marsh habitats, while the microband base camps were located on smaller tributary streams that provided access to lithic resources and game. Procurement sites were located in a variety of settings which were attractive to game or which provided specialized non-food resources (Custer 1984, 1986a).

Middle Archaic settlement models for the Middle Atlantic region are not well developed, and there is a lack of agreement among archaeologists regarding the bracket dates for that period. Gardner and many of his associates use a beginning date of circa 6500 BC for the Middle Archaic, arguing that the bifurcate-based points represent the initial phase of this period. Other investigators place the bifurcate-based points in the Early Archaic and use a more recent date of circa 6000 BC for the beginning of the Middle Archaic. Regardless of whether or not the bifurcate-based points are considered Early Archaic or Middle Archaic, there is a paucity of data pertaining to the interval between 6000 BC and 4000 BC. Custer's (1984) compilation of radiocarbon dates for Delaware and Maryland's Eastern Shore indicates an apparent absence of cultural activity for this period. Wanser (1982) has examined collections from southern Maryland (Charles and St. Marys counties), which includes the Zekiah Swamp area, one of the resource zones used most heavily during Maryland's prehistory. The collections generally support Gardner's assertions that there was an increasing focus on interior swamps during this time, but Wanser concluded that there were anomalous patterns in the frequencies of diagnostic points for the Middle Archaic (circa 6000 to 4000 BC).

Stewart and Cavallo (1991) have recently summarized Middle Archaic data for the Delaware Valley, addressing issues of chronology, settlement pattern, and subsistence. They bracket the Middle Archaic to the period circa 8500-5000 BP, and they argue that bifurcate-based points represent the first major element of this period. Based on excavations at the Abbott Farm National Landmark and other sites, they identify a number of Middle Archaic contexts that have yielded triangular points. Their settlement pattern model for the Middle Archaic includes three site types: Base Camp/Staging Areas (Type A); Limited Activity Transient Camps (Type B); and Individual Activity Areas or Stations (Type C). Type A sites were occupied by the maximum group size and were located in areas that afforded access to a wide variety of resources. Type B sites were occupied by smaller groups and would have been used on a seasonal or as-needed basis; this site type includes the Procurement Site type defined by Custer (1984). Type C sites were also used on a seasonal or as-needed basis and

were used by individuals or small groups (Stewart and Cavallo 1991).

In the Middle Atlantic Coastal Plain, the Late Archaic is generally viewed as a period of population increase, with evidence of increased sedentism and larger population aggregates. In Delaware, Custer subsumes the traditional Late Archaic period into his Woodland I period. In that period, he has observed that the distinctive characteristics of the settlement system are (1) the presence of base camps along major drainages that supported much larger population aggregates and (2) a corresponding abandonment of sites in other locations. The intensification of settlement in the major riverine zones is possibly related to the warm, dry conditions associated with the Subboreal climatic episode, which possibly decreased the carrying capacity of marginal areas that were exploited during the Atlantic climatic episode (Custer 1984, 1986a).

For southern New Jersey, Kraft and Mounier (1982) have observed that Archaic sites are found primarily in riverine, lacustrine, and coastal settings. They argue that by the Late Archaic a centrally based wandering settlement system had been achieved. Although the settlement pattern was focused primarily on riverine zones, sites located on the divides between drainages, like Site 7S-F-68, were functionally related to this settlement pattern.

Custer (1984, 1986a) has described the change from Archaic to Woodland settlement patterns as essentially a shift from a mobile to a more sedentary pattern. This shift was manifested by the appearance of large base camps in riverine and estuarine settings and by a corresponding reduction in the variety of exploited micro-habitats. For the Woodland I settlement pattern, Custer indicates that the three basic Archaic site types persisted: macroband base camps, microband base camps, and procurement sites. However, Woodland macroband base camps were larger than the corresponding Archaic site type, while the range of activities carried out at microband base camps and procurement sites decreased (Custer 1984, 1986a).

The addition of domesticated foods to the diet led to important changes in the Late Woodland or Woodland II settlement patterns. However, Stewart et al. (1983) have summarized data for the Late Woodland in the Delaware Valley and Upper Delmarva Peninsula, and noted a general continuity in settlement/subsistence systems from the Middle to Late Woodland periods. In general, Late Woodland settlement patterns were characterized by an increasing sedentism, which was reflected in larger villages located adjacent to areas of easily tilled soils, the construction of more permanent structures, and the increased use of food storage facilities (Custer 1984, 1986a).

For southern Delaware, a number of distinct settlement pattern models have been proposed for the Late Woodland Slaughter Creek complex (Thomas et al. 1975). The original models developed by Thomas et al. (1975) were based on an extensive survey of environmental resources available in the Delaware Coastal Plain, and they included three basic site types: (1) seasonal camps, (2) permanent and semi-permanent camps, and (3) transient camps. In Custer's (1984, 1986a) recasting of these models, seasonal camps correspond to microband base camps, while permanent and semi-permanent camps correspond to Custer's macroband base camp site type. Transient camps, as defined by Thomas et al., were used for short-term forays on a seasonal or as-needed basis. This site type would include hunting camps, and would correspond to Custer's procurement site type. An important element of the models developed by Thomas et al. is the delineation of resource zones, each with a distinct suite of exploitable resources. Site 7S-F-68 would be located in the Poorly Drained Woodland zone, a resource area that occupies a wide area of the Mid-Peninsular Drainage Divide in Sussex County. Each of the five models assumed seasonal movement or forays between the different resource areas. Based on the resource survey, the Poorly Drained Woodland zone would have been most attractive for exploitation during the winter to early spring (Model 1), fall to late winter (Model 4), or late fall and winter (Model 5) seasons.

A number of explicit settlement models for the Woodland period have been developed in conjunction with investigations at the Abbott Farm National Landmark, located in the Middle Delaware Valley (LBA 1983, 1987). Five basic site types were defined for these models: macro-social unit camps, micro-social unit camps, transient camps, specialized camps, and stations. The macro-social and micro-social units are comparable to Custer's similarly named site types, while the transient camp and specialized camp would generally correspond to the procurement site type. For the Late Archaic and Early Woodland, the principal site types were the macro-social unit camp and the transient camp. In Model I for this period, the macro-social unit camps were occupied for only a short part of the year, possibly during the early spring to early summer and again in the late summer to early fall; during the remainder of the year, smaller groups moved between transient camps. Model II for the Late Archaic/Early Woodland postulates that the macro-social unit camps were occupied for a longer duration, and the transient camps were used for correspondingly shorter visits. By the Middle to Late Woodland, greater sedentism is evident in the settlement pattern. In Model I for this period, a single

macro-social unit camp was occupied for a significant part of the year in a resource-rich setting, and all other exploitative activities would have been carried out by small groups using transient camps and stations. Model II postulates a seasonal movement of the entire co-resident group between macro-social unit camps in different resource zones (LBA 1983, 1987).

4. *Intrasite Patterning*

Investigation of the site structure focuses not only on the identification and spatial delineation of activity areas, but also on site formation, which is a closely related issue. Given the lengthy period during which Site 7S-F-68 was utilized by prehistoric groups, there should be little doubt that many different activities were carried out within the same relatively restricted space. Notwithstanding the preservation of features in subsoil contexts, the mixing of material associated with different occupations of the site should be expected. Although the individual episodes of site occupation may have been quite restricted in scope, the succession of occupational episodes would produce a complex of overlapping patterns, a situation that might be clarified only by intensive analysis.

Based on ethnographic information from various hunter-gatherer societies and excavation data, Binford (1983) has identified a number of cross-cultural similarities in the way individuals and groups carry out tasks and discard debris in residential and nonresidential sites. Within a campsite, hearth areas are normally the foci around which a broad range of activities are carried out, and Binford (1983:149) suggests that these activities were not only organized around hearths but were performed "according to a spatial pattern that appears to be universal." Site structure may be viewed as a conglomerate of individual modules that represent either distinct activities or social units. The representation of social structure in space is a culturally universal phenomenon, and occupation sites often contain a series of small areas of equivalent size and form that correspond to social units such as households or extended families.

The patterning of refuse deposits around hearths typically exhibits a concentric form. Small items, such as waste products from craft activities, are normally found between the hearth and the seating area, while larger items are discarded in a "toss zone" away from the primary seating and work area. There are a few basic patterns of refuse disposal among hunter-gatherers that account for the major patterns of archaeological site structure. These basic disposal modes include: (1) dropping or discarding objects in their place of use, (2) tossing individual items away from their place of use or consumption, and (3) dumping a group of items en masse. Small dumps often appear to have a "magnetic" effect, as they accumulate material from subsequent refuse disposal episodes (Binford 1983).

Distinct disposal patterns may be observed inside and outside of structures. While the concentric, or donut-shaped, pattern of refuse is typically left by groups around an outside hearth, greater effort is normally made to maintain the cleanliness of indoor domestic spaces. Refuse dumps are typically located immediately outside the door, left there after the cleaning of a domestic space. Activities that produce large amounts of waste material are typically located away from the primary living area, so that debris may be left in place at some remove from the primary living space. Sites that are intended for reuse, including the peripheral areas adjacent to the primary habitation areas, are typically cleaned of debris (Binford 1983).

While ethnographic sources (e.g., Binford 1983; O'Connell 1987; Yellen 1977) provide an important context for interpretation of structure, interpretation of behavioral patterns must also be grounded on a comprehensive understanding of site formation processes (Schiffer 1987). Site formation issues must be addressed by a site-specific program of soils and geomorphological analysis, crossmending or refitting of artifacts, and analysis of the internal distribution of features and refuse deposits.

5. *Technology*

Lithic artifacts provide the principal avenue for addressing issues relating to technology. Stone tools and the debris from their manufacture, maintenance, and recycling comprise the lithic record of a prehistoric society or culture. This record is a partial reflection of a society's technology--its strategies for interacting with its biophysical and social environments. How a society organizes its technology provides important insights into the economic and social structure of that society (Koldehoff 1987; Nelson 1991). These facts, coupled with the durability of stone at the material of tool technology, underscore the amount of potential information that can be gleaned from lithic artifacts.

Five basic categories of information can be derived from lithic artifacts: depositional, temporal/stylistic, functional, technological, and raw material. These aspects of the lithic record are all interrelated and cannot be completely divorced from one another. Raw material analysis identifies the lithic materials that were manipulated; this information permits inferences to be made about procurement strategies and the related issues of exchange and settlement mobility. Technological analysis examines tool design and methods of production, maintenance, and recycling;

this information helps to document the organization of technology and address topics such as site function. Functional analysis determines the tasks in which tools were employed; this information also helps to document the organization of technology and site function. Temporal/stylistic analysis provides chronological as well as other cultural information; unfortunately, only the most formalized stone tools are temporally diagnostic (e.g., projectile points), and even these items tend to be less sensitive to temporal change or regional styles than are ceramics. Information about depositional processes helps to identify activity areas, tool kits, and larger-scale site formation processes; this information is derived from crossmending artifacts and plotting artifact distributions.

6. *Environmental Adaptation*

The environmental adaptation theme examines cultural response to changing environmental conditions. Given the lengthy period during which Site 7S-F-68 was used and the region's paleoclimatic history, the archaeological record at the site would be expected to reflect cultural responses to changing environmental conditions. Specifically, these changes would be reflected in the composition of tool kits and in the subsistence patterns. Subsistence and settlement pattern issues, discussed above, pertain directly to the environmental adaptation theme, and reconstruction of past environmental conditions provides the necessary context for examination of this theme. Carbone (1976) and Custer (1984) have provided important baseline information for the region, and these syntheses may be expanded by other available data (e.g., Brush 1990; Thomas et al. 1975; Watt 1979).

C. METHODOLOGY

1. *Sampling Strategy and Field Methods*

The program devised for data recovery was based on a sampling plan that included three principal components: (1) excavation of block areas centered on productive loci of the site identified during the Phase II fieldwork, (2) exploratory excavations to provide a better spatial sample of the site area, and (3) expansion of block areas to recover significant features and deposits identified during the exploratory excavations.

On the basis of the Phase II testing, two areas were identified for expansion of block excavations. The first of these, identified as the North Excavation Block, was centered on Test Units 9 and 10, which contained a charcoal feature (Feature 2) and the largest number of diagnostic artifacts. This block also encompassed Test Units 5 and 11, as these units contained pottery and diagnostic points. The second block area, identified as the South Excavation Block, encompassed Test Units 1 and 7, which represent the downslope area of the site. Test Unit 1 contained an Early Archaic point and Test Unit 7 contained a fragmentary point whose morphology suggests an Early Archaic form.

A few exploratory units were scattered throughout the site to provide a spatially more representative sample, although the site area had been fairly well tested during the Phase II fieldwork. Reserve units were used to enlarge block excavations around significant features or deposits.

Altogether, the data recovery excavations encompassed an area equivalent to approximately 25 percent of the site area within the right-of-way. The site is estimated to cover an area of approximately 700 square meters (20x35 meters), and a sample of approximately 3 percent was obtained during the previous fieldwork. During the data recovery program, an additional 173 square meters of the site area were excavated, providing an overall excavation sample of 28 percent of the site. Figure 5 portrays the spatial sampling obtained during the Phase II and III fieldwork.

The excavation methodology followed the field techniques used in the Phase II testing program, to permit integration of the results of both phases of excavation. During the testing program, a vertical datum and a horizontal grid system were established for the site, and these were reestablished and used as the primary spatial control systems for the Phase III fieldwork.

The primary excavation units were 2x2-meter squares, although some units in the excavation blocks were necessarily smaller to accommodate the standard unit size (1x2-meter) employed during the Phase II fieldwork. The plowzone was removed as a single level, and then the underlying subsoil levels were removed according to 10-centimeter levels. Within each unit, subsoil levels were excavated according to quadrants (1x1-meter squares), in order to permit more refined spatial analyses. Features and soil profiles were drawn to scale and photographed using black-and-white and color slide film. Excavated soils were described according to standard USDA soil textural classes and Munsell soil color notation.

The Phase II investigations demonstrated the presence of historic artifact deposits in some areas of the site. These deposits appeared to represent modern litter and generalized sheet refuse associated with a farmhouse located outside the right-of-way, and they were not considered significant (LeeDecker et al. 1992). Because a sample of the site's nineteenth-century and

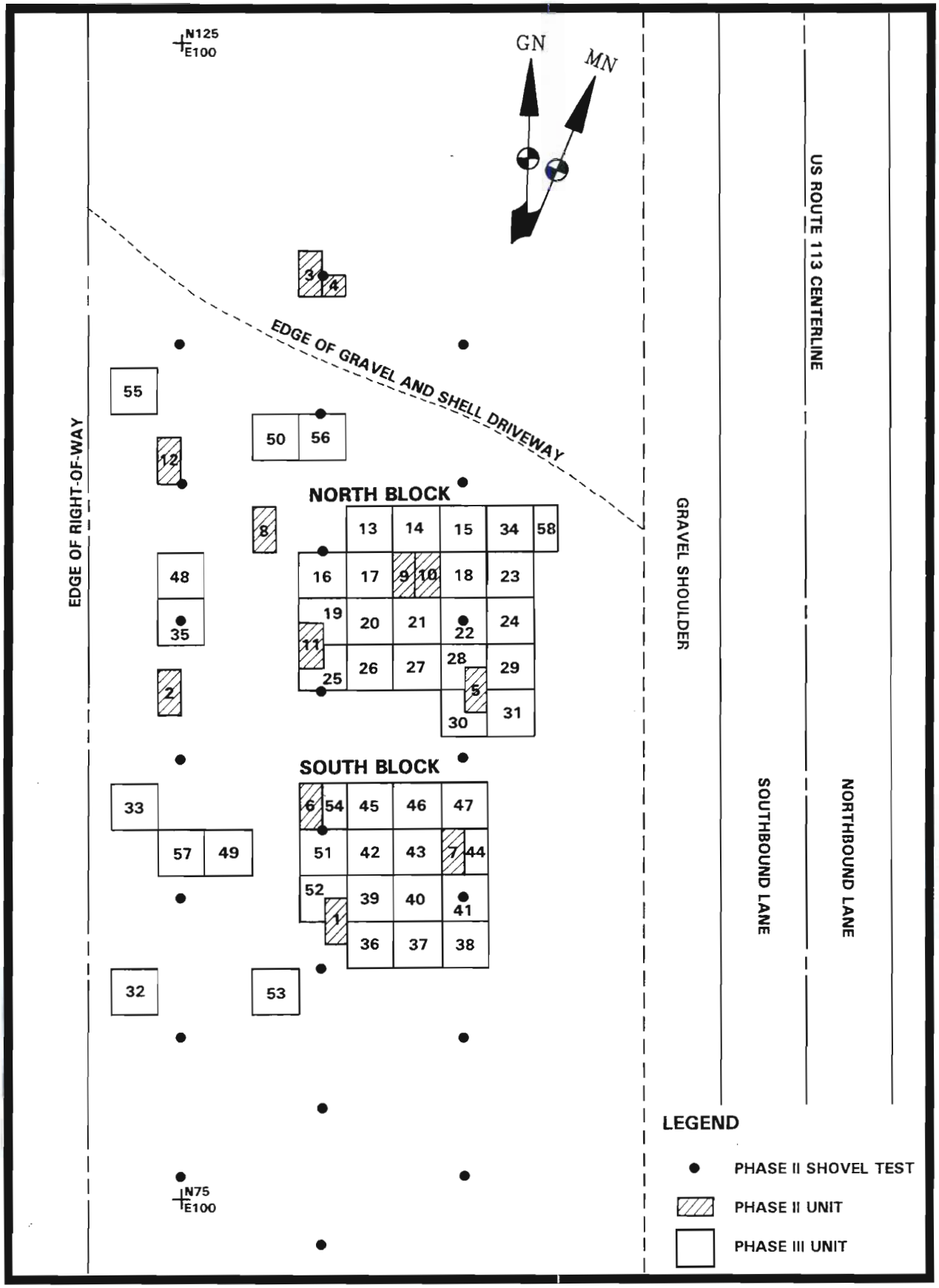

FIGURE 5: Spatial Sampling in Phase II, and III Fieldwork

twentieth-century material was obtained during the Phase II investigations, material of this type was not retained during the Phase III excavations. Historic artifacts recovered during the Phase III fieldwork were examined and discarded after a determination that they did not represent a significant resource.

2. *Artifact Processing and Analytical Methods*

A substantial artifact collection from the site had already been processed and analyzed for the preceding Phase I and Phase II investigations. In order to take full advantage of the existing analytical information, the artifact processing and analysis for the data recovery program followed the same overall laboratory procedures. This allowed integration of new information into the database already established for the site.

The artifact collections were processed for eventual storage and curation by the Delaware State Museum. Artifacts were assigned accession numbers according to the system utilized by the Island Field Museum. The assigned accession numbers for Site 7S-F-68 are as follows:

Accession Number	Phase
89/41	I
91/33	II
92/159	III

In addition to the accession numbers, unique catalog numbers indicating field provenience within the site were also assigned. After cleaning, the tools and diagnostic artifacts were marked with the accession number and catalog number. Tools and ceramics were then separated from debitage and the material was cataloged by the appropriate analyst or laboratory technician. After analysis, the collections were sorted according to major classes (bifaces, unifaces, cobble tools, cores, debitage, fire-cracked rock, etc.) and placed in resealable plastic bags with a card containing the full site provenience, the date of excavation, the excavator's initials, the catalog number, and the accession number.

Artifact cataloging and tabulation were accomplished by a computerized database system developed by the LBA Cultural Resource Group. The database was developed using the MicroRim Inc. R:BASE System V relational database software package, which runs on IBM PC XT and compatible microcomputers. The overall database for this project contains four principal files: (i) provenience, (ii) prehistoric artifacts, (iii) historic artifacts, and (iv) floral and faunal material. An overview of the information in the principal files is presented below.

Full field provenience information was included in the provenience file: *Catalog Number*, *Site*, *Unit*, *Unit Level*, *Stratum*, *Feature*, *Feature Level*, and *Quadrant*. The majority of these fields were taken directly from the field excavation records and are therefore self-explanatory. During fieldwork, a sequence of catalog numbers was assigned to the provenience list, so that each unique provenience could be identified by a single number. In addition, a *Remark* field was added to the database to accommodate additional explanatory information about specific contexts. Additional fields to identify excavation blocks and interpreted depositional units were subsequently added to the provenience table to facilitate analysis of intrasite patterning.

LBA's cataloging system for prehistoric artifacts has been formalized in a system known as *Lithica* (Taylor and Koldehoff 1991). The analytical approach applied can be described as technomorphological; that is, artifacts are grouped into *classes* and then further divided into *types* based upon key morphological attributes, which are linked to or indicative of particular stone-tool production or reduction strategies. However, a function(s) can be assigned to each artifact class and type. More detailed functional assessments of artifacts can be made by recording specific observations about use-wear and tool morphology. Data derived from experimental and ethnoarchaeological research are relied upon in the identification and interpretation of artifact classes and types. The works of Callahan (1979), Clark (1986), Crabtree (1972), Flenniken (1981), Gould (1980), and Parry (1987) are drawn upon most heavily. Descriptions of the tool and debris types are contained in Chapter VII.

For prehistoric pottery sherds the following attributes were recorded: vessel portion, temper, surface treatment, thickness, count, and weight to the nearest tenth of a gram. Thickness was measured with vernier calipers, but only for sherds with intact surfaces (i.e., uneroded). Because the assemblage is relatively small and very fragmentary, the above attributes, excluding the metric attributes, were not recorded as a series of codes. Rather, they were simply recorded as text in a note field. Sherds were assigned to established ware types, if possible. Burned clay fragments were counted and weighed, but because of their small size and eroded nature, little can be inferred from them.

Historic artifacts were cataloged according to standard typologies (e.g., Noel Hume 1970; South 1977), using the class, type, and variety approach (for example, class = glass, type = bottle, variety = case). First, the collection was sorted according to major classes--ceramics, curved glass, pipes, and small finds. The small finds class is a residual or catch-all category that comprises a broad variety of items, including ar-

tifacts assignable to South's (1977) Architectural, Furnishings, Arms, Personal, Clothing, and Activities groups. Because significant historic deposits were not recovered, cataloging of the ceramics and glass was carried only to the level of individual sherds, rather than vessels, and no crossmends or Minimum Number of Vessel determinations were made. Cataloging was accomplished by use of alphabetic and numeric codes for the various attributes, but more lengthy "translations" were generated for printing catalog sheets. For example, the codes "CRW 10" translates to "Ceramic, whiteware, shell-edged blue," with an automatically entered date range of 1820 to 1900. During data entry, some of the attributes--date ranges, for example--were automatically entered by the computer for commonly encountered artifact types.

Cataloging and analysis of the floral and faunal material samples were completed by a consultant, and the catalog was subsequently integrated into the overall database. For each specimen, the recorded data includes species identification, count, weight, and other modification. Cataloging procedures used for the floral and faunal material are described in Chapter VIII.