

II. CULTURAL AND ENVIRONMENTAL BACKGROUND

Physical Environment

For most of the 12,000 years that Native Americans inhabited eastern North America, populations lived as hunters and gatherers. The economic lives of native inhabitants were closely tied to the landscape, and they commanded a detailed knowledge of the geographic distribution of the natural resources on which they depended. For this reason an understanding of the natural or physical environment is critical to the study of prehistory. An analysis of settlement and subsistence patterns—where and how people lived—must begin with a consideration of what resources were available, where they were located, and where people had to go to get them. The physical environment is not static, but rather is constantly in flux. The environment has changed markedly during the past 12,000 years—the landscape looked considerably different at that time than it now does. And until about 5,000 years ago, those differences were directly related to the retreat of the continental ice sheets at the end of the Pleistocene, the last Ice Age. The following paragraphs will consider the physical setting of the Lums Pond site and how it is related to prehistoric use of the area, first examining the physiography of the area—the streams, soils, bedrock formations—then vegetation and animal life, and finally climate and its alterations through time.

Geomorphological Setting: A Brief Landscape History

There are two main physiographic regions represented in the Delmarva Peninsula: the Coastal Plain, consisting of marine sediments laid down as an earlier seabed; and the Piedmont, a hard, crystalline bedrock landform. The transition between the two zones is known as the fall line, which marks the change from lowlands to uplands and signals the extent of navigability of inland streams.

The Coastal Plain in Delmarva is subdivided into two segments, referred to as the Low and High Coastal Plains. The Low Coastal Plain comprises most of Kent and Sussex counties, and consists of unconsolidated marine sediments, mostly sand and clay. The High Coastal Plain consists of sand and gravel sediments whose origin is continental rather than marine. Glacial outwash generated by the melting of the continental ice sheets at the end of the Pleistocene deposited extensive beds of coarse sands, pebbles and cobbles across the High Coastal Plain from the Piedmont southward to the Smyrna River. Known as the Columbia Formation, the pebble and cobble beds contain quartzite, quartz,

and chert, which represented a valuable source of raw material to prehistoric populations for stone tool manufacture.

The High Coastal Plain is somewhat more hilly than the Low Coastal Plain, showing greater relief, with elevations ranging as high as 16 meters (50 feet) above mean sea level. As a result, streams in the region may often be incised, having more steeply cut valleys than occur to the south. Moreover, a greater variety of soil types tends to be present along with more diverse environmental habitats. Streams in the High Coastal Plain typically flow eastward to the Delaware River and are tidal through their low and middle reaches. A few streams at the western edge of the High Coastal Plain flow to the west toward the Chesapeake Bay. The divide separating the watersheds is referred to as the Mid-Peninsular Drainage Divide. The SR 896 corridor runs along this divide from the intersection with I-95 southward to Summit Bridge and beyond.

The Lums Pond archaeological site lies on a wide ridge above the confluence of two headwater tributaries of St. Georges Creek. True to the physiography of the region, the area around the site shows relatively little relief, but two main features are noticeable. One consists of a low knoll lying north of the stream confluence and comprising the highest portion of the site in elevation. The second feature is a wide and low terrace system bordering both streams. Elevations range from 53 feet above mean sea level, along the western stream, to 74 feet, at the top of the rise along Howell School Road. These elevations are somewhat higher than those typically recorded in the High Coastal Plain, thus reflecting the proximity of the fall line and the higher elevations of the Piedmont.

Two prominences are visible just south of the fall line near Newark: Iron Hill and Chestnut Hill, outliers of the Piedmont physiographic province. They rest on the crystalline rock that forms the Piedmont, but are surrounded by Coastal Plain sediments. The hills are composed mainly of igneous rock, such as gabbro, norite, and pyroxenite, but outcrops of jasper occur in many parts of the hills. While the quality of the jasper is highly variable, material suitable for stone tool manufacture is present and is known to have been used by prehistoric populations. Preliminary chemical characterization studies conducted here have indicated that jasper from Iron Hill can be distinguished from jasper that occurs in outcrops to the north in the Delaware River Valley, and farther west in Pennsylvania and Virginia. It may, then, be possible to follow the regional distribution of jasper artifacts from Iron Hill, and thus to map transportation and exchange routes.

The U.S. Department of Agriculture studies indicate that soils bordering the two streams at the site consist of poorly drained types (Fallsington loam or sandy loams) that typically support hardwoods and wetland vegetation. While these soils can be used for

agriculture, they had not been systematically cultivated within the survey area, probably due to a seasonally high water table. In contrast, most of the site area was comprised of deep, well-drained upland sandy loam (Sassafras sandy loam), that supports a mixed hardwood and pine forest cover, but is susceptible to erosion. The farming potential of this soil is reported as excellent, and cultivation, as at the Lums Pond site, is typically intensive. The implications of the extent of cultivation for archaeological site disturbance were noted and became an important factor in determining the overall significance of the archaeological remains at the site.

Plant and Animal Resources

Lums Pond lies within a region currently defined by geographers as dominated by an oak-chestnut forest. This forest community contains a variety of trees including various oaks, poplar, beech, chestnut, hickory, maple, ash, cherry, elm, walnut, and butternut. Agriculture and ongoing land development and urbanization in the region have greatly altered the landscape and the make up of plant and animal communities. In its natural state the region supports populations of deer, turkey, small mammals, and reptiles, along with a variety of birds, particularly migratory waterfowl.

The Paleoenvironment and Human Occupation of the Middle Atlantic

The natural environment of Lums Pond—including the form of the landscape, the climate, water resources, and plant and animal life—has existed in its present condition for several thousand years with relatively little change. Thus our picture of prehistoric life over that period can be based on what we know of the area today. Prior to that time, conditions were different, considerably so in some instances. The driving force behind the variations has been climate change. Much of what is known about climate and the paleoenvironment is based on pollen sequences extracted from marsh or bog deposits containing organic material that can be dated using radiocarbon technology. Using pollen data, the types of plant life that were prevalent can be determined along with their relative proportions, and from that information inferences can be made about climate and the appearance of the landscape. A large amount of spruce and hemlock pollen, for example, suggests a cold and wet, or boreal climate, while a mixture of tree and grass pollen implies a patchwork of forest and open parkland.

In general, the environment of the Lums Pond area and Middle Atlantic region has remained relatively stable for the past 5,000 years. Prior to that time, two broad trends

are noted, both of which were linked with the retreat of the last continental glaciers during a period that coincides with the arrival of Native American populations in the Northeast. The trends are characterized as gradual warming and the replacement of the existing open, boreal forest typified by coniferous trees with a closed forest made up of temperate, mixed deciduous communities.

At the end of the last glaciation, much of northeastern North America was considerably colder and wetter than at present, covered by open tundra and boreal forest environments. Sea level has been estimated at as much as 130 meters (430 feet) below current levels, with estuary systems such as the Chesapeake and Delaware Bays yet to form, still consisting of rivers and outwash channels. Accompanying the retreat of the ice sheets was a gradual warming trend that resulted in a rise in sea levels, the flooding of coastal zones, and the development of new estuary environments. Northern forests and their associated faunal communities were gradually replaced with varieties more typical of southern temperate zones, so that by approximately 3000 BC, an essentially modern climate and environment had become established. Climatic changes did not occur at a smooth, unvarying rate, but rather consisted of a series of short-term variations within a general trend. Climatologists have divided the period into divisions referred to as Late Glacial, Pre-Boreal, Boreal, Atlantic, Sub-Boreal, and Sub-Atlantic.

Cultural Development

The study of the physical environment of the region and the alterations it has undergone during the time the area has been occupied by human populations furnishes insights into the nature and availability of habitats which would have been suitable to prehistoric groups living in the region. These environmental changes provide a background or context for cultural change as seen through artifact and settlement pattern variation. The major cultural changes recognized in the Delaware archaeological record are referred to by periods which span hundreds and sometimes thousands of years.

In the late 1960s, James Griffin defined a broad chronological sequence for eastern North America which reflected widespread developments in technology and social adaptation. These periods are referred to as the Paleo-Indian, which extended from approximately 14,000 to 8000 BC, the Archaic, extending from 8000 to 1000 BC, and the Woodland, from 1000 BC to AD 1600. The latter two periods, the Archaic and the Woodland, were divided into early, middle, and late subperiods. While Griffin's chronology remains the basis for the study of prehistory in the east, an alternative chronology has been proposed for the Delmarva Peninsula by Jay Custer, of the University of Delaware. This regional chronology defines the Paleo-Indian period as

extending from 12,000 to 6500 BC, and the Archaic period from 6500 to 3000 BC. Two later periods are recognized: Woodland I, from 3000 BC to AD 1000; and Woodland II, from AD 1000 to 1600. Table 1 summarizes the correspondence between the two chronologies, along with their relationships to the major climatic periods referred to earlier.

	CLIMATIC EPISODES	TRADITIONAL EASTERN CHRONOLOGY	DELMARVA CHRONOLOGY	WOODLAND COMPLEXES OF THE HIGH COASTAL PLAIN AND PIEDMONT / FALL LINE PROVINCES
1600 A.D.	SUB-ATLANTIC	LATE WOODLAND	WOODLAND II	MINGUANNAN
1000 A.D.		MIDDLE WOODLAND	WOODLAND I	WEBB-- DELAWARE PARK
500 A.D.				CAREY -- BLACK ROCK
0 A.D.	BLACK ROCK-- DELMARVA ADENA			
500 B.C.	CLYDE FARM-- BARKER'S LANDING			
3000 B.C.	SUB-BOREAL	EARLY WOODLAND	ARCHAIC	
4500 B.C.		LATE ARCHAIC		
6500 B.C.	ATLANTIC	MIDDLE ARCHAIC	PALEO-INDIAN	
8500 B.C.	BOREAL	EARLY ARCHAIC		
10,500 B.C.	PRE-BOREAL	PALEO-INDIAN		
12,000 B.C.	LATE GLACIAL			

Table 1. Comparison of Prehistoric Chronologies

Because much of the existing database from Delmarva, as well as various settlement pattern models derived from that data, result from work conducted by Custer and his associates, the regional Delmarva chronology has been employed in the Lums Pond study.

Paleo-Indian

About 15,000 years ago, during climatic episodes known as the Late Glacial and Pre-Boreal, the climate in the region was considerably colder and wetter than it is at present. Tundra-like conditions were prevalent near the edge of the glaciers. The ice

front did not extend beyond central New Jersey, and to the south, in regions like Delmarva, lay abundant open grassland interspersed with stands of spruce and fir. Large grazing animals and now extinct megafauna ranged across a patchwork of parkland and boreal forests. The retreat of the glaciers brought a fairly rapid warming trend throughout the Middle Atlantic, a phenomenon that was directly reflected in the replacement of northern plant and animal species by those more characteristic of temperate zones to the south. Like much of the Middle Atlantic region, New Castle County and the Lums Pond area were characterized by a relatively complex set of overlapping environmental zones, providing a variety of subsistence resources for prehistoric populations entering the area. By the time of the arrival of humans some 14,000 years ago, most of the large grazing and browsing fauna associated with the Pleistocene had disappeared from the Middle Atlantic region—the woods and forest margins supported a wide range of plant and small animal species.

Archaeological sites from this time period are usually identified by the presence of finely crafted stone projectile points, or spear tips, usually made of cryptocrystalline stone such as chert or jasper. The points were characterized by a single, long channel flake, or flute, removed from each face to aid in attaching the point to a spear shaft. Relatively few Paleo-Indian sites have been reported throughout the Middle Atlantic, a phenomenon that may be due in part to the fact that sites once located in coastal areas or along streams are now submerged by the rise in sea level that accompanied the melting of the ice sheets.

Archaic

The traditional chronology for eastern North America describes a break in cultural patterns at about 8000 BC, which corresponds approximately with the warming trend signaling the Boreal and subsequent Atlantic climatic episodes. Open grasslands diminished in extent, and boreal forests were replaced by pine and northern hardwoods, and in particular, oak. The new cultural pattern, referred to as the Archaic period, is usually recognized as ranging from around 8000 to 1000 BC. It was characterized by adaptations to environmental conditions which rapidly approached that of the present. Most Middle Atlantic archaeologists agree that there was a degree of continuity between the Paleo-Indian and the Early Archaic periods in patterns of settlement and subsistence, where people lived and how they supported themselves. In the Delmarva regional chronology, the Paleo-Indian and the Early Archaic periods are combined under the single rubric of Paleo-Indian. Populations remained highly mobile, while intensive foraging and transitory use of resource areas is indicated by the presence of many small sites. Specialized, transient procurement sites visited on a seasonal basis have also been

identified, suggesting the beginning of scheduled, logistically planned use of the landscape.

One of the most important environmental changes affecting prehistoric populations throughout eastern North America during the Archaic period was the gradual rise in sea level resulting from the melting of the continental ice sheets. Rising sea levels produced widespread lowland flooding, which extended up many Pleistocene river valleys, such as the Delaware and Susquehanna, giving rise to the term "drowned" river valley. It is estimated that inundation of the Susquehanna River system, which culminated in the formation of the Chesapeake Bay, began as early as 14,000 BC. Among the effects of inundation were a marked rise in local water tables, the development of complex estuary systems, and a consequent increase in floral and faunal resources in newly formed marsh or wetland areas. Large marshes and swamps became an important focus of occupation during the period. Generalized deciduous forests, made up of hardwoods such as oak and hickory, were in place by 4000 BC, near the start of the Sub-Boreal climatic episode. The forests produced large quantities of mast foods—acorns, beechnut, and chestnut—which fostered an increase in populations of deer, small mammal, and game birds such as the wild turkey. Unlike the Paleo-Indian period with its distinctive fluted spearpoint, a variety of projectile point styles occurred in the Archaic period. But perhaps most importantly, the lithic tool kit was marked by the appearance of groundstone tools, the first artifactual evidence of extensive plant processing.

Woodland I

Around 3000 BC, the rate of sea level rise slowed, allowing riverine and estuarine environments to stabilize enough to support significant and seasonally predictable populations of shellfish and anadromous fish—salt water fish, such as salmon or, on the East Coast, sturgeon, that spawn in freshwater streams. An increase in the number of archaeological sites at this time indicates population growth, while the size and complexity of settlements along rivers and estuaries suggests a trend toward sedentism, or more settled occupation, as well as organized strategies for resource acquisition. The apparent development of sedentism forms the basis for distinguishing the Archaic and Woodland I periods in the Delmarva region. Near the fall line, in areas similar to Lums Pond, the spring and summer months saw large base camps situated along major streams, like St. Georges Creek, at which anadromous fish were harvested. During the fall and winter months, smaller base camps were occupied along inland tributaries. More transient, special purpose camps used for the harvesting or procurement of specific resources, were employed to support the base camp occupations.

Certain tool associations were common throughout the region, particularly in the Piedmont, to the west and north of the study area, where several styles of broad-bladed point were manufactured from specific types of stone: Susquehanna broadspears, for example, were made from rhyolite, while a broad, contracting stem point known as Koens-Crispin was made from argillite. Based on artifact associations, it has been inferred that wide-bladed points such as these were designed in part for use in exploiting riverine resources. The points are often found in association with vessels carved from steatite, another characteristic artifact of the period. Around 1000 BC, techniques for pottery manufacture were introduced across the region. The earliest known ceramic in the area, used from about 1200 to 800 BC, is a steatite-tempered variety referred to as Marcey Creek ware, after its type site on the Potomac River in Arlington County, Virginia. Beginning at about this same time, a series of regional complexes has been recognized (Custer 1989). These complexes consist of groups of sites that are limited in distribution and time span and have similar characteristics based on the artifact assemblages they contain. For example, an early ceramic ware known as Dames Quarter, is typically found in combination with long-stemmed projectile points, broadspears, and fishtail points, and comprises a cultural complex designated as Barker's Landing in the High Coastal Plain and as Clyde Farm in the Piedmont/Fall Line zone.

Recent evidence suggests that distinctive residential patterning, including the use of a form of shallow pit house, developed during early in the Woodland I period (Custer 1994). There are indications that population was on the increase in the latter portions of the period, as semi-sedentary base camps, referred to as macro-band base camps, increased in size. A shift is noted in the locations of these base camps from small, creek floodplains to larger, riverine floodplains. Yet the pattern of deliberate and intensive foraging for food and other resources that was evident earlier in the period appears to have remained essentially unchanged. Increased participation in trade and exchange networks is also noted, as is an increase in societal complexity. Both of these processes are inferred from the appearance of exotic lithic raw materials as well as artifacts and burial ceremonialism that are associated with cultures from the Mississippi and Ohio River Valleys (Custer 1989).

Later Woodland I complexes in Delmarva include Black Rock, Delmarva Adena, Carey, Webb, and Delaware Park (Custer 1994). The Black Rock Complex, which appears to have been related to cultures in southeastern Pennsylvania, is characterized by a relatively thick ceramic ware known as Wolfe Neck, along with artifacts made of argillite and rhyolite, types of stone acquired from Pennsylvania, New Jersey, or Maryland. Delmarva Adena sites contain numerous burials, caches of bifaces made of chert from Flint Ridge, in Ohio, along with beads, pipes, and other characteristic grave goods, all apparently related to the Adena culture centered in the Ohio River Valley. The

Carey Complex occurs late in the Woodland I period and is marked by the retreat of Adena influence on the peninsula, including the abandonment of mortuary centers. Carey is distinguished by a thick-walled, shell-tempered ceramic ware known as Mockley, and lanceolate or stemmed Fox Creek projectile points, often made of argillite or rhyolite. Other complexes recognized late in the Woodland I in Delmarva include the Delaware Park Complex in the north and the Webb Complex in the south, both characterized by crushed quartz-tempered Hell Island ceramics and Jack's Reef pentagonal points. The Webb Complex includes evidence of mortuary ceremonialism that suggests the re-emergence of contact with groups outside the region.

Woodland II

By approximately AD 900, horticulture began to achieve a significant role in subsistence practices across much of the Middle Atlantic region. Yet direct evidence of plant cultivation is rare on the Coastal Plain, and has yet to be recorded on the Delaware Coastal Plain. Agriculture is thus presumed to have remained at best a secondary activity. The absence of tools made from non-local stone and the disappearance of non-local influences on mortuary practices imply a breakdown of the extensive trade and exchange networks operating during the early portions of the Woodland I. Cultural stability is also inferred from the relative lack of variability in ceramic wares throughout the period.

These changes are distinct across Delmarva and represent a cultural break defined as Woodland II, a period that extended through the date of European Contact. In the Piedmont/Fall Line and High Coastal Plain zones, the main Woodland II cultural complex is known as Minguannan, distinguished by a ceramic ware of the same name, and several small, triangular projectile points, which served as either dart or arrow tips. In contrast to settlements to the south, on the Low Coastal Plain, there is little indication of widespread sedentism associated with Minguannan Complex sites—there were no large villages, nor was there a marked shift to fertile bottomlands.

Historical Summary

The first permanent European settlement in Delaware was established in 1638 at Fort Christiana, near the present day City of Wilmington, first under the sponsorship of the Swedes and later by the Dutch (DeCunzo and Catts 1990). English hegemony in the Delaware River and Chesapeake Bay areas began in 1664. Within New Castle County, five tax districts, or hundreds, were established by 1687, including Pencader Hundred near the present town of Glasgow. Formal settlement of Pencader Hundred began in

1701, and by the mid-eighteenth century, towns and industry grew, stimulated by commercial expansion and increasing population. The earliest settlers in the Lums Pond vicinity were farmers, raising crops to support their households and livestock, and raising wheat for sale as a cash crop (Wise 1983). Enough farmers raised wheat to encourage construction of a mill and millponds at Lums Pond. During the nineteenth century, the economy of Delaware remained predominately agricultural, although much more land was being cleared and farmed. Road networks were expanded and upgraded, and turnpike companies were chartered. In 1829, the Chesapeake and Delaware Canal was opened, providing a fast way of crossing the Peninsula (Wise 1983). The construction and use of the canal directly affected the size of Lums Pond, and at various times the pond was either dammed up or completely drained. The growth of railroads provided access to urban markets, resulting in the emergence of new towns and changes in agriculture and industry. Industrialization and commercialization was primarily focused on the Piedmont, with the Upper and Lower Peninsula mainly remaining agrarian. In the 1930s, many roads in Pencader Hundred were widened, although the rural character of the area prevailed. During the 1960s, through to the present day, increasing suburbanization has transformed the region, and large agricultural areas are undergoing conversion to an amalgam of commercial, light industrial, and residential uses (Bowers 1987).