# NATURAL RESOURCE PATTERNS

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### Physiographic Setting

The Delaware Park Site is located in the Atlantic Coastal Plain Physiographic Province, but is 1.6 kilometers south of the Appalachian Piedmont Highlands. The proximity of the site to the Fall Line contact between these two provinces is reflected in the unique topography associated with the site. The site is on a small knoll along the south bank of the White Clay Creek. This knoll is from 90 to 220 meters in width and runs for at least a mile along the stream. Elevation at the site is only 6.7 meters above MSL. The southeast side of the knoll dips gently into a partially dessicated swamp, now seen as a flat low wetland area. To the northeast, between the knoll and the stream channel, is a similar low-lying wetland area.

The site is located at the confluence of two major stream systems in the area; the White Clay Creek and Mill Creek. Both streams flow out of the Piedmont and enter the coastal plain only a few miles west and north of the site respectively. The Fall Line is traversed by both streams with only minor rapids. Flood plains are broad and level and the flooding of both streams is a regular occurance in recent times. Although neither stream is tidal in the immediate vicinity of the site, the White Clay Creek becomes affected by tidal movements within 1.6 km. downriver of the site. The Christina River, into which the White Clay flows only a short distance below tidewater, is a large, sluggish, stream which flows out of the Piedmont only a short distance west of the White Clay, at which point it is approximately the same size stream. The numerous streams which enter the Christina River before it reaches the major Delaware River system give it a status of the major drainage system in northern Delaware.

The United States Department of Agriculture's Soil Conservation Service survey of New Castle County (Matthew & LaVoie 1970) classifies the soil of the Delaware Park Site area as falling within the Sassafras-Fallsington-Matapeake Association. The area of this association is described as "Level to gently rolling, well-drained and poorly drained, moderately coarse textured and medium-textured soils on uplands" (Matthew & LaVoie 1970:5).

The Delaware Park Site sits upon a Comus soil type. The Comus series consists of "..well drained soils on flood plains that lie on the Piedmont Plateau and extend along some of the major streams into the fringe of the Piedmont (Matthew & LaVoie 1970:18). The water table is usually well below the surface, but flooding is a hazard at irregular intervals. The native vegetation consists mostly of oaks and other hardwoods but much of the area of this soil series has been cleared for farming. (refer to Fig. II-1)

A more detailed look at the Delaware Park Site will be presented in the section on field investigations. Appendix D should also be referred to for more information.

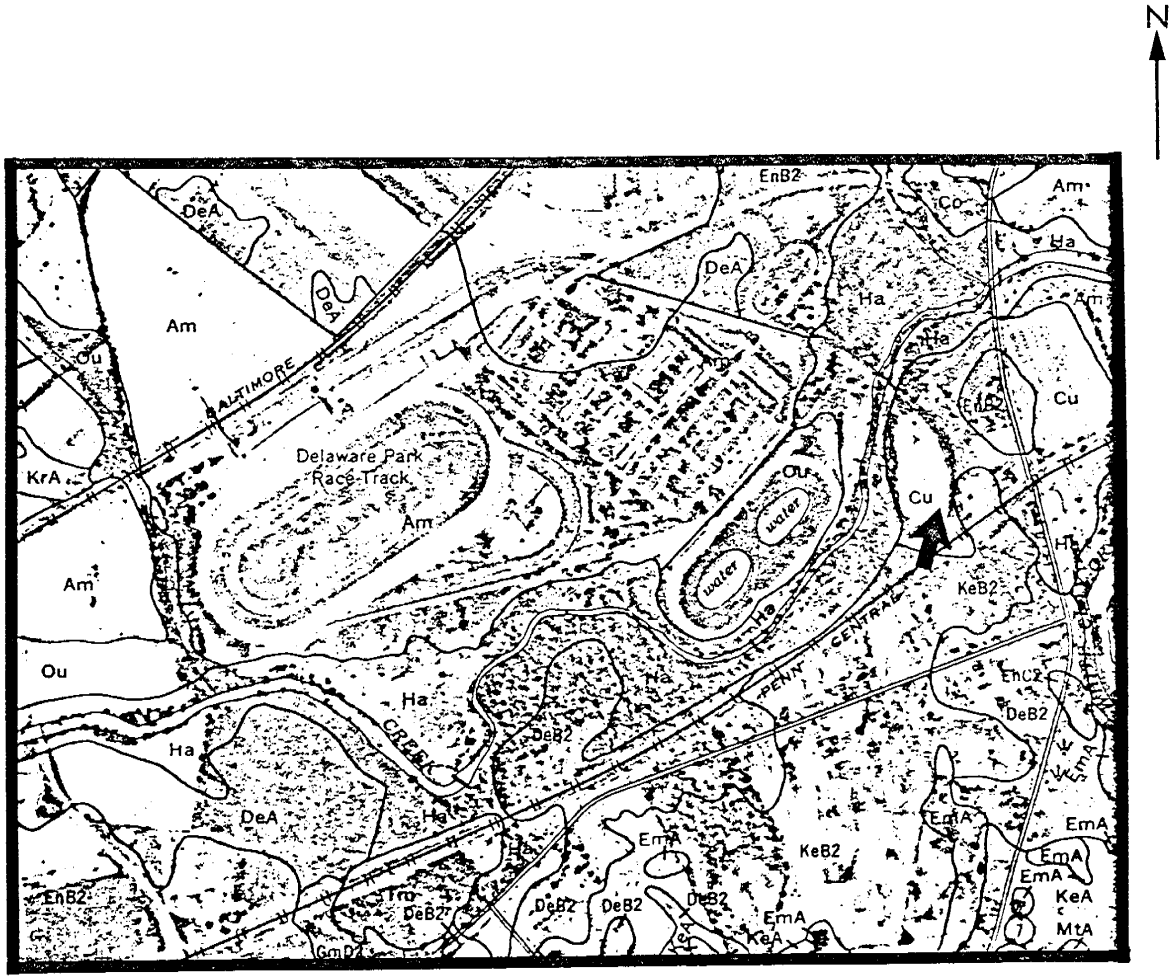


FIGURE II-1 USDA-SCS SOIL SURVEY SHEET #15

## Geologic Profile

This summary of the geologic profile of the Delaware Park Site is taken in toto from the "Summary Statement" of Appendix D, "Physical Environment and Geologic History of the Delaware Park Site", prepared for this report by Dr. Robert Doyle of the Department of Geology, University of Delaware.

The Delaware Park Archaeological Site Fig. II-2 is located approximately one mile south of the Fall Line. This line marks a geologic and topographic break between ridge-forming Paleozoic crystalline rocks of the Piedmont to the north, and younger unconsolidated sediments that form the flat surface of the low-lying Coastal Plain. The site itself is underlain by three geologic units of the Coastal Plain stratigraphic sequence. These are, from top to bottom, Recent flood plain silt deposits, late (or post) Pleistocene alluvial fan deposits, and the Potomac Formation. The coarse sands and gravels of the Columbia Formation are not present at the site proper. All of the archaeological features are found within the flood plain silt unit or in features dug into the underlying alluvial fan unit.

Although there is no definitive geochronological evidence to date the geologic units, and thus the cultural period, information available from field investigations and literature review provides a reasonable estimate of the historical setting of the site. This evidence, discussed in a later section of this report, indicates that the cultural age of the site is 1) post-18,000 years B.P., and 2) there is no evidence that the site was inhabited during the deposition of the younger Quaternary alluvial fan deposits, which are presumed to be 18,000 to 24,000 years B.P. in age. Stated another way, the site was inhabited after the end of the Pleistocene, probably during the last 10,000 years, which is the assumed date of deposition of flood plain sedimentation related to the flooding episodes on White Clay Creek.

The present drainage and topography patterns at the site have not changed significantly during the last 10,000 to 15,000 years. The course of White Clay Creek has been stable, with minor north-side meandering, during that time. The accumulation of flood plain deposits has raised the height of the knoll at the site slightly. This increase in height probably continued during the time of occupation. However, the site is assumed to have been a positive topographic feature prior to occupation. Marsh (or swamp) existed at a lower elevation south of the site, under the present rail lines and for a few hundred feet to the south and east of them. (Fig. II-3).

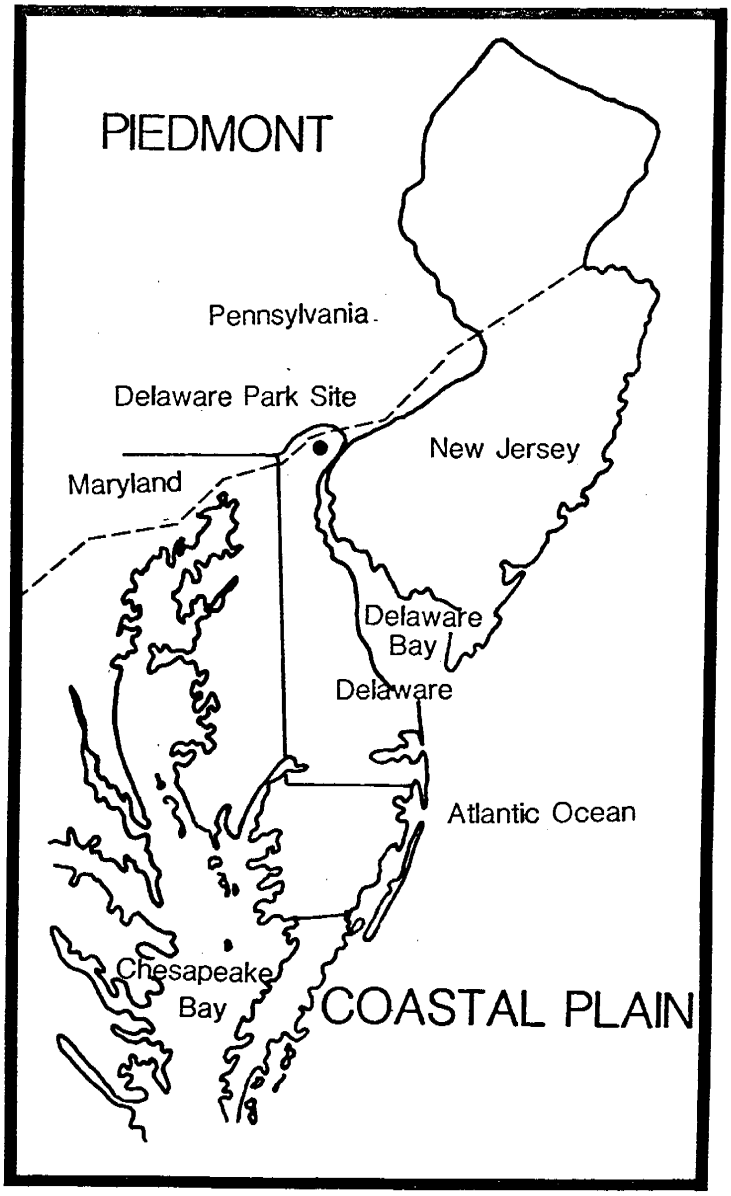


Figure II-2 SITE PHYSIOGRAPHIC LOCATION

---- FALL LINE

PLATE II-1 STRATA CUT - OLD ROAD CUT

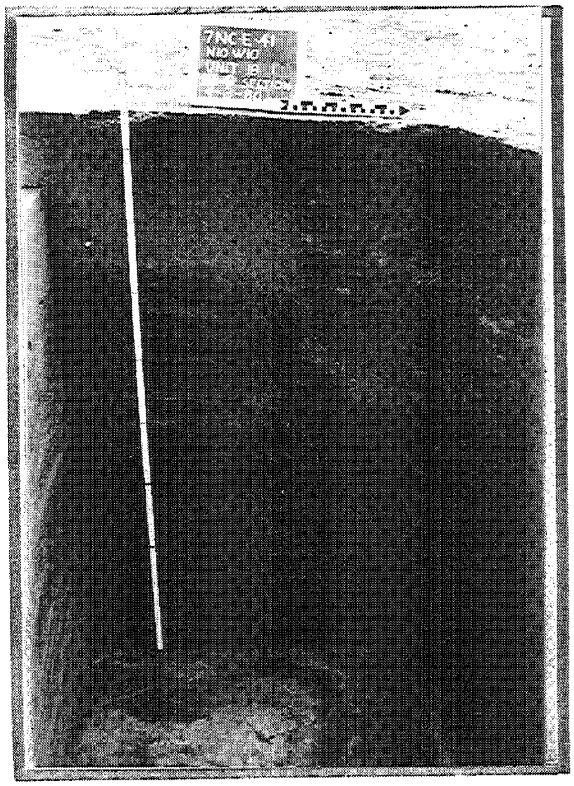


PLATE II-2 STRATA CUT - UNIT 18 N10/W10

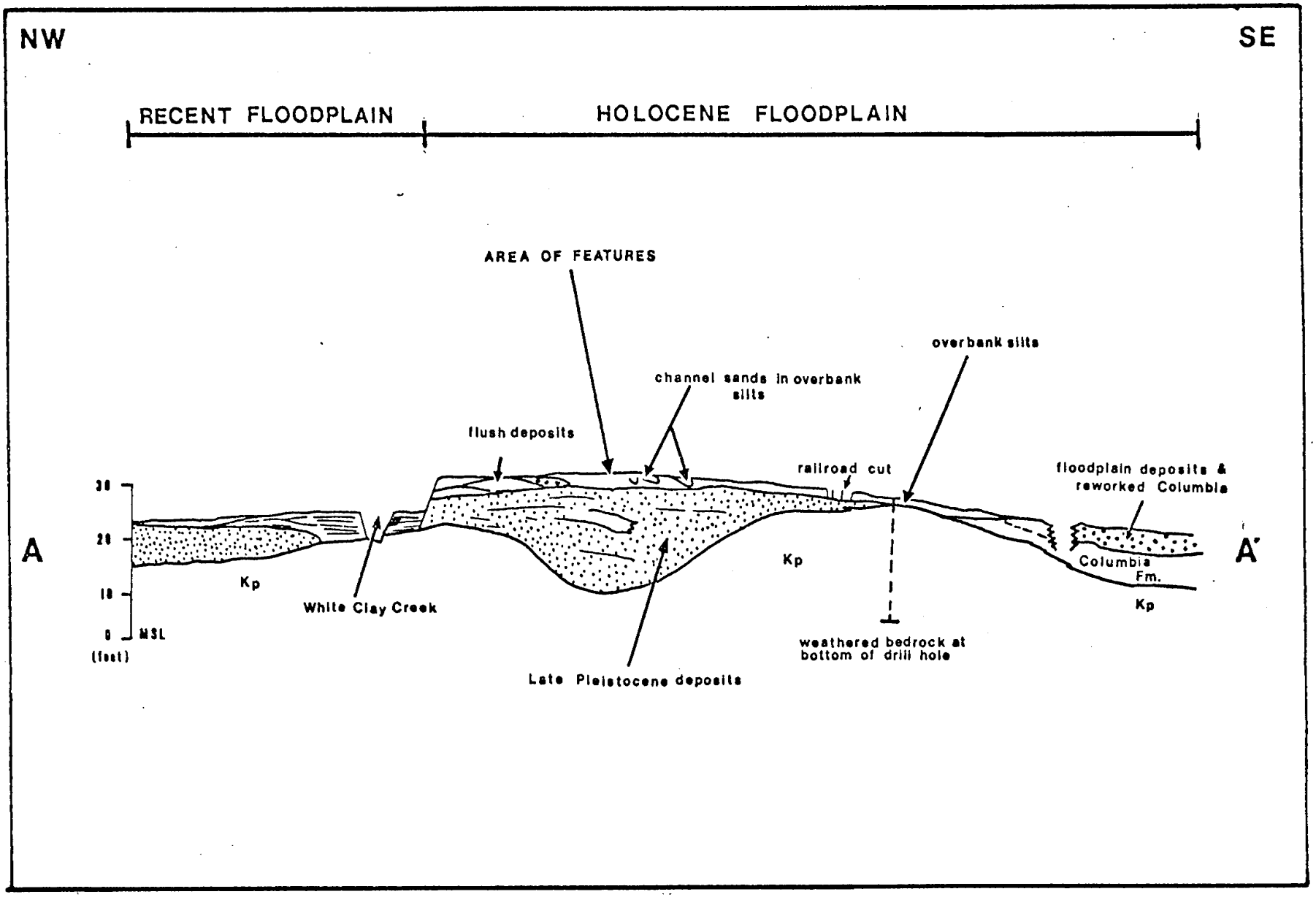


Figure II-3 GEOLOGIC CROSS SECTION THROUGH SITE

## Flora

The biotic micro-environments have been identified in and near the Delaware Park Site including swamp, open shrub and grassland, and deciduous forest areas (see Appendices G). A close resemblance is demonstrated (see Appendices D and G) between the present and the prehistoric environments and present inventories of flora and fauna can, for all practical purposes, be applied to the aboriginal setting.

The swamp (or marsh) areas are low wetlands supporting marsh vegetion dominated by grasses, rushes and sedges. Cord grass, spike grass, black rush, saw grass, cattail, maiden cane, common reed, water millet, sedges and occasionally water lilly in standing water are common. The transitional or marsh borders are dominated by water tolerant species including maples, gum, cypress, holly, sweet bay, pond pine, willows, alders and oaks. Shrubs and vines, herbacious plants and composits are also common. wild rice, giant fox-tail grass, golden shrub and smartweed are found adjacent to marshy areas.

The deciduous forest areas contain a mixture of wet and dry land species. The canopy is generally dense and well mixed with maples, gum, cypress, holly, oaks, poplar, chikory, cherry, chestnut, willows, alders, and pines. The understory is equally dense with carpetweed pigweed, clammyweed, mustard, spurge, mint, bayberry, oxcalis, smartweed, raspberry, poke, grape, spicebush, honeysuckle, cat briar, blue beech, creeper, pinksterflower, and miscellaneous herbaceous and dogwood, sycamore, crabapple, redbud, walnut, hazelnut, ironwood, birch, beech, elm, hackleberry, Jerusalem artichoke, arrow arum, arrowhead, bois d'arc, sassafras, meadow sweet, raspberries, violets, poison ivy, skunk cabbage, goosefoot, greenbriar, nettles and other species are also quite common.

The open shrub and grassland areas comprise the majority of surface area around and near the site and are generally covered by a moderate to dense growth of shrubs, mixed grasses, herbaceous and composit plants. Spicebush, meadow sweet, shadbush, hawthorne, wild cherry, deer vetch squawroot, sheep sorel, buttercup, bedwtraw, nightshade, chickweed, false flax, copperleaf, skullcap, thyme, beans, hog peanut, mustard, sumac, holly, laurel, buttonbush, arrowwood, blackhaw, elderberry, ragweed, goldenrod, touch-me-not, rose, sunflower, giant fox-tail grass, blackberry, plum, milkweed, dandelion, lambsquarter, leek, persimmon, paw paw, strawberry and clover are also common in this type of environment.

## Fauna

The varied micro-environments along the Fall Line and around the Delaware Park Site provides an excellent habitat for a large and diverse fauna. Species native to both the Piedmont and Coastal Plain can be found in the area and within a short distance from the site. In Captain John Smith's "The Description of Virginia" (1608), edited by Edward Arber (1895), bears, adgers and wolves are mentioned on the Coastal Plain. Eastern bison and elk were probably former residents of the Piedmont in this area as well. None of these species have survived in norther Delaware due mainly to the encroachments by man.

There has been little change in fauna aside from that just mentioned and the inventories by Shelford (1963), the Newark (Delaware) Ring Arterial Environmental Committee (1973), Corps of Engineers (1976), and others represent species that were most probably available during earlier times.

Twenty two species of mammal are now identified in New Castle County. Large game is represented by whitetailed deer, the last large herbivore in Delaware. Small game furbearers include cottontail, squirrel, muskrat, beaver, otter, mink, weasel, oppossum, raccoon, skunk, fox and woodchuck. Bats, moles, shrews, mice and voles are also common but are not normally recognized as game animals.

Reptiles are represented by several species of turtles, snakes, and skinks. Amphibians include frogs, toads, and salamanders, Anadronous fish such as gar, shad, sturgean and herring are seasonally available in larger area streams for only a few months each year while eel, bluegill, chub, dace, darter, bullhead, suchker and shiners may be found year round in both larger and smaller streams. Shellfish are also common including welks, clams, oysters (in tidal estuaries to the south) as are freshwater mussels.

Fifty eight species of fowl have been identified in New Castle County including hawks, bobwhite, pheasant, dove, cuckoo, owls, kingbirds, fly-catchers, phoebe, wood pewee, swallow, bluejay, crow, chickadee, titmouse, nuthatch, wrens, mockingbird, catbird, thrasher, robin, thrush, starling, towhee, sparrows, wifts, hummingbird, kingfisher, flickers, woodpeckers, vireo, warblers, oven bird, waterthrush, yellowthroat, chort, redstart, meadowlarks, blackbirds, orioles, grackles, cowbird, tanager, cardinal and turkey. migratory species including ducks, geese, cranes, herons and others frequent the area in exceedingly large numbers seasonally.

Invertebrates are common to all local environs. Arthropod populations are more common in grassy and wooded environs (Shelford 1963:70) but are also found around the margins of wetlands and standing water. Species are too numerous for mention here but are being included for their importance to the local fauna. Consult Shelford (1963) for a general inventory and biotic distributions.

## Catchment Analysis

As previously stated, a degree of correspondence has been demonstrated between the present and paleoenvironments in the project area. This allows for a valid discussion of resource patterns and food resource procurement potential in the area. Understanding this potential, the distribution and seasonal availability of floral and faunal resources, is a prerequisite to understanding subsistence-settlement patterns (Thomas et al 1975, Schmits 1978:101) as a major concern of prehistoric populations. Subsistence rounds of foraging peoples were necessarily scheduled around the availability of resources.

The study of adaptive strategies of aboriginal groups in specific environs, synecology (Lewis 1974), has only recently become the focus of researches conducted in the Middle Atlantic area. Researches by Thomas, Griffith, Wise and Artusy (1975), Johnson (1978), McNamara (1977), Cavallo (1979), Bonfiglio and Cresson (1978), Williams and Thomas (1980) and others point out the importance of site location and function in relationship to area resources. These studies address the potential for exploitation of resources as a major determinant in procurement technology, scheduling factors and settlement types and locations.

The local types and distribution of faunal and floral resources are being presented here as an aid to understanding the nature of occupation at the Delaware Park Site. This is necessary because the placement of the site can be seen as environmentally determined. The Delaware Park Site was apparantly strategically located in proximity to a maximum of locally available resources (please refer to Appendix G) as will be demonstrated in the analysis sections of this report.

The following is a brief reconstruction of the resource procurement potential of the three microenvironments around and near the site. It must be noted, however, that the occupants of the Delaware Park Site were not restricted to the site area, and other resources were available at unspecific distances from the site. The carrying capacity of the immediate area can not be accurately discussed due to the lack of attention to this by naturalists and since the degree of territoriality practiced by the occupants is not known.

A listing of species, habitat and seasonal availability is provided in Table II-1, Floral Resources, Table II-2, Faunal Resources.

Swamp - The swamp wetlands (Marsh?) are located on lower ground principally along the branches of White Clay Creek and its floodplains north and south of the site (see Figure II-3). Resources here are principally aquatic including both year round and season resources (plants, fish, shellfish, small game). The year round species listing in Table II-1 are added to in the spring by anadromous fish in the streams and Fall and Winter by migratory fowl and seed bearing plants. The margins of the wetlands are habitat for amphibians, small predators and water tolerant plants.

Deciduous Forest - Forested areas exist as small stands northeast and southwest of the site. This microenvironment provides a habitat for the greatest number of foraging resources. The canopy plants provide nuts and other edible parts and the understory provides the majority of fruits and greens seasonally available. The understory also provides cover for small and large game, fowl and invertebrates. Plant resources are most abundant during summer and fall months and most animals are available during the spring, summer and fall (refer to Table II-1).

Open Shrub and Grassland - This microenvironment presently covers more than fifty percent of the land around the site, but this is due to agricultural practices of modern times. Seasonally available resources in native open shrub and grassland areas include seeds in summer and fall months fruits in the fall, roots, leaves and pods from spring through fall, and both seasonal and year round faunal resources. Large herbivores such as bison, deer and elk and small game such as rodents and avian species are available year round. Reptiles and invertebrates are available from spring to fall (see Table II-1).

FLORAL RESOURCES

| TABLE II-1 | Preferred Environments | | | Seasonal Distribution | | | |
|---|---|---|---|---|---|---|---|
| Floral Resources | Swamp | | Shrub/Grass | Spring | Summer | Fall | Winter |
| black rush | x | | | x | | x | x |
| cattail | x | | | x | | x | x |
| common reed | x | | | x | x | x | |
| water millet | x | | | x | x | x | |
| sedge | x | | | x | x | x | |
| water lilly | x | | | x | x | x | x |
| maple | x | x | | x | x | x | x |
| gum | x | x | | x | x | x | x |
| willow | x | x | | | | x | x |
| oaks | x | x | | | | x | |
| wild rice | x | x | | | x | x | |
| giant fox tail | x | x | | x | | x | x |
| golden club | x | x | | | x | x | |
| smartweed | x | x | | | x | x | |
| carpetweed | | x | | x | x | x | |
| pigweed | | x | | x | x | x | |
| clammyweed | | x | | x | x | x | |
| mustard | | x | x | x | x | x | |
| spurge | | x | | x | x | x | |
| mint | | x | | x | x | x | |
| bayberry | | x | | | x | x | |
| oxalis | | x | | | x | x | |
| raspberry | | x | | | x | x | |
| deer vetch | | | x | | x | x | |
| squawroot | | | x | | x | x | |
| sheep sorel | | | x | x | x | x | |
| buttercup | | | x | | x | x | |
| bedstraw | | | x | | x | x | |
| nightshade | | | x | | x | x | |
| chickweed | | | x | | x | x | |
| false flax | | | x | | x | x | |
| copper leaf | | | x | | x | x | |
| skull cap | | | x | | x | x | |
| thyme | | | x | | x | x | |
| beans | | | x | | x | x | |
| hog peanut | | | x | | x | x | |
| Jerusalem artichoke | | x | | x | | x | x |
| arrow arum | | x | | x | | x | x |
| arrowhead | | x | | x | | x | x |
| elm | | x | | x | x | x | x |
| huckleberry | | x | | | x | x | |
| bois d'arc | | x | | | x | x | |
| sassafras | | x | | x | x | x | x |
| meadowsweet | | x | x | x | x | x | |

* includes water courses

| Floral Resources | Preferred Environments: Swamp | Preferred Environments: Shrub/Grass | Seasonal Distribution: Spring | Summer | Fall | Winter |
|---|---|---|---|---|---|---|
| violets | x | | | x | x | |
| skunk cabbage | x | | x | x | | |
| goosefoot | x | | x | x | | |
| greenbriar | x | | x | x | | |
| nettles | x | | x | | | |
| wild cherry | | x | | x | x | |
| sumac | | x | x | x | x | x |
| arrowwood | | x | | x | x | |
| blackhaw | x | | | x | x | |
| elderberry | | x | | x | x | |
| ragweed | | x | | x | x | |
| goldenrod | | x | | x | x | |
| milkweed | | x | x | x | x | |
| pines | x | | x | | | |
| hickory | x | | | | x | |
| cherry | x | | | x | x | |
| chestnut | x | | | | x | |
| poke | x | | x | | | |
| grape | x | | | | x | |
| spice bush | x | x | | x | x | |
| honeysuckle | x | | | | x | |
| sweet pepper | x | | | x | x | |
| blue beech | x | | | | x | |
| apple | x | | | | x | |
| walnut | x | | | | x | |
| hazelnut | x | | | | x | |
| birch | x | | x | x | x | |
| beech | x | | x | x | x | x |
| touch-me-not | | x | | x | x | |
| rose | | x | | x | x | |
| sunflower | | x | | x | x | |
| black berry | | x | | x | x | |
| plum | | x | | x | x | |
| dandelion | | x | x | x | | |
| lambsquarter | | x | x | x | x | |
| leek | | x | | x | x | |
| persimmon | | x | | x | x | |
| paw paw | | x | | x | x | |
| strawberry | | x | | x | x | |
| clover | | x | | x | x | |

* includes water courses

TABLE II-2

FAUNAL RESOURCES

| | Preferred Environments | | | Seasonal Distribution | | | |
|---|---|---|---|---|---|---|---|
| | Swamp | Forest | Shrub/Grass | Spring | Summer | Fall | Winter |
| **Mammals** | | | | | | | |
| bear | | x | | x | x | x | |
| badger | | x | x | x | x | x | x |
| wolf | | x | | x | x | x | x |
| bison | | | x | x | x | x | x |
| elk | | x | x | | | x | x |
| deer | | x | x | | | x | x |
| rabbit | | x | x | | | x | x |
| squirrel | | x | | x | x | x | x |
| muskrat | x | | | x | x | x | x |
| beaver | x | | | x | x | x | x |
| otter | x | | | x | x | x | x |
| mink | x | | | x | x | x | x |
| weasel | x | x | | x | x | x | x |
| opposum | | x | | x | x | x | |
| raccoon | | x | | x | x | x | x |
| skunk | | x | x | x | x | x | x |
| fox | | x | x | x | x | x | x |
| woodchuck | | x | x | x | x | x | x |
| **Amphibians** | | | | | | | |
| turtles | x | | x | x | x | x | |
| frogs | x | | | x | x | x | |
| **Fish** | | | | | | | |
| gar | x | | | x | | | |
| shad | x | | | x | | | |
| sturgeon | x | | | x | | | |
| herring | x | | | x | | | |
| eel | x | | | x | x | x | x |
| **Avifauna** | | | | | | | |
| bluegill | x | | | x | x | x | x |
| bobwhite | | | x | x | x | x | x |
| pheasant | | | x | x | x | x | x |
| dove | | x | x | x | x | x | x |
| turkey | | x | x | x | x | x | x |
| ducks | x | | | x | | x | x |
| geese | x | | | x | | x | x |
| **Invertebrates** | x | x | x | x | x | x | x |

* includes water courses