RIVERDALE PARK ARCHAEOLOGICAL PROJECT

Draft Report:

Documentary Research & Field Strategy

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Report Prepared For:

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Wave Hill

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Why doesn't this report address what changes are being proposed?

How extensive are the proposed changes

Usually fieldwork is only one in areas that ~~have~~ will have an impact.

I. INTRODUCTION

This project is an archaeological investigation of Riverdale Park, a New York City park in the Riverdale section of the Borough of the Bronx (see Figure 1). The New York City Department of Parks and Recreation owns the property and it is administered by the Bronx Borough Headquarters of the Parks Department.

The park is a narrow strip of land that extends from West 254th Street to West 232nd Street. The land, formerly part of several private estates and properties, was deeded to New York City in a series of transactions from 1942 to 1952, to be preserved as a Natural Wildlife Area (Sauer 1985:1; Stewart 1984:1).

In 1984 the park was designated as the site of a City Capital Improvement Project to undergo a major replanting and restoration program. Ian McHarg,of Philadelphia, was engaged as the landscape architect (Sauer 1985: 1).

Wave Hill has been operating educational and reforestation programs in the park, under a 1956 agreement with the Wildlife Department of Parks. In August 1984 evidence of prehistoric sites was discovered in the park and Wave Hill notified the New York City Landmarks Preservation Commission and the Department of Parks of these findings.

In September 1984 the Department of Cultural Affairs commissioned a preliminary archaeological survey and report on the sites in the park (Sauer 1985: 1). The survey was conducted by Dr. Nan A. Rothschild and Mr. James P. Fenton of Columbia University. Their findings and recommendations called for further investigations of the known sites and the entire park (Rothschild & Fenton 1985: 26-27). The survey results are included in this report.

In July 1985 Wave Hill received a grant from the Department of Cultural Affairs to conduct an archaeological survey of Riverdale Park. This report documents the results of the documentary research and details the research strategies and goals for the field phase of this project. Details concerning the laboratory phase will follow in a separate document.

Purpose and Goals of Project

The purpose of the present project is the development of a management plan for the potential archaeological resources in Riverdale Park, in conjunction with the restoration program. The management plan will be based on the results of the archaeological research which includes documentary research, field testing, and laboratory analysis. The purpose of the management plan will be to provide the developer, in this case, the New York City Department of Parks and Recreation, with a plan for the appropriate management of the cultural resources in Riverdale Park that may be impacted by the proposed Capital Improvement Project.

The preliminary documentary research has been completed and is presented in the third section of this report. The purpose of the literature search was to provide a framework from which the research potential would be

explored and research questions developed. Throughout the project more detailed documentary research will be conducted as questions are raised from the evidence provided in the field and laboratory phases.

The purpose of the field testing, or survey, is twofold: to determine the integrity and significance of the exposed, known archaeological resources; and to locate and identify potential cultural resources, in the park. The presence of known sites that are both prehistoric and historic and the potential for additional sites requires the employment of several different survey methods. Briefly, this will involve subsurface testing, including shovel test excavations on a grid system; a limited number of excavation units along the ridge and in exposed sites; and shallow shovel clearing to explore historic sites. Probing will also be utilized in areas where documentary evidence indicates historic structures and to investigate the possibility of features associated with these structures. Details of the field survey are outlined in Section V.

Laboratory and data analysis will involve the assessment and interpretation of the information obtained through the field survey, including stratigraphic and artifactual data. The analysis will be directed toward addressing the research questions developed from the documentary research as well as those that may arise from the field data. Details of laboratory procedures and data analysis will be presented in a separate document. This report covers only the literature search and field phases of this project.

The end result of the project will be a report documenting all of the evidence from the investigation, including documentary, field and laboratory data and interpretations; and a management plan for the cultural resources. The report will be submitted to the New York City Department of Parks and Recreation, the New York City Department of Cultural Affairs, and Wave Hill. The landscape architect, Ian McHarg, will also be provided with a copy of the report.

Project Structure

The funds for the present project were provided through a grant from the Department of Cultural Affairs to Wave Hill. In light of the fact that the Department of Cultural Affairs is not staffed with an archaeologist to provide guidance or approval for this project, an advisory panel has been established for this purpose. It is comprised of four archaeologists who will act in an unofficial capacity in much the same fashion as a review agency would. The panel will be available to consult with the principal investigator and will be periodically informed of the progress of the project. All reports will be subject to approval of the panel.

Advisory Panel members are: Russell Handsman, American Indian Archaeological Institute, Washington, CT; Nan A.Rothschild, Columbia University, NY; Bert Salwen, New York University, NY; David H. Thomas, American Museum of Natural History, NY. Great Basin Specialist

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The project staff consists of one principal investigator, Valerie DeCarlo, and two assistants, Barbara Hershey and Brian Ludwig. At present, there are three consultants: for the transit survey, Greenhouse Consultants, Inc., NY and Edward Stein; and for the computer data base, Jed Levin.

Acknowledgements

We would like to thank the following for their help and support in organizing this project: Peter Sauer and the staff of Wave Hill; Janet Griffin of the Bronx Parks Department Headquarters; Bert Salwen of New York University; and Nan Rothschild of Columbia University.

II. PHYSICAL ENVIRONMENT

This section contains descriptions of the physical environment of Riverdale Park and the surrounding area. Descriptions of the natural environment can provide important information to be used in assessing the site's potential, in explaining the distribution of archaeological remains, and to provide clues as to the effects of land use on archaeological resources.

The information presented below indicates that much of the park has remained undisturbed. Perhaps the greatest change in the natural environment has been the land clearing activities by either the pre-contact Native Americans or the European settlers which has ultimately resulted in the introduction of many non-native plants. Land clearing, coupled with urbanization of the area, has resulted in the loss of much of the fauna once common to the lower Hudson Valley. Therefore, current floral and faunal conditions are more indicative of the changes that have taken place since pre-contact times rather than what would have been available to pre-contact groups.

Site Description

Riverdale Park is situated on the eastern shore of the Hudson River in Bronx County, New York. The site lies approximately 3 miles north of the George Washington Bridge and approximately 1 mile south of the Westchester County border (see Figure 1).

The site is bordered by West 254th Street at its north end and by West 232nd Street at the south end. The eastern edge of the park is formed by Palisade Avenue up to Spaulding Lane at which point the park is bordered by privately owned property and the Wave Hill Complex. The New York Central Railroad tracks form the western border. The railroad tracks lie on the present-day shore of the Hudson River (see Figures 2-4).

The park is approximately 6280 feet long and between 260 and 560 feet wide. There is a small section of privately owned property in the approximate center of the park. This section measures approximately 240 feet from north to south and 380 feet from east to west. The total area of the park covers approximately 97 acres, 40 acres of which extend out into the Hudson. Thus, the study area is approximately 57 acres (Stewart 1984: 1).

The park consists of basically two major topographic areas, a narrow ridge that slopes to the river at grades between 15 and 20 percent and a narrow strip of low-lying land that runs along the railroad tracks. The park is presently covered with very dense vegetation, consisting of both trees and a dense understory. Aside from the dense vegetation, the site commands a clear view of the river and the Palisades on the western shore.

As a Natural Wildlife Area, the park has remained largely undeveloped since it was deeded to New York City, with the exception of the formation of unpaved trails through public use. However, several relatively recent encroachments are evident (see Figures 2-4). There are two sewer

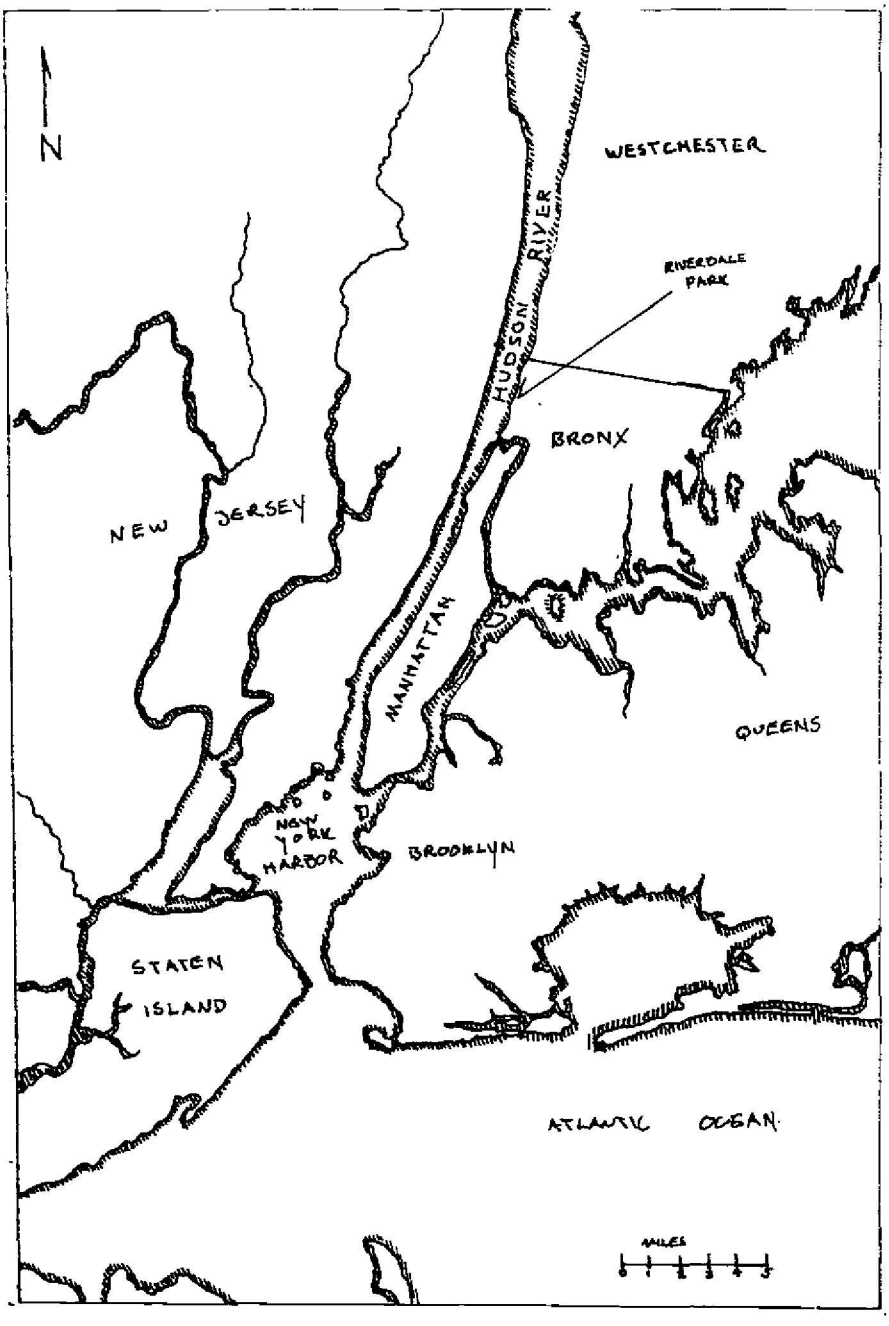


FIGURE 1

Site Location

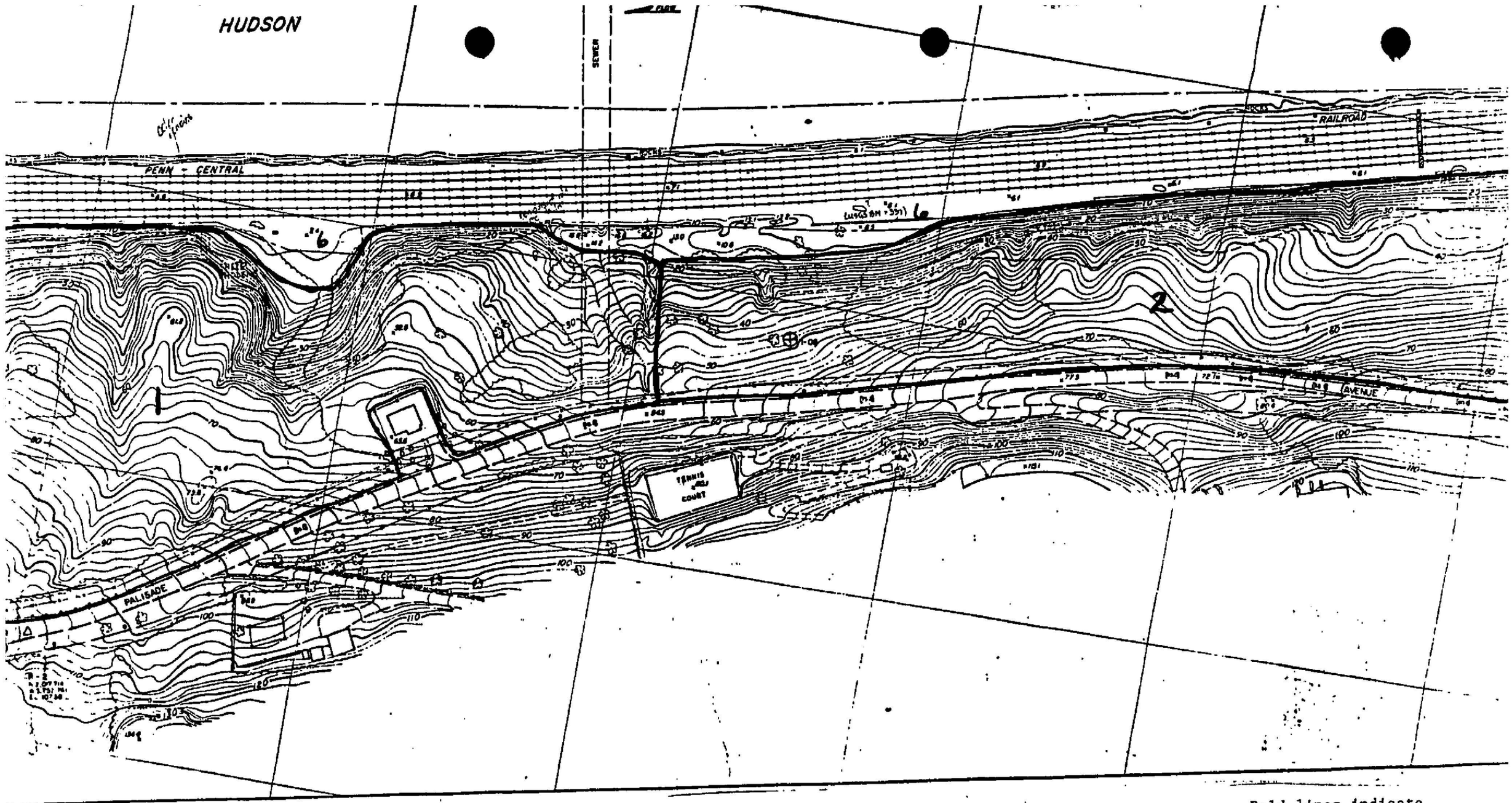


FIGURE 2

RIVERDALE PARK:
Southern Portion

Bold lines indicate study area boundaries.

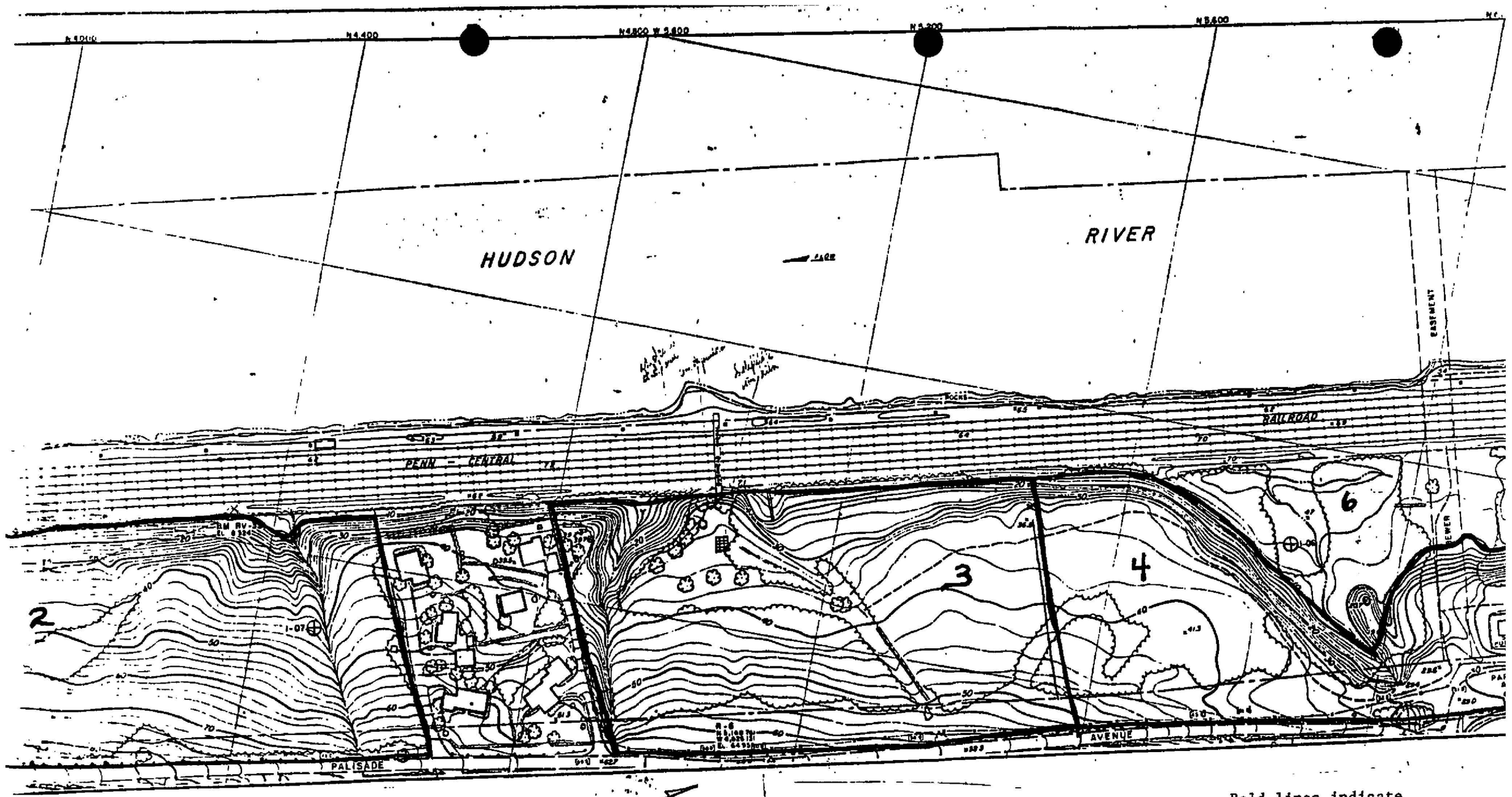


FIGURE 3

RIVERDALE PARK:
Middle Portion

Bold lines indicate study area boundaries.

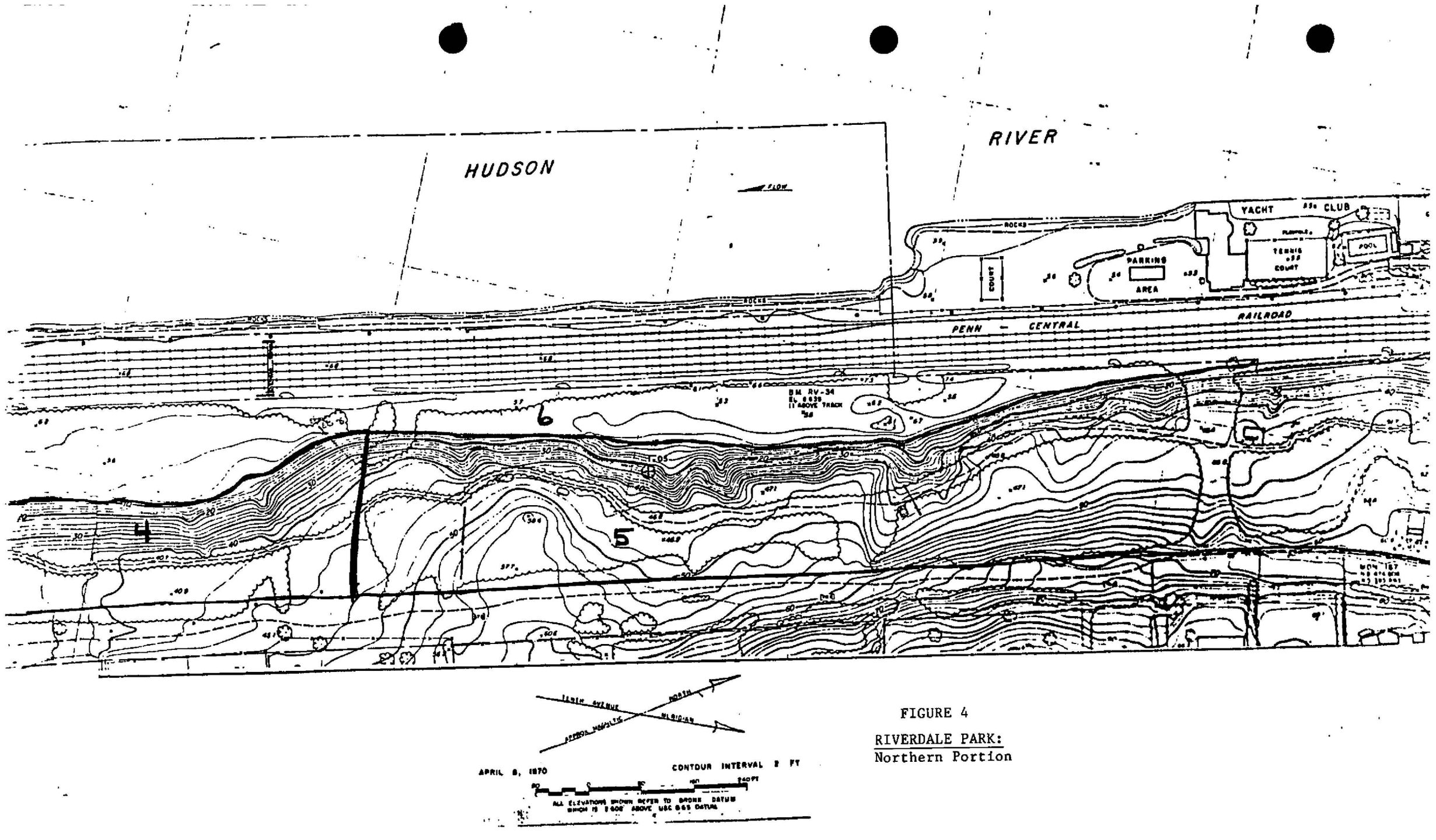


FIGURE 4

RIVERDALE PARK:
Northern Portion

Bold lines indicate study area boundaries.

easements with ten inch drain pipes running in an east-west direction across the park. On the eastern edge of the site, north of Spaulding Lane, there are several fire hydrants along the proposed route of Palisade Avenue to West 254th Street. There are also two drainage ditches, one stone-lined, the other concrete, along the edges of the private property, presumably designed to divert water run-off from this area. Considerable dumping has also occurred, mainly along the edges of the park. There is also evidence of current recreational use of the park in the form of camp fire hearths and modern debris but even this evidence is sparse. In general, the site has experienced little in the way of development.

Local Geology

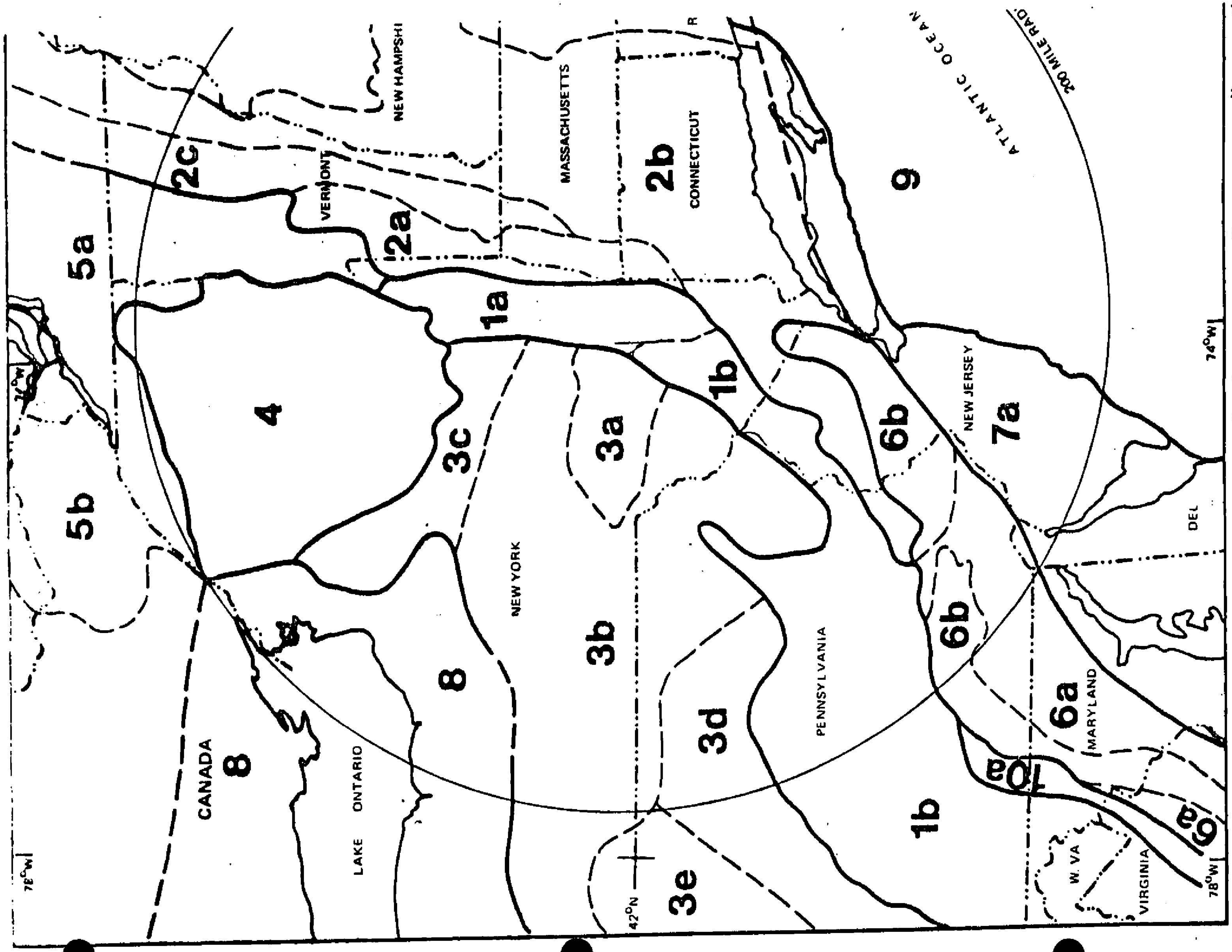
The study area is located within the New England Physiographic Province. The Province extends from Maine to Pennsylvania and is "underlain by extensively deformed and faulted Precambrian and lower Paleozoic metamorphic and igneous sequences" (Connally 1979: 5). There are five sections within this province; the study area lies within the New England Upland section and is part of the Manhattan Prong of this section (see Figure 5)

The New England Upland section is characterized by a series of moderate ridges underlain by Paleozoic and Precambrian gneisses. The entire section is about 550 miles long and between 15 and 85 miles wide. Area relief is low to moderate with elevations ranging from approximately 500 feet to 2200 feet. Topography is governed by lithology and the effects of glaciation (Connally 1979: 5-6).

The major ridges and valleys of the Metropolitan New York region were developed through erosion ten or twenty million years ago, during the latter portion of the Tertiary Period (see Figure 6). The present topography is fundamentally "the result of differential erosion between rock formations of variable hardness" (Schuberth 1968: 179).

Fordham gneiss is the oldest, underlying rock formation in New York City. However, it does not rise to the surface across the entire region, but is overlain in places by Inwood Marble and the Manhattan Formation (Schuberth 1968: 82). Gneiss, a metamorphic formation, is a "rock that has changed from its primary form to a new one" (Schuberth 1968: 7). This process may be the result of earth pressures, heat, or chemically active fluids deep within the earth's crust (Schuberth 1968: 7). Gneiss exhibits a banded appearance with alternating light and dark gray to black bands approximately two to three inches wide. It is largely composed of the minerals quartz, feldspar, and biotite mica. Fordham gneiss derived its name from the site of its first discovery in Fordham Heights of the Bronx (Schuberth 1968: 61-62).

Riverdale Park is part of the Riverdale Ridge, a rock formation of one billion year old Fordham gneiss (Horenstein nd: 8) (see Figure 7). The Riverdale area is composed of "gneiss and mica-schist, with heavy intercalated beds of coarse-ground dolomitic marble and thinner layers of serpentine" (Stertz 1978: 1). The Riverdale Ridge enters the Bronx at Mount St. Vincent and drops off sharply at Spuyten Duyvil. Here, the gneiss is beneath a layer of Inwood Marble which is not as erosion resistant as the gneiss (Schuberth 1968: 85; Stertz 1978: 1).



1 VALLEY & RIDGE
- 1a HUDSON SECTION
- 1b MIDDLE SECTION

2 NEW ENGLAND PROVINCE
- 2a TACONIC SECTION
- 2b NEW ENGLAND UPLAND SECTION
- 2c GREEN MOUNTAIN SECTION
- 2d WHITE MOUNTAIN SECTION
- 2e SEABOARD LOWLAND SECTION

3 APPALACHIAN PLATEAU PROVINCE
- 3a CATSKILL SECTION
- 3b SOUTHERN NEW YORK SECTION
- 3c MOHAWK SECTION
- 3d ALLEGHENY MOUNTAIN SECTION
- 3e KANAWHA SECTION

4 ADIRONDACK PROVINCE

5 ST. LAWRENCE VALLEY PROVINCE
- 5a CHAMPLAIN SECTION
- 5b NORTHERN SECTION

6 PIEDMONT PROVINCE
- 6a PIEDMONT UPLAND SECTION
- 6b PIEDMONT LOWLAND SECTION

7 COASTAL PLAIN PROVINCE
- 7a EMBAYED SECTION

8 CENTRAL LOWLAND PROVINCE

9 CONTINENTAL MARGIN

10 BLUE RIDGE PROVINCE
- 10a NORTHERN SECTION

0 50 100 MILES

NORTH

FIGURE 5

Regional Physiography Map

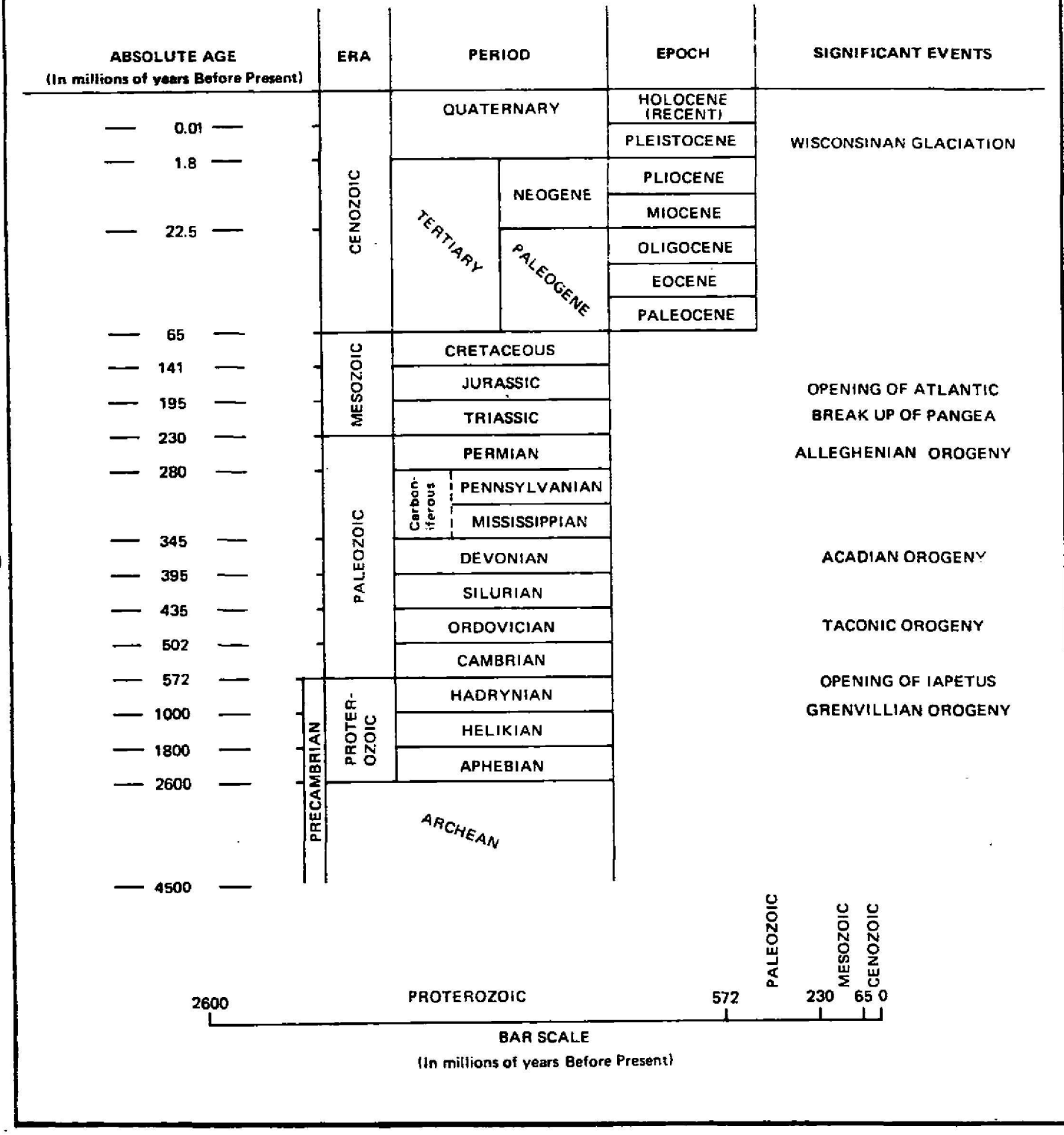


FIGURE 6

Geologic Time Scale

(after Connally 1979)

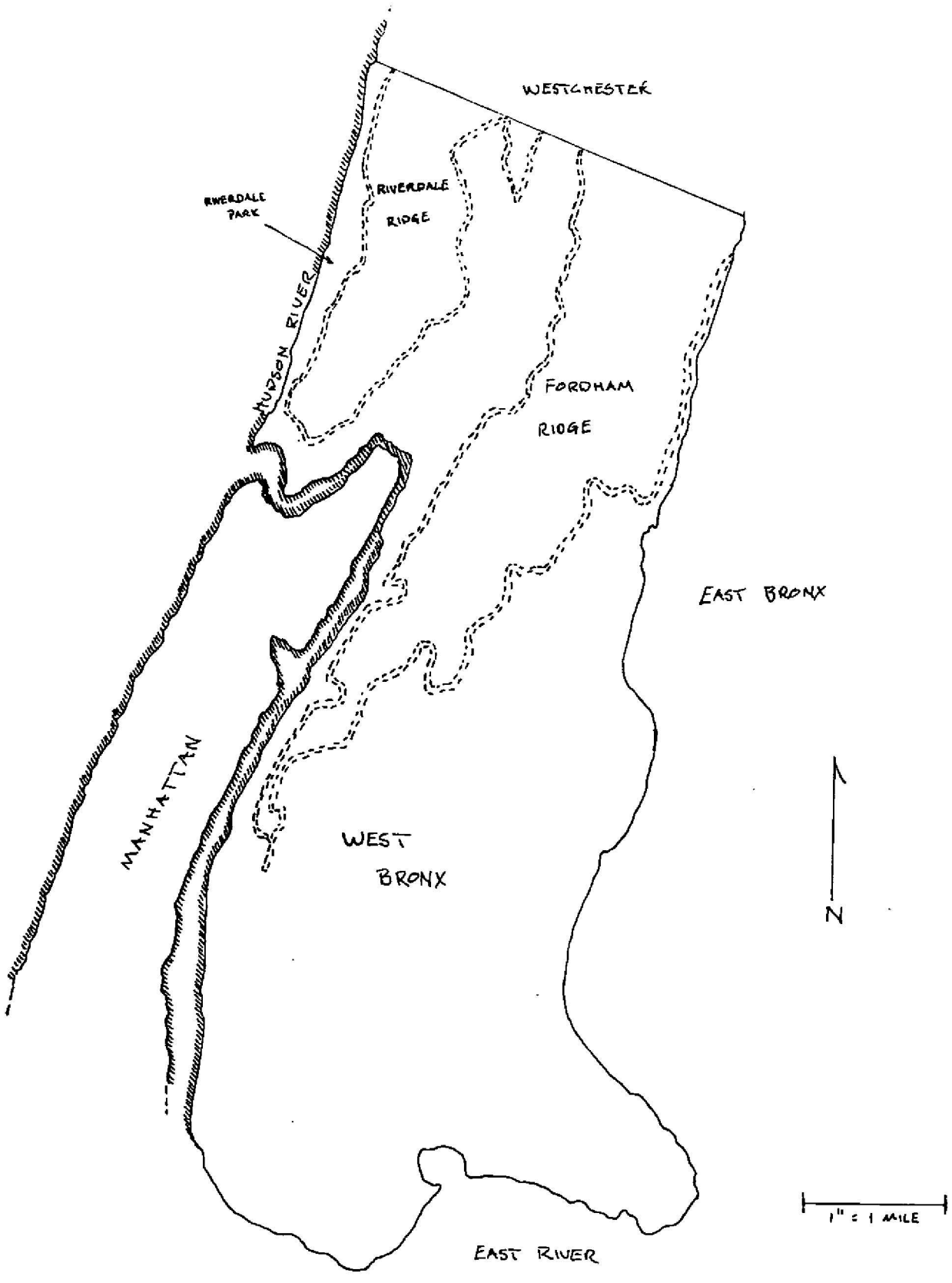


FIGURE 7

Geology of the West Bronx

(after Fluhr 1960)

Pedology

In the Hudson Valley region, the soils are generally categorized as "brown gravelly and stony loams, largely derived from glacial drift" (Funk 1976: 6).

In the Riverdale area the soil has developed mainly from metamorphic Hudson River shales. Limestone, sand and clay are also present but loam predominates, a condition favorable to cereal growth. The loam is generally fine in texture and reddish brown in color. The rocks in the area are alkaline in nature (Stertz 1978: 1).

A soil study of Riverdale Park was conducted in 1984 by Jim Thorne, for the landscape architect. The preliminary results of this study are presented below.

"The native soils of this area are derived from glacially deposited sand which lies atop ice-contact stratified drift of varying depth" (Thorne 1984: 1). The eastern edges of the park are composed of more clay-rich soils derived from the local gneiss and gneissic till. However, this area has also received a great deal of soil eroding from the highlands above, and the dumping of debris.

Another important implication for the condition of archaeological resources is the apparent lime-influence of the soil. Although the results of the soil pH tests are not yet available, the presence of the common earthworm, which requires high calcium and a soil pH of not less than 5.5, is strong evidence of lime-influenced soils. Thorne believes the source for this condition is probably the limestone pockets that occur uphill from the park. The presence of limestone in the soil would promote preservation of bone and raises the possibility of the high recovery of this resource.

The western side of the park has been strongly influenced by railroad activity. Parts of the hillside, that form the ridge, have been "scalped" for railroad bed construction. "This scalping has resulted in areas where severe erosion of the sandy, structureless soil has become particularly severe" (Thorne 1984: 2). Throughout much of this area, oyster shell, part of the archaeological midden sites, is visibly eroding out of the slope, resulting in the destruction and loss of these sites.

The area around the remains of the concrete foundation and brick oven, in the northern section of the park, had apparently once been a garden. The incorporation of organic matter up to 8-10 inches in the soil indicates plowing. Beyond this area, at the northernmost end of the park, there is little evidence of plowing. However, erosion may have obscured such evidence. In any case, this area was definitely cleared, possibly for grazing.

Other parts of the park show sporadic disturbance in either the form of dumping of some degree of erosion and actual soil removal for railroad bed construction.

Field observations along the length of the western edge of the park have disclosed widespread disturbance by the railroad, principally in the form of dumping and extensive earth movement. Also, the lowland area where Alderbrook once drained into the Hudson has received severe disturbance of a different form. Between the fall of 1984 and the late spring of 1985 approximately 1000 railroad ties, previously dumped in this area, were removed with heavy machinery. The resultant trenches were then filled with sand (Janet Griffin 1985: personnal communication).

Hydrography

There are two sources of water in the study area: the Hudson River and several small freshwater streams or springs.

The Hudson River is 315 miles long, originating as a small stream flowing out from Lake Tear of the Clouds in the Adirondacks to its mouth at New York City. It is the largest river in New York State, draining an area of 13,370 square miles (Eisenberg 1982:3). From Troy to New York, roughly the southern half of the river, its bed lies below sea level, making it an estuary of the Atlantic Ocean. The width of the river varies between 1,000 feet and 3 miles (Funk 1976: 6). In the immediate vicinity of the site the river is approximately one mile wide.

In the park, there is topographic evidence that suggests the presence of at least two, and possibly more, small streams or springs that once drained into the Hudson. One stream, Alderbrook, is located in the northern third of the park. Alderbrook, once called Dogwood Brook, located near 247th Street, was the only major stream in the Bronx that emptied directly into the Hudson.

Evidence for the presence of a second stream, located in the southernmost section of the park in the vicinity of the pumping station, is based partly on floral conditions which exhibit plants favoring wetlands (Sorvig 1984: 3). However, it is not clear whether this is a natural waterway or one that has developed as a result of human intervention.

Floral Evidence

The native vegetation of the Hudson River Valley lies within the chestnut-oak-yellow poplar zone of the Southern Hardwood Forest. The upland areas surrounding the Valley fall within the birch-beech-maple-hemlock zone of the Northeast Hardwoods (Funk 1976: 6).

Such broad generalizations must be applied with caution, especially in relation to an essentially urban area such as Riverdale. Local variation in climate, geology and human modification are important factors in determining the local plant distribution (Eisenberg 1982: 4).

A floral survey of Riverdale Park was conducted by Kim Sorvig in July 1984. For the purposes of the study, the most important interpretation presented by Mr. Sorvig is that virtually every acre of the present park was cleared by early settlers and that all of the vegetation currently present is second-growth forest of not more than 150-200 years age (Sorvig 1984: 1).

The park was divided into eleven floral communities: the ridge above the slope with six distinct zones; the area between the railroad and the slope with a residual wetland; two distinct, small valleys; the highly disturbed strip along the railroad; and the strip along Palisade Avenue (Sorvig 1984: 2).

The current floral populations provide significant evidence that supports the interpretations of historic land use and prehistoric environmental conditions such as the presence of fresh-water sources in the immediate study area.

Fauna

The current faunal composition of the study area is the result of human alteration of the landscape and is, perhaps, more illusrative of this change rather than representing what faunal resources would have been available before urbanization. Despite this fact, the faunal composition may represent at least part of the total potential population.

The year-round, nesting bird species present in the park are those that prefer young plant growth habitats and include catbird, northern oriole, cardinal, sparrow, and starling. Woodland birds, such as warblers and vireos have been observed in the park. However, they do not nest here largely because starlings have taken over the favored nesting areas. Wetland or marsh species such as heron and wood duck are very rare and ,again, do not nest here because the wetlands no longer exist along the shores of the Hudson. Although this region is an important link for migratory species, their presence is rare. This is a result not only of habitat destruction here but also in Central and South America (Susan Antenen 1985: personal communication).

Small mammals have been observed in the park but have not been catalogued according to frequency. These include gray and flying squirrel, chipmunk, racoon, rabbit, short-tailed shrew, meadow vole, white-footed mouse, and hairy-tailed/star-nose mole. Amphibian and reptilian species present include American toad and garden snake (Alexander 1985: 13).

Noticably absent from the faunal list, as one would expect in an urban environment, are some of the mammalian species common to the Hudson Valley. The hardwood forests of pre-colonial times would have supported such fauna as white-tailed deer, black bear, elk, beaver, woodchuck, otter, bobcat, gray fox, timber wolf, muskrat, turkey, and seasonal populations of migratory birds (Funk 1976: 7).

Recent Glacial Events

The physical characteristics of the Hudson Valley and, specifically, the study area, are largely the result of recent Pleistocene glacial events. The Pleistocene Epoch began approximately 1.75 million years ago and ended 10,000 years ago (see Figure 6) (Eisenberg 1982: 6).

Glaciation began in the latter half of the Pleistocene with four stages or cycles of glaciation/deglaciation of the Pleistocene ice sheet. However, there is very little information concerning the first three stages. The fourth, and most important, glacial advance, the Wisconsin, began

approximately 75,000 years ago and was marked by secondary fluctuations called substages. These substages left identifiable traces such as striations and glacial erratics, in the Metropolitan New York area. The ice sheet, almost 4000 miles long and perhaps as much as 2000 feet thick, advanced as far south as New York City (Schuberth 1968: 180-184).

Pleistocene glaciation significantly lowered sea level and caused erosion of the Hudson Valley so that today relief is low to moderate with average elevations at about 400 feet (Connally 1979: 2-20). The glacial ice sheet locked up so much of the water that by 19,000 years ago sea level had dropped to 400 feet below its present level. The coastline was more than 90 miles east of its current position (Eisenberg 1978: 20).

As the glacier advanced south it carried tons of soil and stones, depositing this debris at its margins, forming low hills and terminal moraines. It reached its southern limit across Long Island, northern New Jersey, and Pennsylvania by about 18,000 years ago and began its retreat prior to 15,000 BP and perhaps as early as 17,000BP (see Figure 8) (Eisenberg 1978: 19; 1982:6)

With the northward retreat of the glacier, meltwaters began to create a series of proglacial lakes in the Hudson Valley. "Dammed on the south by a terminal moraine, proglacial Lake Hudson filled the Hudson Valley south of the Highlands by about 15,000 years ago" (see Figure 9) (Eisenberg 1982: 6). Proglacial Lake Albany filled the Valley from the Hudson Highlands to Troy around 13,000 BP. Both lakes were drained by 12,000 BP when the dam created by the terminal moraine was breached (Eisenberg 1982:6).

In addition to the formation and subsequent draining of the proglacial lakes, glacial retreat led to the rise in both the land and sea level through isostatic rebound and glacial meltwaters. Isostatic rebound of the land of as much as 800 feet in the north occurred as a result in the loss of the weight of the ice sheet (Connally 1979: 20).

By 11,000 years ago sea level had risen to about 100 feet below its present level and the shore was approximately 20 to 30 miles south and east of its present location (Salwen 1975: 43). By 6,000 years ago sea level had reached its present level (Salwen 1962: 1).

Although there was significant isostatic rebound in this region, the bed of the Hudson lies below sea level. This is a result not only of rising sea level but is also due to crustal subsidence or downwarping during the past 5,000 years or more. Therefore, the Hudson River has remained an estuary since 12,000 BP (Eisenberg 1982: 7).

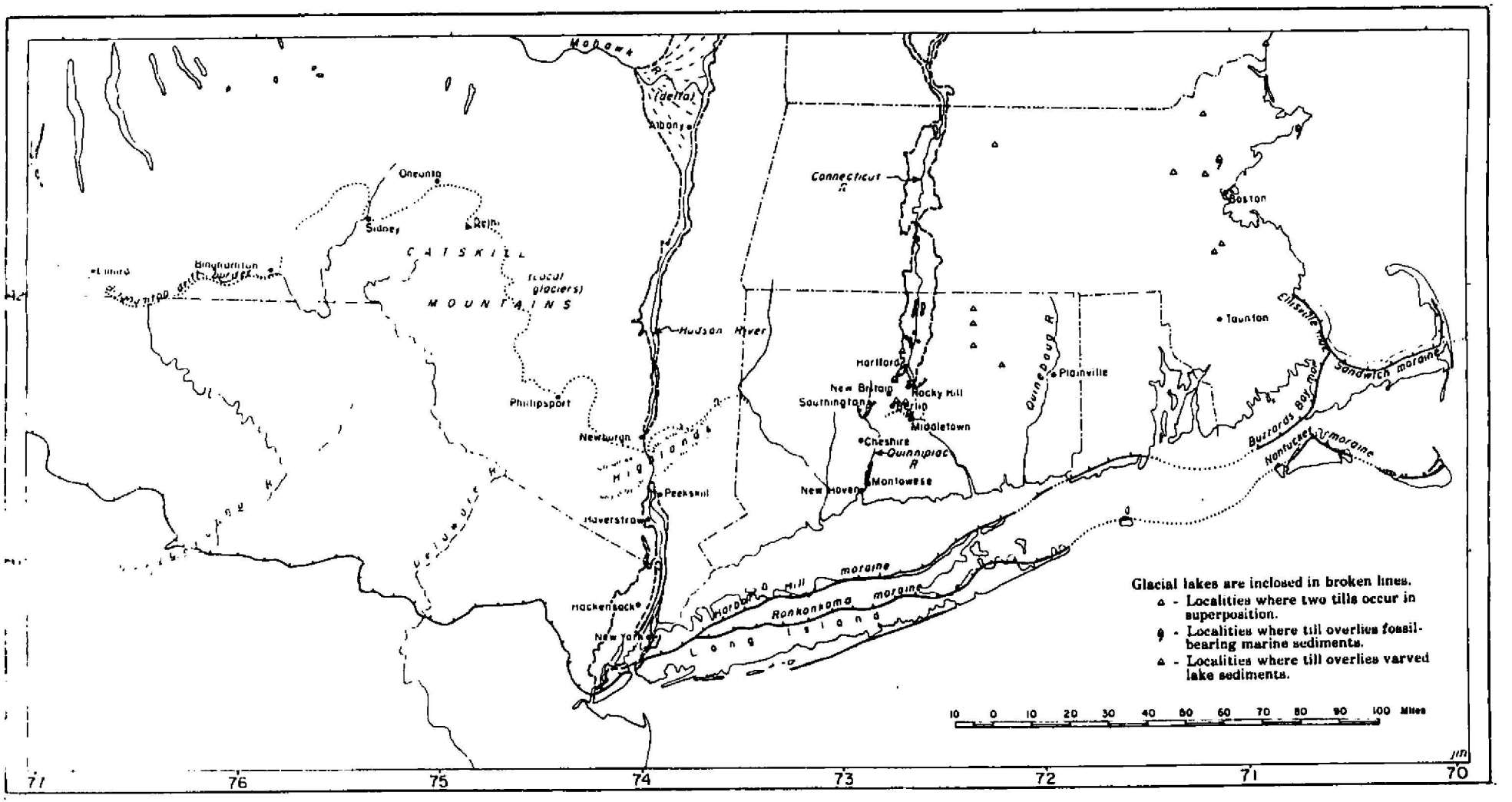


FIGURE 8

Map of the Wisconsin Drift Border in the Northeast

(after Eisenberg 1982: fig. 7)

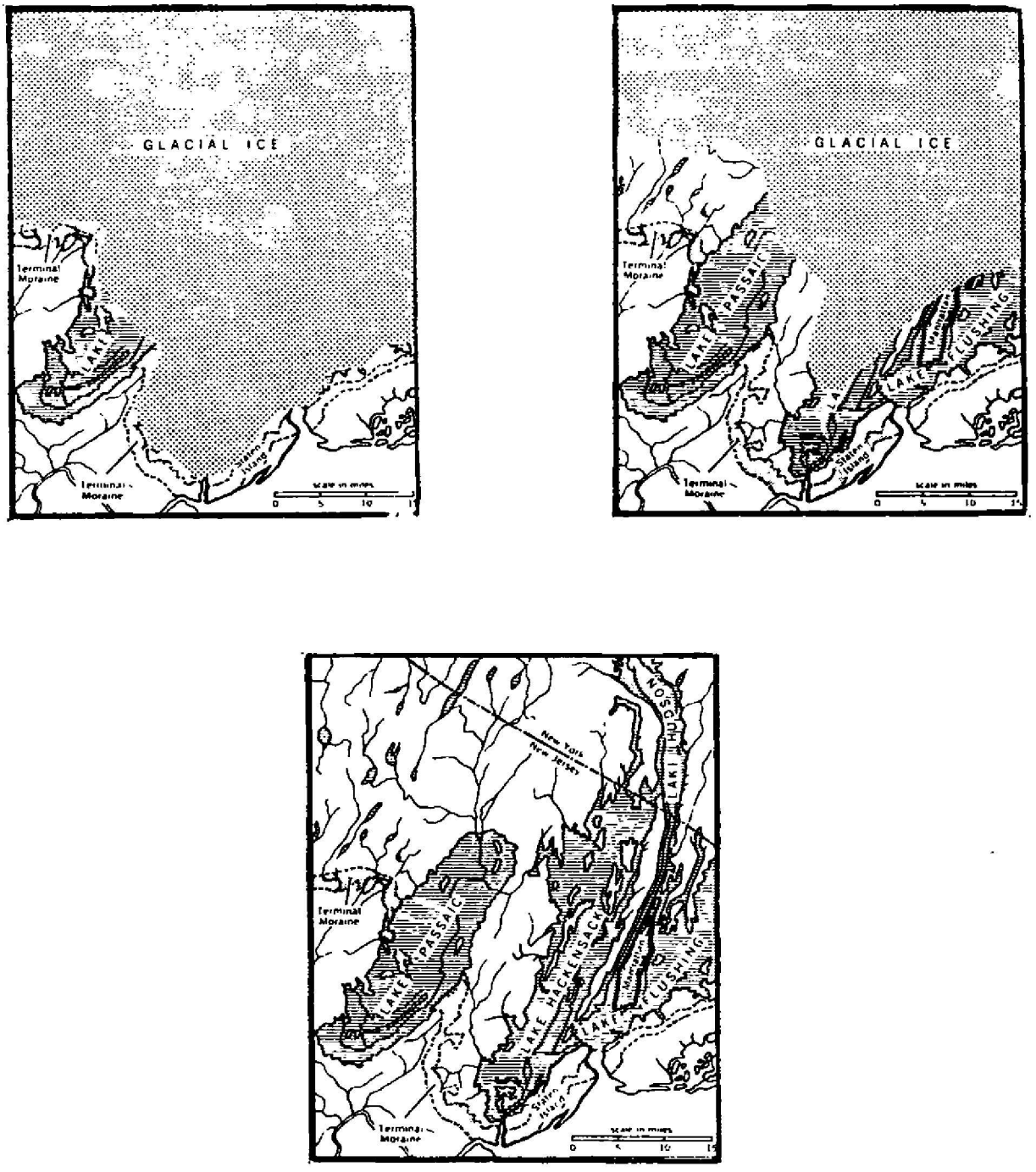


FIGURE 9

Development of Glacial Lakes Passaic, Hackensack, Hudson, and Flushing

(after Schuberth 1968: fig. 70)

III. DOCUMENTARY RESEARCH

The documentary research for this project was conducted in order to ascertain the archaeological potential of the site; to develop a cultural framework for assessing the archaeological remains; and to develop research questions appropriate to the study area.

Repositories of documents, maps, and publications that were visited included the Bronx County Historical Society, the New York Public Library, the New York Historical Society, the Heye Foundation Research Library, and the American Museum of Natural History Research Library. Additional research material and publications were provided by Peter Sauer, Susan Antenen, Peter Ritchings, and Uta Gore of Wave Hill; Ed Rutch of Historic Conservation & Interpretation, Inc.; Harvey Lubar of the Bronx Parks Headquarters; and Peter C. Freudenthal of Consolidated Edison Company of New York, Inc.

Hudson Valley Prehistory

Background research for the prehistoric period was confined mainly to the Hudson Valley. While information from other areas often provides further insights into research questions and potential, the immediate purposes and goals of this project do not justify such investigation.

The following is a basic outline of Hudson Valley prehistory, to serve as a framework for both the research questions and the archaeological potential (see Figure 10). The information presented in this section is divided into the standard stages of cultural development.

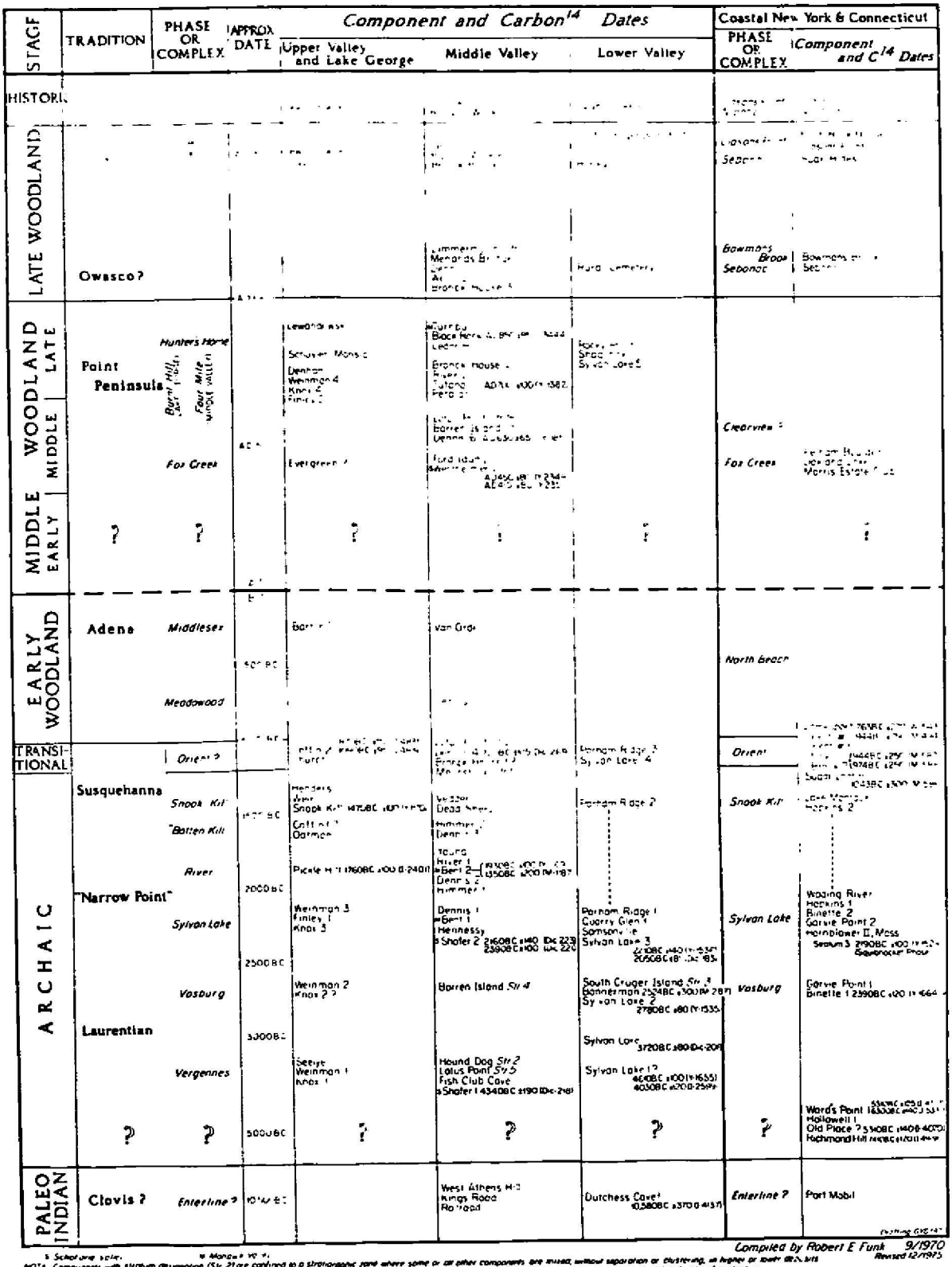


FIGURE 10

Cultural Sequence in the Hudson Valley

(after Funk 1976: fig. 27)

Paleo-Indian Stage

Post-glacial environment

The traditional environmental succession for the post-glacial Northeast was tundra, park-tundra, spruce forest, and pine or pine-hardwood forest (Funk 1976: 206). While this reconstruction, indicated in pollen diagrams, is the basic succession, it must be applied to specific regions with caution. It has been argued that traditional approaches to pollen analysis and interpretation has led to general reconstructions that do not necessarily reflect local variation (Eisenberg 1978: 23-30).

Eisenberg has presented detailed criticisms of traditional palynological analysis in his study of Paleo-Indian settlement patterns. His criticisms have been summarized as follows:

> "1. the general failure to employ correction factors in the pollen studies, 2. the tendency of attributing deciduous tree pollen in the early pollen profiles to contamination, 3. the presence of sampling bias in the recovery of both plant and animal remains, 4. the general failure to deal with ecotones, 5. the questionable use of uniformitarian models which equate early study area environments with contemporary northern latitude situations" (Eisenberg 1978: 119).

Based on these criticisms and actual evidence Eisenberg has argued that post-glacial forests were not uniformly coniferous but were, in fact, mixed coniferous-deciduous. For instance, the presence of oak in pollen diagrams appears too often to be discounted as contamination (Eisenberg 1978: 26). In the immediate vicinity of the present study area there is evidence that the post-glacial forests were actually mixed coniferous-deciduous (Salwen 1975: 43).

The unique environmental circumstances resulted in ecological relationships that have no modern counterpart. In fact, the boreal forest habitat occupied by Paleo-Indian groups was a low latitude one, and may have had a higher carrying capacity than present-day boreal forests of Canada and Alaska (Salwen 1975: 47).

"Plant species probably formed a series of separate communities in close proximity to one another. Swamp coniferous forest existed in lowland areas, while deciduous trees covered better drained upland environs" (Eisenberg 1978: 122). There may have been transitional zones of mixed coniferous-deciduous communities in the areas separating the lowlands and uplands. This would have resulted in a great diversity in faunal resources available for human exploitation.

Late Pleistocene fauna persisted into the early post-glacial period and include mammoth, mastadon, moose-elk, horse, giant beaver, and giant ground sloth. Remains of these animals have been recovered in the Hudson Basin. In addition, bison, caribou, elk, and other species, not presently found in the region, did exist here in the late glacial and early post-glacial times (Salwen 1975:44).

Of all of these animals only caribou was recovered in direct association with Paleo-Indian remains (Salwen 1975: 44). [It should be noted that the typically acidic soils of the Northeast presents a problem regarding bone preservation (Funk 1976: 2).] There is no direct evidence that Paleo-Indian groups exploited the apparently abundant mastadon (Eisenberg 1978: 139; Salwen 1975: 44).

Paleo-Indian Subsistence

Traditional characterizations of Paleo-Indian subsistence patterns in the Northeast argue for specialized big-game hunting of migratory herds of herbivores such as caribou (Funk 1976: 212). Archaeological evidence such as the presence of "exotic" lithic materials on most sites, the lack of dwellings and the relatively small size of sites is used in support of this highly mobile subsistence model (Funk 1976: 223-226).

However, Eisenberg presents a very different picture of Paleo-Indian subsistence patterns in the Hudson Valley. A model of restricted wandering, efficiently utilizing a wide variety of locally available resources is proposed. Six sites were examined in terms of site location, faunal and floral remains, and lithic assemblages. The conclusions are listed below:

1. The sites are associated with lowland waterside or upland bluff or ridgetop areas, consistent with a mosaic environmental composition. A variety of fauna would be available.
2. While hunting was probably an important subsistence activity, fish and plant remains from one of the sites indicates the exploitation of varied resources. Artifact assemblages also support this pattern.
3. The major proportion of the artifact assemblages are manufactured from locally available lithics, suggesting restricted wandering. The small percentage of exotic stone may have been obtained from the local glacial cobbles or may have been the result of "regular cultural contact between groups occupying neighboring territories" (Eisenberg 1978: 138-139).

The culture designated as Paleo-Indian "is characterized by the presence of fluted, bifacially-flaked projectile points and by a variety of unifacially-flaked knives, scrapers, gravers, and other tools" (Salwen 1975: 44). These distinctive projectile points are thought to be the products of culturally related groups that spread across the North American continent between 11,000 BP and 9,000 BP (Salwen 1975: 44).

In the Hudson River drainage there are only five known Paleo-Indian sites. There are two additional sites in the Hudson Basin but in other drainages, and three others immediately outside the Hudson Basin (Salwen 1975: 45).

Some of the sites are located on high ground and are thought to be small, seasonal hunting camps. There are a variety of other site types including one flint quarry-workshop-habitation site, a hunting camp and flint workshop, a temporary shelter, and a spring-summer base camp which contained direct evidence of only fishing and plant collecting (Salwen 1975: 45). This variety of site types is consistent with Eisenberg's model of restricted wandering in which a wide variety of locally available resources are exploited.

Archaic Stage

The Archaic Stage of the Northeast is divided into three phases: Early (9,000-6,500 BP), Middle (6,500-5500 BP), Late (5,000-3,000 BP). The phases represent changes in cultual traditions reflected largely through artifact assemblages. Little is known of the Early and Middle Archaic in the Northeast; archaeological evidence, although increasing in the past decade, is sparse. The presence of Early Archaic cultures, in particular, has been the subject of much debate and remains unresolved at present. However, it seems apparent that throughout the Archaic, a diffuse adaptive strategy was practiced, although it may have "changed in form over time so that there was an increase in its complexity and efficiency and in the number of resources available and exploited" (Starna 1979: 74).

The Archaic Stage "is defined as an adaptation characterized by a diffuse adaptive strategy with all of its ramifications, an associated technology, a central-based wandering or restricted wandering community pattern and its associated settlement pattern/system" (Starna 1979: 74).

At approximately 9,000 years ago, white or red pine replaced spruce as the dominant tree, possibly indicating a warmer, drier climate. This change has been dated at 9250±100 years in a bog at Alley Pond, Long Island. However, the forests "in the lower Hudson Valley and on Long Island and Staten Island contained significant amounts of both birch and oak" (Salwen 1975: 49).

It has been suggested "that the pine forest environment supports relatively sparse animal and plant resources useful to man, in contrast to the higher carrying capacity of park-tundra in late-glacial times or deciduous forests in more recent times" (Funk 1976: 231-232). Therefore, in the Early Archaic, population distribution would have been extremely sparse and the relative scarcity of archaeological evidence from this period is used in support of this hypothesis. However, this argument would not apply to the lower Hudson Valley, with its mixed coniferous-deciduous forests.

Oak and other hardwoods gradually began to replace pine as the dominant species so that mixed forests of oak and other hardwoods with pine and hemlock became established. Pollen diagrams display variations in the amounts of hemlock and hickory with two hemlock peaks separated by an abundance of hickory between 6,000 and 4,000 years ago. This change has been interpreted to represent minor climatic changes from a warm-moist, warm-dry, to a cooler, moister environment (Salwen 1975: 49).

At the beginning of the Archaic Stage, sea level was approximately 80 feet below its present position and by 3,000 years ago it was only nine feet below its present elevation. By this time the coastline was essentially the same as today (Salwen 1975: 40).

Early Archaic

The Early Archaic period ranged from ca.10,000 to 6,000 BP and is represented archaeologically by the presence of Hardaway, Palmer, Stanly, and bifurcate-base projectile points (Brennan 1977: 414; Dumont 1979: 42); Funk 1979: 35). The subsistence pattern is presumed to display a dependence on aquatic resources such as fish, shellfish, reptiles,

waterfowl, small mammals, and aquatic plants (Funk 1979: 36).

Archaeological evidence for the Early Archaic has been growing steadily. In the lower Hudson Valley, Early Archaic projectile points have been recovered from several sites excavated by Brennan (1977). These points were found on shell midden sites but not in direct relation to the middens.

Four sites on Staten Island have produced Early Archaic material with corresponding dates between ca.9000 BP-7000 BP (Ritchie & Funk 1971: 45). Six sites in the Upper Delaware River Valley in New Jersey and one on the Pennsylvania side of the Delaware have also produced Early Archaic tool assemblages and features (Dumont 1979: 42).

The Rockelein site on the upper Delaware River in New Jersey has produced four distinct varieties of Early Archaic points in contexts rich in associated artifacts and features. Three separate occupations were identified, all displaying a "heavy reliance on the food resources of the river and riverine terraces" (Dumont 1979: 41-50).

Although the debate concerning the Early Archaic in the Northeast is largely unresolved, the archaeological evidence from the southern reaches of this region does indicate occupation during this period. The vast majority of the sites display a dependence on aquatic resources with some small game hunting and plant processing.

Middle Archaic

Very little is known about this period in the lower Hudson Valley but there does appear to be an increase in population or, at least, a more intensive occupation of this area. Two sites in the lower Hudson Valley, Croton Point and Montrose Point produced dates of 5850±200 BP and 5650±200 BP, respectively, from the lowest levels of huge oyster shell middens. Although both middens contained very little cultural material, they do appear to have been "oyster processing stations" (Salwen 1975: 51). Although other types of subsistence activities were probably being practiced, the size of these middens demonstrates the importance of oyster shell in the diet.

Two other sites, out of the study area but in the immediate region, produced slightly older radiocarbon dates, 6560±100 BP from a Sylvan Lake rockshelter in Dutchess County, New York and 6170±135 BP from a Delaware floodplain site in Pennsylvania. The location of both sites provides evidence of the exploitation of different habitats (Salwen 1975: 51).

Late Archaic

The Late Archaic has been well-documented on numerous sites in the Hudson Valley; far too many to describe in this report. Instead, an overall description of this period will be discussed.

There is archaeological evidence, based largely on projectile point styles, for the simultaneous presence of more than one cultural tradition. At least two major traditions are evident: an inland-oriented tradition in the northern and western portions of the Hudson Basin and regions beyond and a coastal-oriented tradition, occupying the Atlantic Coastal Plain and

adjacent Piedmont Zone. The boundary between the two traditions is roughly Poughkeepsie, on the Hudson River, and Port Jervis, on the Delaware (Salwen 1975: 52).

Although each of the cultural complexes represents an adaptation to a totally different environment, a general collecting pattern of subsistence is characteristic of all. Each social unit "seems to have occupied a relatively restricted territory, which it exploited with remarkable thoroughness. Since no single resource, or for that matter, no single part of the habitat, could yield a satistfactory year-round food supply when approached with the technologies available to these societies, each utilized a wide variety of techniques to harvest an equally large number of food resources. They became specialists in diversification" (Salwen 1975: 52).

This diverse subsistence pattern is reflected in the faunal remains at archaeological sites. While the white-tailed deer usually comprises the largest proportion of bone, other mammals, as well as birds, turtles, fish and shellfish, are also represented. Although seeds, berries, and nuts are not often preserved at sites, the presence of grinding stones attests to the importance of these resources in the diet (Salwen 1975: 52).

The exploitation of a widely diverse food base, obtainable at different times of the year, in different habitats, requires frequent shifts in residence. This results in a number of special purpose sites, including small winter hunting camps and spring fishing stations, larger multi-purpose spring and summer camps, fall nutting sites, and coastal shellfishing stations. A preferred location for the larger spring and summer settlements was the borders of lakes and fresh or saltwater marshes with abundant plant and animal resources (Salwen 1975: 52-53).

The flexibility of the Archaic subsistence and settlement pattern insured the survival of local groups even when one or more of the resources were not available. Conversely, the mobile nature of this mode of subsistence would counteract overpopulation and overexploitation of any given resource. "Thus, the Archaic populations appear to have been in relatively stable equilibrium with the carrying capacities of their local habitats" (Salwen 1975: 54).

A long Late Archaic sequence has been established for the Hudson Valley. It begins with the Vergennes phase, which may have had a regional equivalent in the lower Hudson. This phase was followed by the Vosburg complex extending from Lake George to the metropolitan area. The Vosburg complex has been radiocarbon dated between 2800 B.C. and 2500 B.C.

The Sylvan Lake complex succeeded Vosburg and is dated 2210 B.C.$\pm$140. The characteristic traits of this complex are small, narrow-stemmed projectile points, notched bannerstones, choppers, ovate knives, side scrapers, expanded-base drills, and pebble hammerstones. This complex persisted in the lower Hudson until the appearance of traits associated with the Susquehanna Tradition, a Terminal Archaic manifestation (Ritchie & Funk 1973: 46-47).

Terminal Archaic Stage

It is conceivable that the highly successful Archaic cultures would have continued indefinitely. However, approximately 4,000 to 3,500 years ago there is evidence for important new cultural stimuli. At this time, stone bowls begin to appear with new artifact types, including broad projectile points (Salwen 1975: 54).

The bowls, carved soapstone, were often heavy and not easily transportable. In addition, the sources for this material were as far away as southeastern Pennsylvania and central Connecticut. Therefore, "it is usually assumed that water transport was of particular importance at this time" (Salwen 1975: 54).

Archaeological evidence from the Hudson Valley indicates that Terminal Archaic groups stayed near major streams throughout much of the year with occasional trips inland in the winter. In the northern region, they seem to have avoided high bluff stations, while in the southern-most areas, there is evidence for occupation of such stations. The distribution of the soapstone pots indicates that they were not carried to the inland winter sites but were left behind at the Hudson River bluff sites and at the settlements along large tributaries (Funk 1976: 266).

Although direct evidence of subsistence is rare, it is possible to reconstruct diet from several sites. There was apparently a dependence on deer, turkey, and other small game in the fall and winter, fishing in the spring and summer, and the exploitation of nuts in the fall. In the lower Hudson Valley, oysters were harvested in the warm seasons (Funk 1976: 266-267).

Although subsistence patterns seem to have changed little from the Archaic, the introduction of soapstone vessels led to increased sedentism and the changes that were to have developed in the Woodland Stage.

Woodland Stage

Environmental conditions have persisted, relatively unchanged, for the past 3,000 years. Sea level has been gradually rising at the rate of approximately three feet per 1,000 years, so that the present coastline has also changed little in the past 3,000 years. Palynological evidence indicates the onset of cooler, moister weather approximately 2,000 years ago and with this, the forest cover assumed the character it maintained until the recent past (Salwen 1975: 55).

There is evidence, in regional pollen diagrams, for increasing amounts of non-arboreal pollen in the upper portions of the columns. Although there are no absolute dates for this change, it has been suggested that forest destruction is indicated, beginning at least 1,000 years ago or earlier (Salwen 1975: 55). The replacement of the forest by grasses and herbs is generally attributed to Woodland groups practicing land-clearing and cultivation.

By definition, the Woodland Stage begins in the Northeast with the first appearance of clay pottery approximately 3,000 years ago. The presence of clay vessels, which are fragile and difficult to transport, is assumed to indicate sedentism or semi-sedentism which, in turn, is associated with cultivation. However, in the Hudson Basin, the first appearance of cultivation occurs almost 2,000 years after the presence of pottery (Salwen 1975: 56).

The apparent lag "between the first introduction of the idea of horticulture and its serious adoption as a major contributor to subsistence has been explained in various ways" (Salwen 1975: 56). One factor may have been the success of the Archaic subsistence pattern and the other may have been the late appearance of an adaptable race of maize to the Northeast. "As is usually the case, the interaction between cultural, biological, and environmental factors was probably more complex than is immediately apparent" (Salwen 1975: 57).

However, with the adoption of maize-based horticulture, came a series of irreversible cultural and environmental changes (Salwen 1975: 57).

Village sites were located near land suitable for cultivation, such as alluvial flats. The land was cleared by the combined techniques of burning and cutting with stone axes.

The Maxon-Derby site in Onondaga County, New York, dating from approximately AD 1000, contained at least ten round and elongated structures, housing a total of 200-250 people. The late prehistoric Mohawk village of Garoga possibly housed as many as 1000 people. As villages increased in size, so did the land under cultivation. Villages were relocated every ten to twenty years, possibly because of overexploitation of the land or the growing scarcity of both game nad firewood at the site (Salwen 1975: 57).

Little is known, thus far, about villages in the Hudson Valley and the coast. There is evidence that they were smaller than the villages in central New York, called "castles" in early European accounts (Salwen

1975: 57). Palisaded villages existed in the Montauk territory on Long Island in the early seventeenth-century. However, "archaeological and ethnohistorical data suggest that hte warfare pattern here was less intense than it was in central New York", even though population density was much greater here than in central New York (Salwen 1975: 58).

The Woodland Stage is divided into three periods: Early, Middle, and Late.

Early Woodland Stage

There are two Early Woodland manifestations in New York State: the Meadowood phase, a western and central New York culture, and the Middlesex phase, a central and eastern New York culture.

The distribution of characteristic projectile points, Meadowood and Adena, of Early Woodland groups, indicates a preference for the Hudson River and its tributaries. Year-round occupation of low-lying areas is characteristic of this stage. No faunal or floral remains have been recovered from the few excavated components of this stage, therefore, subsistence activities have had to be inferred from artifact assemblages and site locations (Funk 1976: 277-278). However, there is no evidence for significant changes in subsistence or settlement patterns from the Terminal Archaic Stage (Ritchie & Funk 1973: 96).

For the first time, tubular clay and stone pipes appear (Ritchie & Funk 1973: 96). It has been suggested to indicate tobacco cultivation or perhaps use of one of many wild plants for smoking (Salwen 1975: 56).

Other new elements include birdstones, boatstones, gorgets, and copper ornaments. Also burial ceremonialism during the Early Woodland, reaches new levels of complexity and refinement (Ritchie & Funk 1973: 96).

Burial practices include cremation, bundled, flexed, and multiple interments. Red ochre was characteristic as were the inclusions of grave goods such as bifacial blades, pipes, gorgets, birdstones, copper objects, and fire-making implements.

Evidence from Meadowood sites indicates a mixed economy of hunting, fishing, and gathering with no evidence for horticulture. Sites are generally located on large lakes or streams. Radiocarbon dates for this phase are between cal1000 and 560 B.C. (Ritchie & Funk 1973: 96).

The Middlesex phases, less delineated than Meadowood, have been represented solely at burial sites, none of which were excavated by present-day professional standards (Ritchie & Funk 1973: 349).

Middle Woodland Stage

This stage begins in eastern New York at approximately A.D.350-400 and is characterized by the appearance of certain new ceramic series with a variety of decorative techniques including dentate-stamping, rocker-stamping, pseudo-scallop shell-stamping, and corded-stick decoration. Other diagnostic traits include the straight pipe, plain elbow pipe, and platform pipe (Ritchie & Funk 1973: 117; Funk 1976: 287).

Another important characteristic of this stage is the culmination of mortuary ritualism which had its roots in the Late Archaic, Terminal

Archaic, and Early Woodland cultures. In western New York State, the appearance of burial mounds strongly suggests influences from the Hopewell cultures of Ohio.

In northern, central, and western New York, the Middle Woodland has been divided into four stages of development. The earliest is Canoe Point, followed by the Squawkie Hill phase, the Kipp Island phase and, finally, the Hunters' Home phase (Ritchie & Funk 1973: 117-120).

The earliest known Middle Woodland phase in eastern New York is Fox Creek, radiocarbon dated at A.D.410±80 from a site in Schoharie. This phase contrasts sharply with central New York manifestations in terms of its diagnostic elements. Rather, the Fox Creek phase shares traits with as yet undefined coastal cultures.

The primary diagnostic traits include the lanceolate Green point; end scrapers on reworked Fox Creek points; Petalas blades (large, straight-based knives); small, ovate or oblong knives; a variety of rough stone tools; and polished adzes and celts. Also diagnostic of this phase is net-impressed pottery.

Ornamental artifacts are almost completely unknown for this phase, as well as other elements common to Middle Woodland cultures. These include pendants, pipes, and bone or antler combs and harpoons. There are also no known burials (Ritchie & Funk 1973: 120).

The fundamental social unit of this phase appears to have been the band, ranging in size from 20 to 50 individuals, moving in territorial limits. The band may have stayed together in the warmer season to fish and hunt while splitting into smaller units in the fall and winter (Ritchie & Funk 1973: 357).

The Middle Woodland cultures of the Hudson Valley depended heavily on white-tailed deer and sea sturgeon. There is also evidence for the exploitation of other mammals and fish, birds, turtles, freshwater clams, nuts, and acorns (Ritchie & Funk 1973: 121).

There is indication for a continuum from Fox Creek to Hunters' Home with evidence of this phase gradually replacing Fox Creek elements. However, there is apparently no increase in settlement size, or change in subsistence activities, except for the introduction of maize horticulture in late Hunters' Home phase levels. Towards the end of this phase, there are trends such as larger and more numerous storage pits and larger vessels, that indicate increased sedentism (Ritchie & Funk 1973: 121).

Ritchie and Funk's (1973: 349) catalog of settlement types for northeastern Middle Woodland cultures are as follows:

1) Recurrently occupied camps
    a. Seasonal, small
    b. Semipermanent, large
2) Small, temporary camps
3) Cemeteries
4) Burial mounds
5) Workshops.

Late Woodland Stage

This stage is arbitrarily distinguished from the Middle Woodland stage, since there appears to be an unbroken continuity between the two. The most important development in this phase, from c.A.D.1000 through contact, was maize horticulture and the appearance of large settlements (Ritchie & Funk 1973: 165).

Ritchie and Funk's (1973:359) classification for Late Woodland settlement types is as follows:

1) Villages; two or more houses (semipermanent occupation)
   a. Undefended
   b. Palisaded
2) Hamlets; usually one house (semipermanent occupation)
3) Camps, recurrent (spring-summer fishing stations)
4) Camp,temporary (fall-winter hunting posts)
5) Ceremonial dumps
6) Cemeteries and ossuaries
7) Workshops.

Most Late Woodland habitation sites, unlike earlier settlements, are single-component sites. This is a result of the selection of locations based on two factors: the requirements of an agricultural economy and the need for defense from hostile neighbors. Therefore, most Late Woodland sites are located far away from major waterways, on small creeks or brooks, and on high hills and knolls (Ritchie & Funk 1973: 339).

The Owasco tradition or culture is poorly documented in the Hudson Valley and the traces that do exist are confined to its earlier stages. There is evidence, reflected in ceramic styles, however, for an East River tradition in the lower Hudson Valley that represents a cultural invasion from the New Jersey area (Funk 1976: 300).

The few traces of Owasco culture were recovered from multicomponent and stratified sites that suggests an Owasco-like development out of Middle Woodland phases, similar to the situation in central New York. However, Owasco village sites are completely lacking, thus far, in the Hudson Valley. Data on house types, fortifications and ceremonialism are also lacking.

Special names for assemblages, complexes, and horizons have been used in the lower Hudson Valley rather than the broader term "Iroquois" because of the "resultant confusion of a linguistic term with a material cultural" (Funk 1976: 301). At the time of European contact, Algonkian-speaking Native Americans occupied the area and had apparently done so for centuries, thus the use of horizon names.

As discussed above, there is scant information on Late Woodland villages in the Hudson Valley. For instance, a palisaded Indian village, called Nipinichsen, is said to have been located in the vicinity of Spuyten Duyvil in the Bronx (see Figure 11). However, there is no archaeological data to confirm this.

Jacobson, Herb Kraft, Ed Lenik — Burial Ridge SI — Paleo — SI 1980's Contact Period

Check Lenik material? use additional sources that are more contemporary

Contact Period

At the time of European contact in the Hudson Valley, all of the Indian groups practiced a mixed economy of maize-beans-squash horticulture with hunting, fishing, and collecting wild plants. This complex subsistence pattern required "seasonal changes in residence by at least some members of the society to permit harvesting of seasonally available resources" (Salwen 1975: 61). The emphasis on various resources varied between groups living in different environments. For instance, those living in coastal regions depended heavily on marine and littoral resources, not available to upriver groups. It has been suggested that the availability of both land and sea resources in coastal areas accounted for the very high density figures for the tribal groups that resided nearest the coast (Salwen 1975: 62).

The population densities for the Wappinger's is estimated to have been ca.18-20,000 in a total area of 19,200 square kilometers, therefore, averaging ca.95-105 people per 100 square kilometers. (The Wappingers lived in New York; Bronx, Westchester, Putnam, and Dutchess Counties; and southwestern Connecticut (see Figure 12). They were a Delaware-speaking people) (Salwen 1975: 59).

This highly complex way of life had its impact on the environment. Cultivation required extensive clearing of the land and, if farming villages did indeed move to new land every ten years or so then widespread deforestation must have been the result. In fact, early European accounts contain references to large tracts of cleared land and the first colonial farms invariably used fields already cleared by previous Indian farmers (Salwen 1975: 62).

Although early seventeenth-century Indian groups were probably "extracting more from their habitats than was being replaced, as is suggested by the decreasing percentage of forest cover, the negative energy balance was probably not very great" (Salwen 1975: 63). Several factors were probably in operation that counteracted resource depletion. These included the use of fish fertilizer on cultivable land; the practice of leabing fields fallow for rejuvenation; and the mixed subsistence economy of farming, fishing, collecting, and hunting. Population growth was also kept in check "by a number of control mechanisms, including an increasingly important cultural one - warfare" (Salwen 1975: 63).

Historical and ethnographic evidence indicates that the Indians of the lower Hudson Valley spoke Munsee dialects of an Algonkian language. Munsee apparently shared many features with the Unami language, spoken by New Jersey Indian groups (Grumet 1983: 17; Kraft 1983: 10).

To the north of the Hudson Highlands, the Indians spoke Mahican. Munsee, Mahican, and Unami were closely related Eastern Algonkian languages, spoken by Indian people throughout much of North America (Grumet 1983: 17).

Archaeological evidence of the contact period in the Hudson Valley is scanty, at best. None of the sites referred to in early European accounts has been located and identified through archaeology, except for the possible palisaded fort of the Kitchiwaucs, a Wappinger group at Croton

Point (Funk 1976: 303). However, this site was investigated in the early twentieth-century without the controls used today in archaeology.

Small components have been recovered from the uppermost levels of several sites in the Hudson Valley. One site, on the Hudson just north of Catskill, called the Rip Van Winkle site, has provided the most information thus far. The site represents "the spring-summer camp of a small band of River Indians, who were in contact with the Dutch settlements in the general area" (Funk 1976: 304).

Conclusions

The outline of Hudson Valley prehistory presented above indicates a long history of occupation spanning approximately 10,000 years. Archaeology in the lower Hudson Valley, thus far, has not fully documented this long sequence although it is probable that this area was occupied shortly after the glacier receded. The rapid expansion and urbanization of the metropolitan area was responsible for the loss of much of the prehistoric record. However, archaeology has recovered parts of this record and the following is a brief outline of prehistoric evidence in the immediate vicinity of the study area.

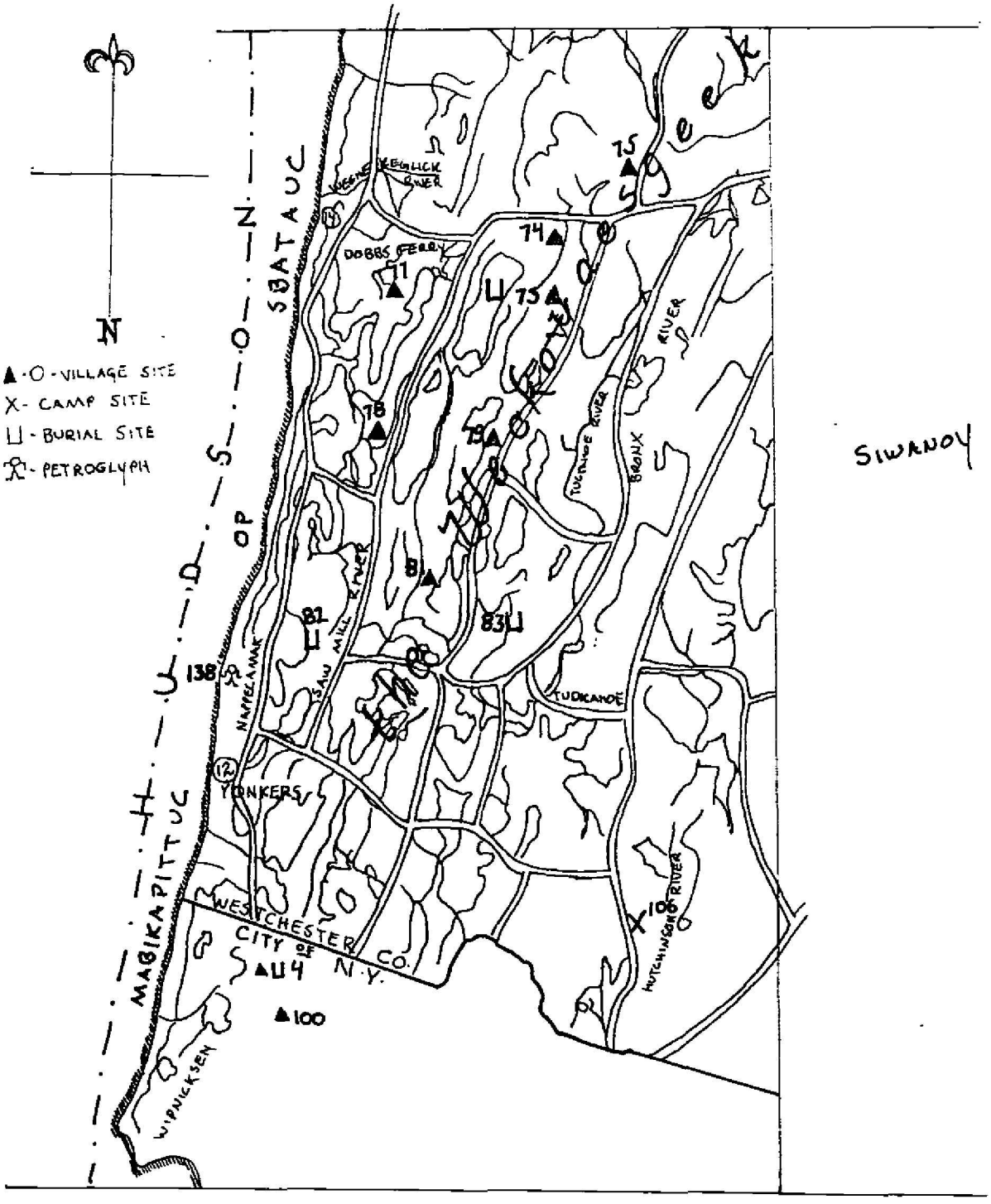


FIGURE 11

Map of Westchester County showing Indian Occupation

Westchester County Historical Society

By workers supplied by the Emergency Work Bureau of Westchester County: 1933

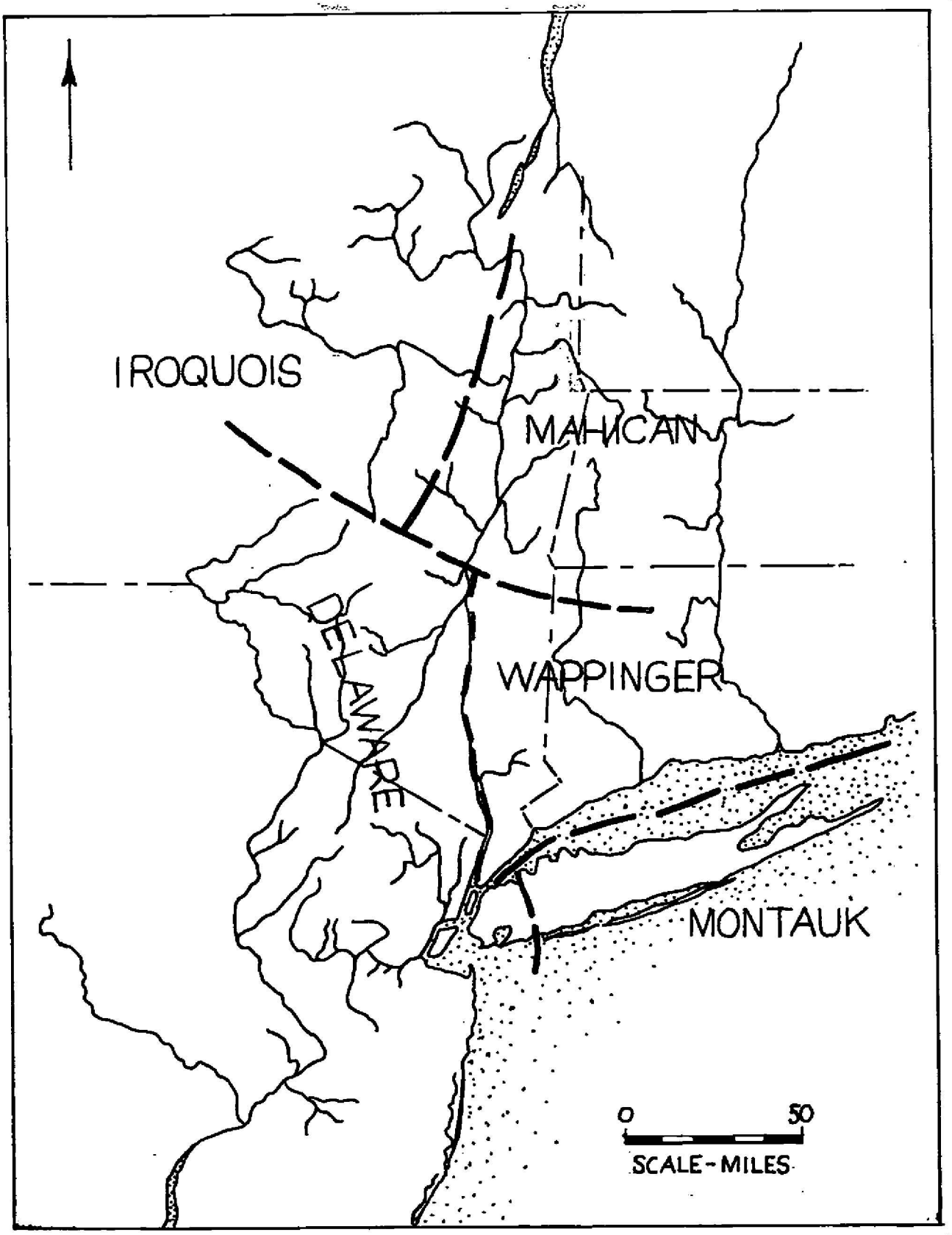


FIGURE 12

Indian Sociopolitical Groups

in the Hudson Basin

(after Salwen 1975: fig.2)

Evidence of Prehistoric Occupation in the Bronx and upper Manhattan

Numerous prehistoric sites have been documented in the Bronx and upper Manhattan. The vast majority of these sites were shell middens on the Hudson and East Rivers and the Long Island Sound, indicating extensive occupation of this area and the exploitation of marine and littoral resources.

Most of these investigations, however, were conducted in the early twentieth-century, without the controls used today in archaeology. In addition, much of this early work predates the development of dating techniques, regional cultural sequences, and other such tools now used in archaeology. Yet, it is possible to ellicit information from these sources.

The largest and best documented of these sites were found at Clason's Point and Throg's Neck, investigated by Alanson Skinner. Both sites were primarily shell middens but included such features as refuse pits and both human and dog burials. Faunal material recovered from these sites included deer, elk, raccoon, beaver, wild turkey, and an assortment of fish, crustaceons, and tortoises. Floral material was also collected and included corn, hickory nut, walnut, and sweet flagroot. Tobacco cultivation may also be indicated by the discovery of pipes (Skinner 1919).

Evidence of contact with Euroamericans was also indicated on the surface of the middens and in the later refuse pits. Foreign trade objects of English origin and the presence of domestic pig were thought to represent at least limited contact (Skinner 1919: 51).

Five sites were investigated in upper Manhattan at Dyckman Street, Fort Washington Park, Isham Street, Tubby Hook, and Inwood. All of the sites were shell middens. Hearths, burials, and refuse pits were discovered at all but the Dyckman Street midden. A variety of artifacts were found at all sites including pottery, chipped and ground stone artifacts, and clay and steatite pipes. A wide variety of faunal material, including deer, elk, fish, bird, and shellfish, were also recovered. However, the chipped stone artifacts were not assigned dates or cultural associations while the pottery was identified as sub-Iroquoian (Skinner 1920).

It is difficult to draw conclusions from the information provided in these early reports other than broad statements as to the apparently extensive nature of occupation of this area. In addition, the sites appear to represent both year-round settlements and seasonal camps and exhibit the exploitation of diverse resources.

Several, more recent, investigations have been conducted in the Bronx. The sites are located in the east Bronx, on or near Eastchester Bay and the Long Island Sound.

The Kaeser site, investigated by Nan Rothschild and Lucianne Lavin, is a shell midden on the north shore of Eastchester Bay. It was apparently sporadically occupied during Late Archaic, Early and Late Woodland, and Historic periods (Rothschild & Lavin 1977: 1).

Based on the functional categories of the artifacts, the Kaeser site was not just an overnight camp but the occupations were also not lengthy. In addition, the site was probably occupied during fair weather because there were no postmolds or definable house structures. It has been tentatively suggested that the food processing, woodworking, and beadworking activities were associated with Early Woodland occupation and that hideworking was associated with Late Woodland occupation (Rothschild & Lavin 1977: 20).

The evidence from Kaeser also suggests that "the midden was apparently accumulated by the occupation of different areas of the site at different time periods, rather that a uniform occupation which might result in a more typical layer-cake stratigraphy" (Rothschild & Lavin 1977: 21).

Other sites in the east Bronx that have demonstrated similar functional patterning are the Archery Range site, investigated by Kaeser and the Pelham Boulder site, investigated by Lopez. At both sites the majority of artifacts were potsherds with few tools (Rothschild & Lavin 1977: 20).

Investigations at the Morris Estate Club site demonstrated that the midden was veritcally stratified. The ceramics indicate an Early or Early Middle Woodland to Late Woodland occupation beginning between 1000 B.C. and 700 A.D. to early seventeenth-century, prior to European contact. A summer season habitation is suggested by the faunal evidence (Kaeser 1963: 13-21).

The presence of numerous sites in the Bronx and upper Manhattan attests to the intensive occupation of this area by at least the Early Woodland Stage. The vast majority of the information has come from midden sites that suggests intensive exploitation of the region's aquatic resources. However, prehistoric occupation of this region may not have been confined to coastal environments and may have begun much earlier than Early Woodland times. The information gathered, thus far, is perhaps the result of several factors. For instance, the early investigations were, for the most part, conducted at sites that were visible on the surface at shorelines that were eroding. The more recent investigations were salvage excavations, again in coastal areas. In addition, these areas have undergone somewhat less development and it can only be assumed that the early and rapid population expansion of the metropolitan region has resulted in the loss of much of the prehistoric record.

Historic Occupation of the Bronx and Riverdale Park

The Early Settlements

The first known European voyage to the Hudson River was made by the Italian navigator Giovanni da Varrazano, who probably took shelter in New York harbor in 1524. The next European visitor was Henry Hudson, the English navigator and explorer, sponsored by the Dutch West India Company, who, in 1609, sailed up the river that would bear his name. Indian accounts of these voyages "speak of the coming of tall floating cloud-houses carrying hairy, pallid, ghostlike men first thought to be Manetuwak, or supernatural beings" (Grumet 1983: 17).

In 1621 the Dutch West India Company was established by the States General of the Netherlands. It was granted a trading monopoly and the right to establish colonies in the New World. Manhattan was chosen as the center of its proposed New Netherland Colony (Archdeacon 1976: 33).

The Dutch West India Company was interested in the fur trade and established settlements along the Hudson between New York and Albany. "The first small group of Dutch settlers arrived in New York in 1624 and was distributed among 4 Dutch outposts: 8 men at New Amsterdam (New York); 2 families and 8 men at a trading post on the Delaware River; 2 families and 6 men at another trading settlement on the Connecticut River; and the remaining 18 or so families at Fort Orange (Albany)" (Salwen 1975: 63).

By the middle of the seventeenth-century small farming communities, both patroonships and free villages, were established in the Hudson Valley (Salwen 1975: 63). The River Indians, living on the eastern shore of the lower Hudson River found themselves living on the land claimed by the Dutch West India Company. These Indians were known as the Wiechquaeskeck or Westchester Indians as they were called after the English takeover of New Netherland in 1664 (Grumet 1983: 18) (see Figure 11).

"As the 1630's wore on, the lower River Indians found themselves in an increasingly difficult economic situation" (Grumet 1983: 18). Lacking immunity to diseases introduced by Europeans, such as smallpox, malaria, flu, and measles, the Indians suffered grave losses. With population greatly reduced, those that survived struggled to protect their villages and trade routes from attacks by competing groups such as the Mahicans and Mohawks (Grumet 1983: 18).

Wars and violent fighting between Indian groups ensued but attacks by the Dutch served to unify such traditional enemies as the Raritans and Wiechquaeskeck against the Dutch. However, casualties among the Indians were very high and many of their villages were destroyed. Finally, in 1644 they asked for an armistice and by 1645 signed a peace treaty (Grumet 1983: 20).

Following the wars, most of the Wiechquaeskeck left Westchester, moving across the river to live with the Haverstraw, Tappan, or Hackensacks, or to the south to Raritan and Navesinck lands. Some of the Westchester Indians returned after signing a formal peace treaty with the Dutch on July 19, 1649. Since most of Westchester was not colonized, it became an attractive location for less hostile lower River Indians who had already sold their lands in such places as Long Island. Even as late as 1650, Westchester was settled by Europeans only in isolated areas along the

Hudson River and Long Island Sound. However, the Dutch were increasingly pressuring the Indians to sell their land and move into the interior. To avoid complete dispossession, the Indians sold their land in small parcels, retaining hunting, fishing, and camping rights (Grumet 1983: 20-21)

The Seventeenth-Century

One of the original European landowners in the Bronx was Adriaen van der Donck. His land was bounded by the Spuyten Duyvil Creek to the south, the Hudson River to the west, the Bronx River to the east, and the Croton River to the north (see Figure 13) (Kane 1947: 3; Stertz 1978: 5-6).

Van der Donck, the first lawyer in the New World, came to New Netherland in 1641 with a government contract for trading with the Indians. In 1646 the Dutch West India Company gave him a land grant, confirmed by the Indian sachem Tacquemack or Tacharem. The land, once called Neperham, was now called Colen Donck, (Donck's Colony). This was anglicized to become "The Yonkers" and finally, "Yonkers" (Stertz 1978: 6).

In 1653 Van der Donck was appointed a patroon, the system under which any man who could secure fifty able-bodied laborers was entitled to a large land grant which he could clear and cultivate (Rothschild & Fenton 1985: 8). This was the first and only patroonship in Westchester.

Apparently, Van der Donck never actually settled on the land but by 1649 he had built a sawmill and laid out a plantation (Stertz 1978: 7).

When Adriaen Van der Donck died in 1655 his lands were willed to his wife Maria (Tieck 1968: 9-10; Stertz 1978: 7). She remarried Hugh O'Neale of Patuxent, Maryland in 1662. They decided to leave the area in 1666 and sold the land to Mrs. O'Neale's brother, Elias Doughty (Kane 1947: 7; Stertz 1978: 8). Doughty, in turn, sold the land sometime before 1667 to William Betts, George Tibbetts, Joseph Hadley, Thomas Delavall, Frederick Philipse, Thomas Lewis, and John Archer. Archer's land became the Manor of Fordham and is not in the Riverdale area (see Figure 15) (Kane 1947: 7; Stertz 1978: 8).

However, the area did not remain divided for very long because Philipse gradually purchased all of the land between 1672 and 1687. On June 12, 1693 the Manor of Philipseburg was created with the annual rent of four pounds twelve shillings to be paid to the king. The settlers, mostly Dutch and a few Indian, were tenants of the manor. Until 1779 Yonkers remained a township within the manor (Stertz 1978: 9).

The Manor of Philipseburg extended from Spuyten Duyvil to the Croton River, a distance of 22 miles (see Figure 14). The manorial system resulted in the planned management of the land over the long term with large tracts of cultivated land under centralized control (Rothschild & Fenton 1985: 9).

Apparently, the Philipse family did not maintain its residence in the section of the manor now constituting the Bronx. Frederick Philipse did, however, live at Tarrytown until his death in 1702.

The area now comprising Riverdale does not appear to have been settled in

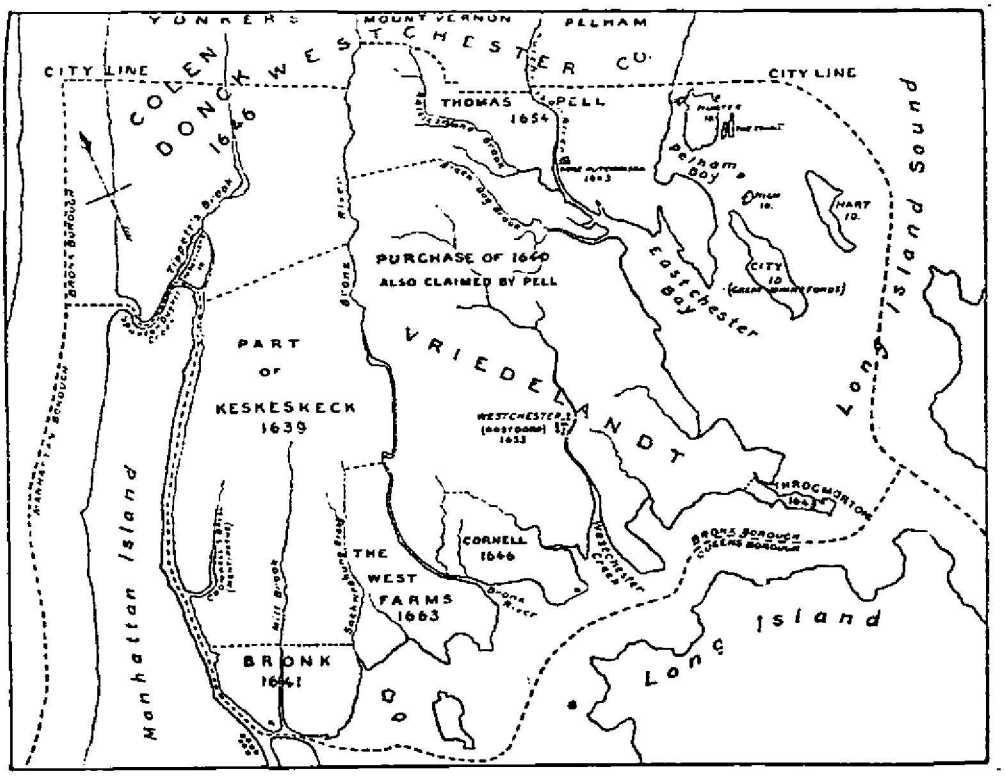


FIGURE 13

The Bronx at the end of the Dutch period: 1664

(after Jenkins 1912)

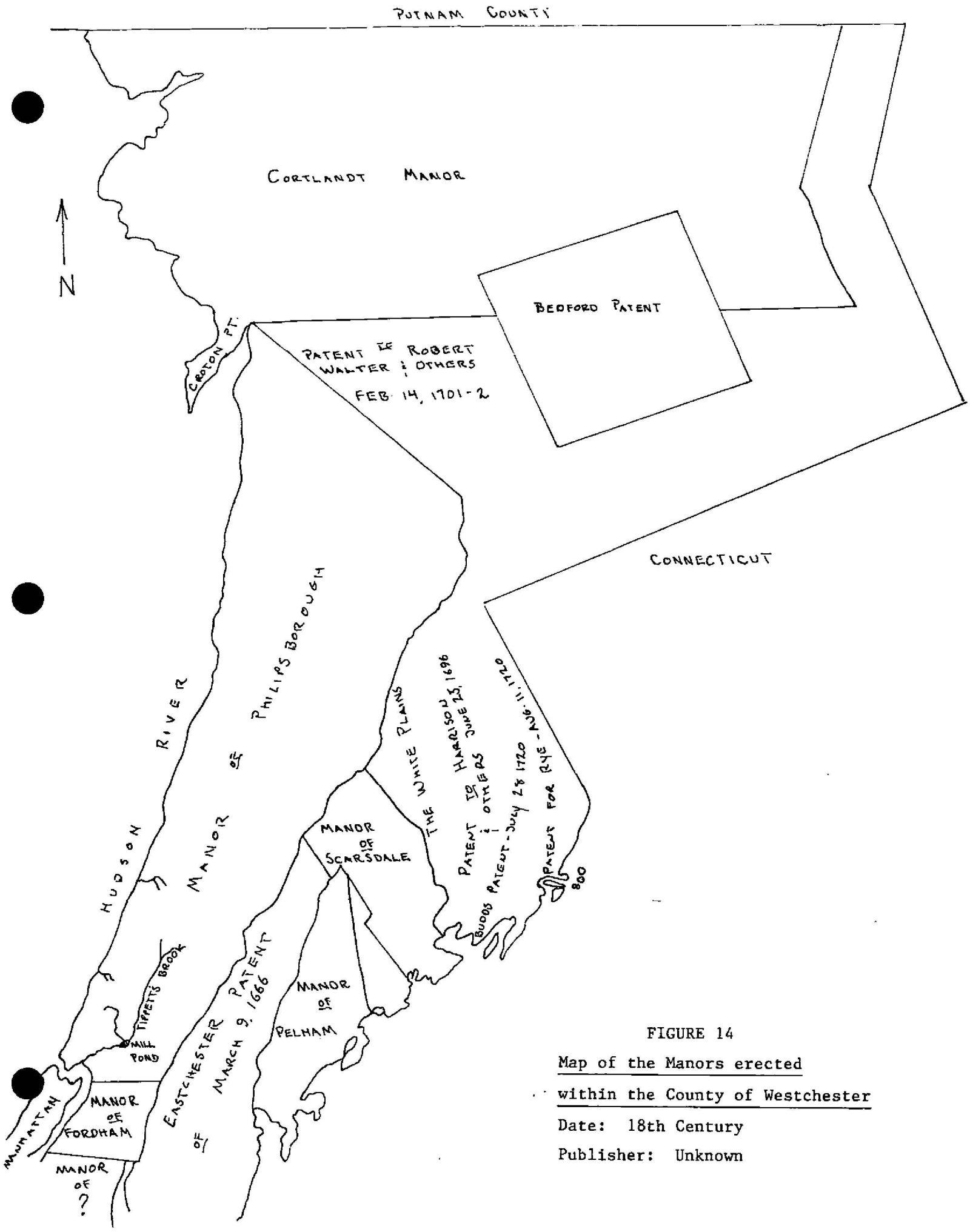


FIGURE 14

Map of the Manors erected within the County of Westchester

Date: 18th Century

Publisher: Unknown

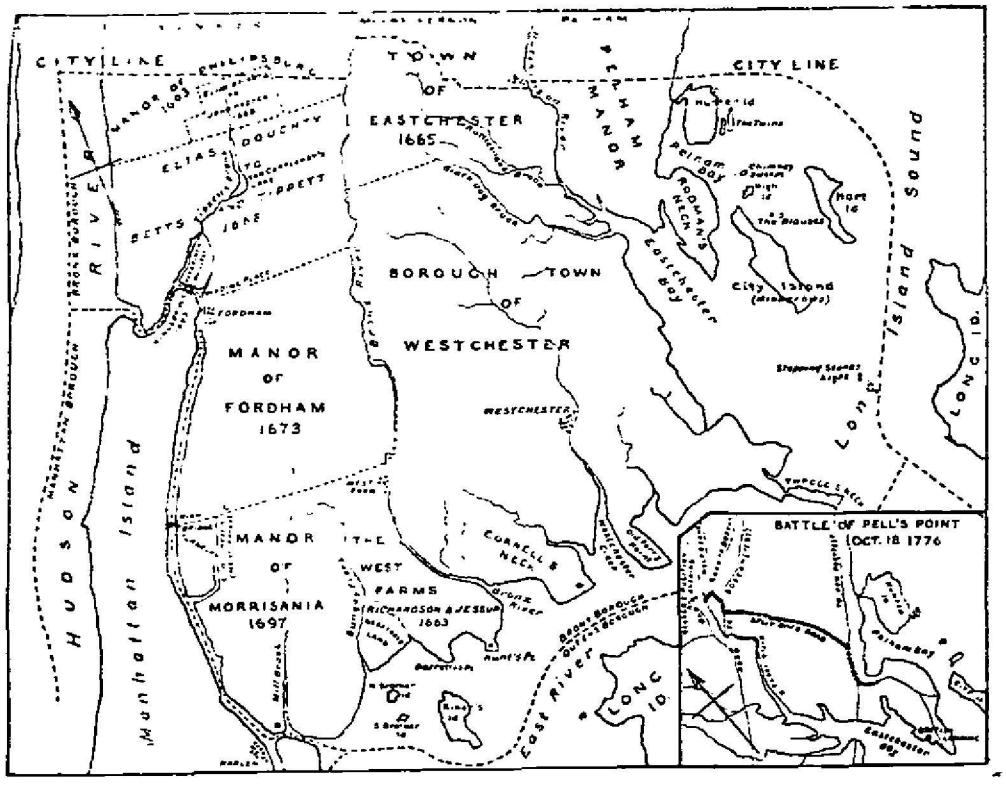


FIGURE 15

The Bronx at the English Period

Battle-field of Pell's Point, Oct.18, 1776

(after Jenkins 1912)

the colonial period. There were few roads at this time and most ran north-south for topographical reasons. The only road through the west Bronx was the Albany Post Road (modern Broadway) (Stertz 1978: 10-12). Although the few early maps of the west Bronx do not indicate settlements, it cannot be assumed that there was no activity or occupation in this area. For instance, the maps would not indicate tenant farmer dwellings; only those of major landowners. It has, however, been assumed that the rugged terrain of Riverdale would have made it a less attractive area for such development (Stewart 1984: 6).

The eighteenth-century

The Philipseburg Manor remained intact, with three successive lords, until the end of the American Revolution. The third, and final, lord was Colonel Frederick Philipse, born in 1720. The Manor was confiscated by the New York State Legislature after the war because Philipse was a loyalist, as were most of the manorial lords. Philipse was captured after the Battle of White Plains in 1779 but released on the condition that he return to Yonkers. Instead, he and his family fled to England and the legislature seized his property (Stertz 1978: 16).

During the American Revolution the Riverdale area was part of the neutral territory. There were forts and redoubts in the surrounding areas of upper Manhattan, Spuyten Duyvil and Kingsbridge. None of the major battles were fought in this area; most of the fighting occurred in the East Bronx. Small, light skirmishes took place in the vicinity but there is no evidence for fighting in Riverdale (Kane 1947: 8-11).

In 1784 the New York State Legislature passed a law by which all lands owned by loyalists were to be confiscated and sold at auction. Isaac Steutenburgh and Philip Van Cortlandt were appointed Commissioners of Forfeiture for Philipseburg Manor which was sold in several parcels (Stertz 1978: 16).

A map of the area, including Riverdale, prepared in 1785, shows no roads or buildings aside from one house on Tibbett's Brook and one on the Spuyten Duyvil Creek (Stertz 1978: 16).

The land that comprises present-day Riverdale was purchased by two local farmers, George and William Hadley (see Figure 16). William Hadley, a patriot, had purchased a tract of land from Colonel Jacobus Van Cortlandt in 1761 and another from the Commissioners of Forfeiture in 1786. William Hadley's land, a total of approximately 260 acres, included the parcel from Dogwood Brook (present-day Alderbrook) to Dodge Lane. In 1785, George Hadley purchased the property from West 256th Street south to Dogwood Brook. Both parcels were bordered by the Hudson on the west and the Albany Post Road to the east (Kane 1947: 12-14; Stertz 1978: 17).

Although the Hadley brothers were farmers, it is not clear what use they made of the segments of their lands that comprise Riverdale Park.

William Ackerman and John Westervelt, both Dutch farmers from Bergen County, New Jersey, purchased land from George Hadley in the 1790's. Ackerman's property extended from West 256th Street to the present-day service road behind the Wave Hill greenhouses. Westervelt's land extended

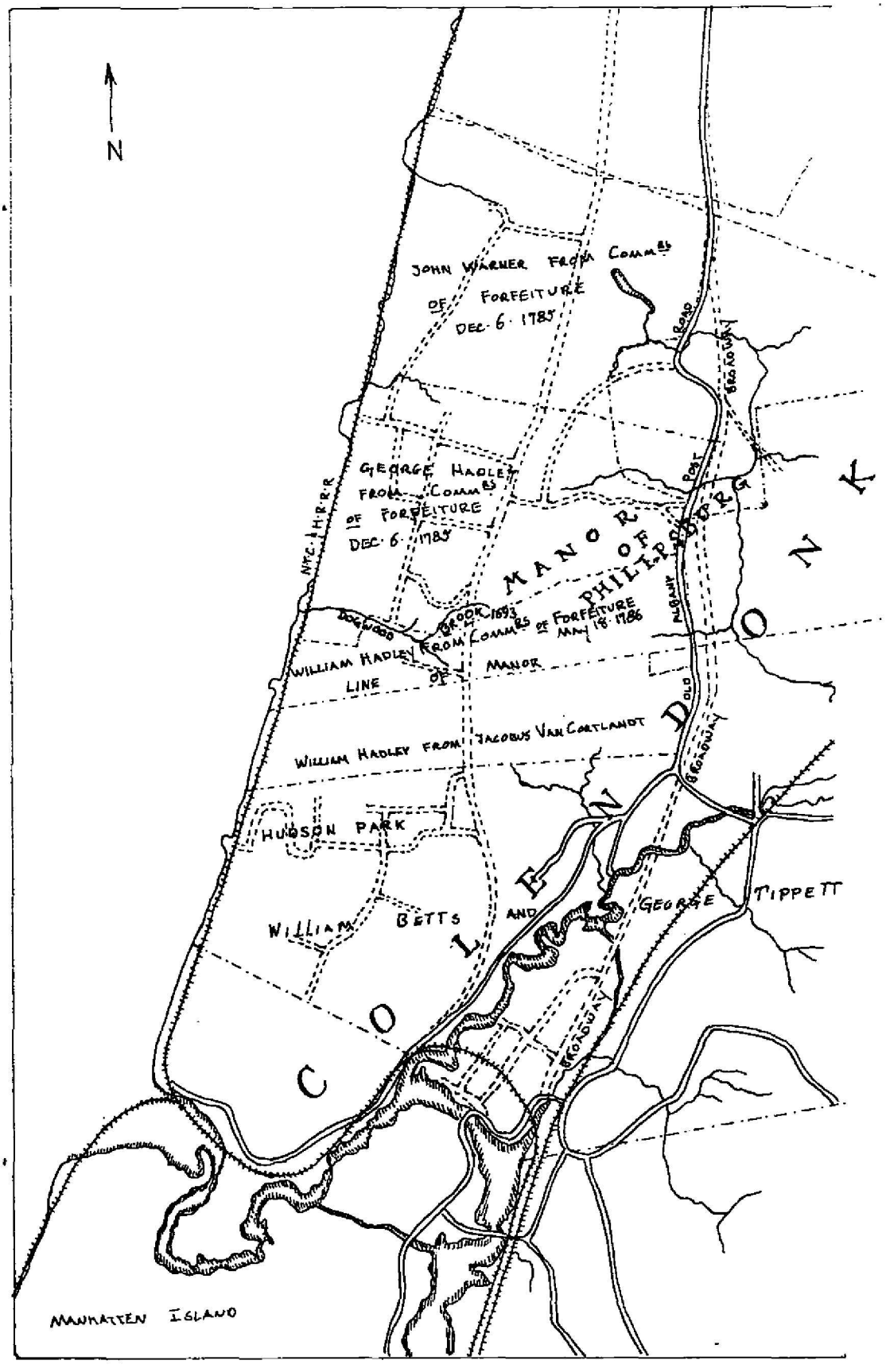


FIGURE 16

Kingsbridge 1645-1783

Thomas Henry Edsall

Scale: 2000'= 1"

from the service road to Dodge Lane. Again, it is not clear whether or not they farmed this land.

The nineteenth-century

It is not until the nineteenth-century that there is evidence for land use of Riverdale Park.

William Hadley's land was purchased by Major Joseph Delafield through foreclosure in 1829. The land extended from the river to the Post Road and was mainly woodland with only a small portion suitable for agriculture (Dodge 1975: 2).

Delafied had searched for a limestone quarry and found a satisfactory deposit several hundred feet above the Hudson. In 1830 Delafield built a lime kiln along the river at present-day 246th or 247th Street that was in operation until 1837. The design for the kiln, imported from France, apparently became the model for others operated throughout the country. Lime produced from this kiln is said to have been used in the construction of forts at the entrance of New York Harbor (Dodge 1975: 27; Kane 1947: 12-13; Tieck 1968: 104).

There is evidence, however, that Joseph Delafied advertised the sale of lime in bulk for manure in a handbill dated March 2, 1835. The handbill also mentions two white storehouses on the dock, built for shipping the lime. The wooden pilings are still evident at low tide. The dock was known as Delafield's Landing and was later called Dodge Dock (see Figure 17) (Kane 1947: 13; Stewart 1984: 8).

In addition, there was a small frame cottage which housed the quarry superintendant at the foot of Dodge (Delafield) Lane. The house, called the Canal House, was so named because it was floated through the canal at the present-day Canal Street and up the Hudson to its present site by Delafield. The house burned down in the early 1960's but its foundation is still in existence in Riverdale Park (Tieck 1968: 104).

The kiln built by Delafield was destroyed in the 1890's when the New York Central and Hudson River Railroad widened the tracks. There is another kiln, still partially standing in the park, that may have been operated by Delafield. It may be the kiln indicated in Delafield's advertisement as the first lime kiln after Spuyten Duyvil Creek (Stewart 1984: 9). It has been suggested that it was in operation prior to 1700 and as late as the 1870's or 1880's (Tieck 1968: 104). The limestone quarry, presently on the Howell property, at 247th Street east of Palisade Avenue, may have supplied the Delafield kilns with limestone (Stewart 1984: 8).

In 1836 William Lewis Morris, a wealthy Manhattan attorney, purchased the lower portion of Ackerman's land from his heirs. Morris built the original Wave Hill House between 1843 and 1844 on the Wave Hill property that presently adjoins Riverdale Park. The Morris family resided here for eight years until 1851, the year Mrs. Morris died. The estate was then managed by a nephew, Edward Morris, until it was sold in 1866 (Kellerman 1970: 5-7).

The property to the south of Wave Hill was purchased in 1835 by Samuel

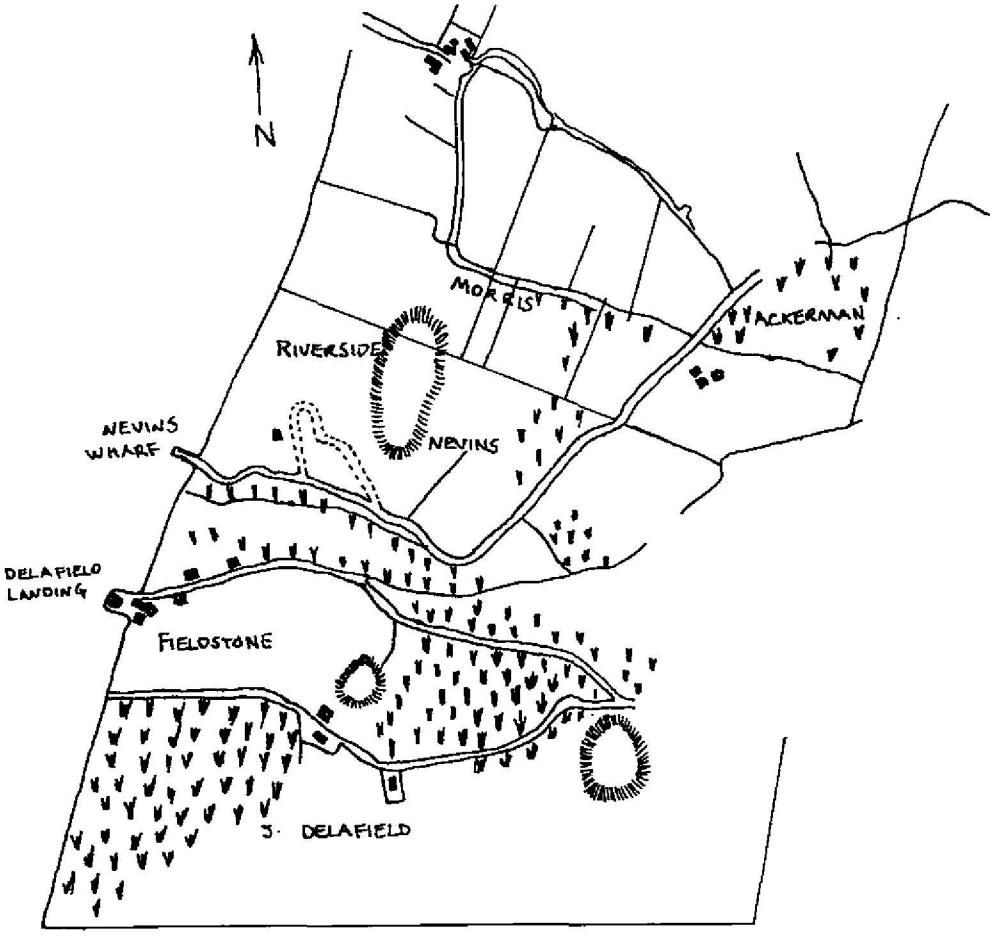


FIGURE 17

Southern part of

Westchester County, New York

M. Dripps New York

1853

Thompson, a successful New York builder and developer, interested in investing in Yonkers real estate. However, in 1838, Thompson sold his land undeveloped. Russell H. Nevins, a Wall Street broker, purchased the land and built a summerhouse near the shore, called Riverside. He also built a carriage road, the precursor of Spaulding Lane, leading down to his private dock (Kellerman 1970: 5-8). The Nevins' dock as well as Delafield's, Ackerman's, and Morris' are indicated on an 1851 map of Westchester County (Sydney & Neff).

Interest in Riverdale and the west Bronx increased sharply by the mid-nineteenth-century with the building of the Hudson River Railroad to Yonkers in 1849 (Stewart 1984: 10). The railroad provided access to the area that had been possible only by boat or by long journey on the Albany Post Road. The vogue of the mid-nineteenth-century for planned villa communities that was sweeping the country had taken hold in New York City (Kellerman 1970: 8).

In 1852 a group of merchants, headed by W.W. Woodworth, purchased the remainder of Ackerman's property, adjoining Wave Hill to the north, for the development of a private villa community. The investors included H.L. Atherton, Samuel D. Babcock, and C.W. Foster. A plan for the community, called Riverdale, was filed in 1853 with plots divided among the investors according to their financial committments. The eastern border of this development was Riverdale Avenue which was to serve as a public thoroughfare for the township of Yonkers (Kellerman 1970: 8).

In 1856 a similar community, south of Wave Hill, was organized by Henry Foster Spaulding, a dry goods importer. This development, to be called The Park - Riverdale, was planned as a private, residential park, stressing the preservation of natural beauty. The villa plots were limited to one house, each with restricted locations for outbuildings. Included in the plan was a five and one-half acre park at the foot of the old carriage road, built by Nevins (Spaulding Lane), near the shore. The park, with ornamental gardens and walks, was to be shared by the villa owners (Kellerman 1970: 8).

Neither of these projects progressed beyond the planning stage. It has been suggested that the severe business crisis of 1857 and possibly the Civil War were the factors responsible for the decline in the area's general development. However, several of the original investors did build homes in the area including Henry Foster Spaulding (Kellerman 1970:8).

Spaulding's home, called Parkside, was built along Spaulding Lane on the site of the present-day Riverdale Country School, directly southwest of the Wave Hill complex. His property extended to the Hudson River and included a segment of Riverdale Park (Kellerman 1970: 8-9).

In 1859 William E. Dodge purchased part of the Delafield estate and built a stone house that was completed by 1863 (Dodge 1975: 27). This purchase included land that is now part of Riverdale Park. Subsequently, Delafield Lane was changed to Dodge Lane.

In 1864, following William Lewis Morris' death, his heirs permitted a connecting carriage road to be cut through the estate. This road, the present-day Independence Avenue, became the eastern boundary of the Wave

Hill property. In 1866 the Morris family sold the parcel west of the carriage road, retaining the segment of the estate from the road to Riverdale Avenue as an investment (Kellerman 1970: 9).

Wave Hill was purchased by William Henry Appleton, a New York publisher and director on the boards of several banks and the New York Life Insurance Company. This tract extended from Independence Avenue to the River (Kellerman 1970: 9). The Appleton family owned the estate until 1903 when it was purchased by George W. Perkins Sr. (Department of Parks 1960).

By 1864 Riverdale had become a regular Post Office stop on the Hudson River Railroad. However, it was still primarily a summer community with many of the residents returning to their Manhattan townhouses in the winter months (Kellerman 1970: 10). In fact, Riverdale had very few commercial establishments until the turn of the century and included only a blacksmith and a feed store (Tieck 1968: 112-113).

In 1874 the area west of the Bronx River and south of Yonkers, including the townships of Morrisania and Kingsbridge, became part of New York City (Stehling 1983), Thus, the Riverdale area became part of the 24th Ward and, together with the entire "Annexed District" came under the jurisdiction of the Department of Parks for the development of a comprehensive street system (Kellerman 1970: 13).

The initial plan for public streets, the gridiron pattern used in Manhattan, came under great debate. Frederick Law Olmsted, the Parks Department landscape architect, joined in the debate and argued for curvilinear streets and irregular building plots as best suited to Riverdale's topography. He successfully convinced the Parks Department that the area was best promoted as a permanent, picturesque suburb. Therefore, in laying out the Riverdale section, Olmsted converted most of the old, private and carriage roads to public streets, maintaining the character of the area (Kellerman 1970: 12-15).

During the late nineteenth-century many new villas were erected and old estates expanded (Kellerman 1970: 15). Riverdale Park, during this period, belonged to several estates until the turn of the century when Perkins began buying estates in the Riverdale area (Kellerman 1970: 20; Stewart 1984: 12).

The twentieth-century

By 1911 George W. Perkins has purchased the estates including land extending along the river west of Independence Avenue from Spaulding Lane to West 254th Street and all of the undeveloped land east of Riverdale Avenue from 249th to 252nd Street (Kellerman 1970: 20). The remainder of Riverdale Park was still part of the estates of the Dodge, Delafield, and Douglas families (Department of Parks 1960).

Development of the Riverdale area in the late nineteenth- and early twentieth-centuries was very slow. The area was isolated from the rest of the Borough with Van Cortlandt Park as a barrier. This 1,132 acre tract

was sold to the city in 1899 for use as a park (Shapiro nd: 6). In addition, there were no major roads aside from Broadway, which runs in a north-south direction, and no inexpensive, adequate mass transportation. In the late nineteenth-century Riverdale had no good crosstown horse car or trolley service and very few crosstown streets. Broadway had the only trolley and horse car service (Shapiro nd: 6-8).

The railroad had little effect on population expansion because it was too expensive for all but the wealthy and did not provide frequent service. Although mass transportation was the major factor in redistributing the population from 1880 - 1920 to the outer boroughs, there was no such similar population increase in Riverdale with the construction of the IRT along Broadway. Population tends to expand near the railroad but the IRT runs along Riverdale's eastern border so that the subway did not have much impact on the population. By 1915 Riverdale had only 4388 residents. It was not until after World War I that population began to increase with the use of the automobile (Shapiro nd: 6-10).

In the 1930's major changes began to occur in the area with the construction of the Henry Hudson Parkway. In 1938 and 1939 many apartment buildings were constructed and zoning laws became the subject of much debate (Kane 1947: 41). However, the wealthy, politically powerful residents of Riverdale successfully worked to preserve the area (Shapiro nd: 12).

Many of the Riverdale residents fought against suburban realtors. For instance, Delafield refused to sell his land and, instead, created a bird sanctuary (Brown 1958: 3). Preservation also took the form of land deeds to New York City that were to form Riverdale Park.

In 1942 the first of these transactions took place with the donation by Mrs. Evelina B. Perkins. Other donors to follow included Mrs. Dorothy P. Freeman (the daughter of Mrs. Perkins), Mrs. Grace P. Dodge, Mr. Cleveland E. Dodge, and the Douglas estate (Kane 1947: 42; Parks Department 1960).

IV. RESEARCH POTENTIAL AND ISSUES

The focus of this project, as a preliminary investigation of the archaeological potential of Riverdale Park, will be the identification of archaeological resources, the determination as to the integrity and significance of the remains, and the development of a cultural chronology, based on the results of the survey. The development of a cultural chronology involves dating the remains and classifying them to reflect temporal categories (Thomas 1979: 139). This is a prerequisite for developing research questions that reflect past behavior and ultimately defining the "processes behind specific cultures" (Thomas 1979: 143).

Although the archaeological potential has not been established, the investigation must be directed toward relevant issues. This section, then, is a presentation of potential research issues to be addressed, given the presence of archaeological remains and the establishment of a cultural chronology. The determination as to the applicability of the research questions will depend on the results of the field survey.

This section has been divided into essentially the same cultural stages as were presented in the documentary research. Specific research questions have been developed only for those resources that have been previously identified and, even in these cases, are necessarily preliminary pending the results of the survey.

Prehistoric Occupation

The study area's proximity to the Hudson River, which abounded in aquatic resources, would have made it an attractive site for prehistoric occupation. The presence of extensive oyster shell deposits of possible Woodland Stage origin, along the ridge in the park, provides evidence of human occupation at least by ca.1000 B.C.

The long history of prehistoric occupation of the Hudson Valley, as early as 11,000 years ago, presents the possiblility of long-term exploitation of the study area (see Figure 10). The fact that palynological evidence indicates a post-glacial mixed-forest habitat in the region suggests that a variety of plant and animal resources may have been available. In addition, evidence has been presented in Section III for the presence of Early Archaic groups in the immediate vicinity.

Therefore, there is the potential for the early presence of prehistoric groups in the study area which may have continued in a nearly unbroken succession to the historic past.

This section contains interpretations of the environmental and archaeological data in relation to the site's archaeological and research potential. Research questions, to be addressed in this project, as well as potential research issues, are presented. For logistical purposes, this section is divided into the same cultural stages used in Section III.

Most of the research issues are suggested rather than being fully developed because the research potential of the site is, at present, still an unknown. This project is essentially an archaeological survey to determine the site's potential and, as such, cannot address questions beyond simple identification and analysis. Therefore, specific research questions will only be addressed regarding the resources previously identified.

An additional note of caution is necessary concerning the research questions. There will only be a limited number of excavation units in the shell midden sites. They will be small, 3 feet by 3 feet, so that the yield of information may not be sufficient to fully address the proposed issues. Nevertheless, the fieldwork and analysis will be oriented toward these research issues.

Paleo-Indian Occupation

The environmental reconstruction for this stage, proposed in Section III, is one of mixed coniferous-deciduous forest habitats that would have supported a diversity of fauna. The presence of deciduous species, specifically oak, in the region has been supported by palynological evidence (Salwen 1975: 43).

In addition, at the beginning of this stage, 11,000 years ago, sea level was 100 feet below its present position. Therefore, the study area would have been considerably higher above the Hudson than its present position of between 50 and 10 feet above the river. The present low-lying ridge that runs through the park may have been a high bluff not more than one-half mile from the river, even at the river's lowest level. It is conceivable that the plant community on this well-drained ridge may have been composed of deciduous species while the low-lying areas, now inundated by the river, represented swamp, coniferous forests. This ridge may have at least been a transitional zone of mixed species, between the higher ridge to its east and the river.

Climatic conditions may have been somewhat more continental than today as a result of the considerably lower level of the sea. This would have meant that the site was much farther inland than at present.

The proposed environmental setting would have supported a wide variety of resources, including fish, shellfish, mammals, migratory waterfowl, and year-round birds. The local lithic sources of quartz, as well as glacial pebbles from the Hudson, would have provided raw materials for tools. The site, therefore, may have exhibited conditions attractive to Paleo-Indian groups.

However, this environmental scheme is not meant to suggest that evidence of Paleo-Indian occupation of Riverdale Park is expected. Rather, it is meant to suggest that conditions may have been such that would have attracted early groups to this area. In fact, there are very few sites from this period in the Hudson Basin which suggests "that total population, as well as the size of individual social units, was very small" (Salwen 1975: 47). Paleo-Indian groups probably occupied coastal areas as did later populations but with the rise in sea level since Paleo-Indian times much of the archaeological record is now underwater.

For the purposes of the present study, research questions other than the identification of archaeological remains associated with Paleo-Indian occupations will not be explored. At present, there are no known Paleo-Indian remains in the park, therefore, to develop research questions beyond simple cultural and possibly functional identifications would be premature. Instead, the recovery of such remains would raise issues to be explored in further investigations. Such questions would focus, for instance, on site function and settlement and subsistence patterns.

Archaic Occupation

Pollen evidence indicates a mixed coniferous-deciduous forest cover for the southern Hudson Valley, which was eventually replaced by predominantly deciduous species by 3,000 years ago. At the beginning of this stage sea level was 80 feet below its present level but by 3,000 years ago it was only 9 feet lower than at present.

Rising sea level during this stage would have made the Hudson River more accessible from Riverdale Park. Minor climatic changes may have resulted in changing forest cover but this may not have greatly affected the availability of faunal resources such as deer, small mammals, fish, and shellfish.

Although Early and Middle Archaic sites are rare in the Hudson Valley, there is evidence for exploitation of the coastal regions and the lower Hudson Valley during this stage. As discussed in Section III, Early Archaic evidence has been recovered from both Staten Island and the Croton Point area of the lower Hudson. Middle Archaic components also have been recovered at both Croton Point and Montrose Point.

These early groups are believed to have practiced a central-based or restricted wandering subsistence pattern with an apparent dependence on aquatic resources. In fact, the Early and Middle Archaic sites in this region have been shell midden sites. Thus, the presence of numerous shell middens in Riverdale Park, although having yielded only Woodland material in the early investigation, strongly suggests the potential for such early remains.

Therefore, several research questions can be addressed concerning the Early and Middle Archaic, given the presence of such material in the planned excavation at the shell midden sites. The following are examples of such questions.

1) Can the Early and Middle Archaic remains be directly associated with the shell middens? Although Early and Middle Archaic projectile points were recovered from midden sites in the lower Hudson Valley, they were not in direct association with the middens (Brennan 1977).

2) Is there evidence for the exploitation of other resources such as fish, fauna, and plants; and what will the presence or absence of such remains reveal about subsistence practices of these groups? What does this evidence reveal about seasonality and the dependence on other resources? Brennan has argued that the lower Hudson oyster shell middens are late winter-early spring stations for harvesting oyster, anadromous fish and migratory waterfowl at a time of year when winter supplies were depleted and game was sparser (1977). Would the evidence from the Riverdale Park support or contradict this theory?

3) How extensive was the occupation, in terms of the number and functional categories of artifacts, associated food remains, and features? Are small, seasonal camps indicated or larger, warm-weather settlements indicated?

By the Late Archaic Stage the environmental setting was esentially the same as in the recent historic past. Sea level had nearly reached its present level so that Riverdale Park was located in essentially the same relationship to the river as at present. Therefore, the distance to the Hudson was greatly reduced, with the ridge not more than 80-90 feet, at its highest point, above the river.

Small, special purpose sites and larger multi-purpose spring and summer settlements are characteristic of the subsistence pattern during the Late Archaic. Therefore, the potential for such sites will be explored in the shovel test survey.

Again, the shell middens along the ridge may be associated with Late Archaic groups. Therefore, research questions, similar to those for the Early and Middle Archaic Stages, can be addressed, given the presence of Late Archaic remains. Examples of such questions are as follows:

1) Are the Late Archaic remains in direct association with the middens?

2) Is there evidence for the exploitation of other resources; and what does this suggest about the subsistence practices of Late Archaic groups?

3) Is more than one cultural tradition represented in the artifact assemblages and are there differences in subsistence activities between these cultural traditions?

4) How extensive was occupation and what type of sites are represented (small, specialized camps or larger, multipurpose settlements)?

5) Are there differences in settlement patterns over time?

Terminal Archaic Occupation

The Terminal Archaic subsistence pattern apparently did not change significantly from the Late Archaic pattern of restricted wandering. However, the introduction of soapstone vessels was an important new cultural stimulus and may be associated with increased sedentism and the importance of water transport.

Therefore, the research issues concerning Terminal Archaic occupation would be essentially the same as those proposed for the Late Archaic. A possible exception would be to explore the relationship between the introduction of soapstone vessels and general settlement and subsistence patterns. For instance, is there a correlation between the use of soapstone vessels and increased sedentism?

Present archaeological evidence indicates that Terminal Archaic groups stayed near major waterways most of the year with only occassional trips inland in the winter, presumably for hunting. Therefore, are long-term occupations represented at this riverine site? Is there evidence of such abandonment of the site in winter?

Woodland Occupation

The Woodland Stage begins with the introduction of clay pottery, associated with sedentism or semi-sedentism, and, eventually, cultivation. In the Hudson Valley, however, the appearance of cultivation occurs some 2,000 years after the introduction of clay vessels.

The Early and Middle Woodland Stages are poorly represented in the Hudson Valley. For the Early Woodland, the Middlesex phase of the central and eastern parts of the state has been represented at burial sites and therefore, little is known of subsistence practices. Although Early Woodland groups show a preference for the Hudson and its tributaries, the scarcity of archaeological remains would suggest that the potential for such components in Riverdale Park is low. However, evidence of both Early and early Middle Woodland periods have been recorded at several sites in the Bronx, including Kaeser and the Morris Estate Club sites. Therefore, research questions may be addressed, examples of which are as follows:

The investigation of the Kaeser site revealed that Late Archaic and Early to early Middle Woodland groups occupied different areas of the site than later groups. In addition, it was tentatively suggested that particular activities were associated with different periods (Rothschild & Lavin 1977: 21). The shell middens in Riverdale Park, although having yielded only Late Woodland material thus far, may present the opportunity to determine the spatial distribution of activities over time and between different cultural groups. In addition, research questions similar to those proposed for the Archaic Stage such as the subsistence activities, extent of occupation, and seasonality, can be applied to the Early and Middle Woodland Stage. For instance, it was suggested that although the Kaeser site represented more than just an "overnight camp site", occupation was not long-term (Rothschild & Lavin 1977: 20).

The most important development in the Late Woodland Stage is the introduction of maize agriculture, associated with the appearance of large settlements. Unlike earlier settlements, most Late Woodland sites are single-component sites with locations based on both the need for defense and cultivable land. Large village sites are completely lacking in the Hudson Valley as is information on house types, fortifications, and ceremonialism. Late Woodland components, of the East River Tradition, have been recorded in the Bronx, again, at Kaeser.

Evidence of probable East River Tradition has also been recovered from Riverdale Park, at the midden site in the southern end. Two pottery sherds were recovered in the preliminary survey that bear incised decoration, possibly East River Incised (ca.1000-1450 A.D.). The only other prehistoric artifact recovered from this site was a small, worked chert flake (see Appendix I). The presence of these artifacts raises several questions to be addressed in the limited excavation of the midden sites and are as follows:

1) Is there evidence of other activities associated with Late Woodland components that may reveal seasonality and extent of occupation? As discussed above, at the Kaeser site, hideworking, apparently associated with Late Woodland, suggests an early fall occupation.

2) Are other subsistence activities represented?

3) Is the Late Woodland occupation, in fact, associated with the middens? Brennan has suggested that artifacts found in shell middens are not contemporary with the shell in the middens but are actually intrusive from later periods when the shell is decomposed. In addition, he has suggested that lower Hudson oysters became extinct between 3,500 and 2,500 years ago when sedimentation reduced the amount of sea water in the Hudson, and thus reduced salinity below the minimum of 11 parts per thousand which is acceptable for oysters (Brennan 1974: 84). If these arguments are valid, then what were the activities of the Late Woodland groups?

The shell middens

The presence of extensive shell deposits along the ridge in the southern end, as well as sporadic shell in the northern half, presents several possibilities for investigation. Rothschild and Fenton (see Appendix I) have suggested that the varying densities of shell in Riverdale Park suggests several different occupational episodes over time rather than one continuous occupation. Rothschild and Lavin believe that the midden at the Kaeser site was "apparently accumulated by the occupation of different areas of the site at different time periods" (1977: 21). This hypothesis, of horizontal versus vertical deposition, will be addressed in the test excavation of the middens.

Historic Occupation

The preliminary documentary evidence would seen to suggest that Riverdale Park was subject to very limited activity until the nineteenth-century. The apparent unsuitablity of the land for cultivation probably contributed to its undeveloped nature until the era of the large nineteenth-century estates.

In the seventeenth- and eighteenth-centuries the land belonged to Van der Donck and then to the Manor of Philipseburg. During this period, the study area probably received little impact because by the close of the eighteenth-century the population of the entire Bronx was only 1,781 (Stertz 1978: 18). In addition, the area would have been accessible only by boat or foot paths because the closest road was the eighteenth-century Post Road (Broadway), a considerable distance to the east.

The only known historic activities, from the research conducted to date, under both of these systems were farming and raising livestock. The main centers of population through these periods were Morrisania and Westechester, both to the southeast of Riverdale.

George and William Hadley, the late eighteenth-century landowners, as farmers, may have practiced agriculture on their land but, again, topography in the park, would have made farming a difficult venture. Although there is evidence for plowing in the northernmost section, it is confined to a small area and suggests household gardening, probably associated with later occupation under one of the nineteenth- or twentieth-century estates. In addition, the deeds for George Hadley's property describe it as undeveloped land (Kornfeld & Kornfeld 1981: 77).

Nineteenth-century land use appears to have been concentrated in the northern half of the park, above the private property. The only known historic features in the southern half are the lime kiln, a possible stone wall foundation, a large depression, and an historic midden, all in the same general area. The research questions regarding the historic resources will then focus on specific sites in each half of the park.

Historic resources in the southern section of the park

The remains of a lime kiln are evident in the southern section of the park above the railroad tracks or what was once the original shoreline of the Hudson River. The documentary research conducted to date has not yielded information concerning its ownership or origin. It has, however, been suggested that it was built in the early eighteenth-century and, as such, is one of the earliest examples of commercial activity in the Riverdale area (Tieck 1968: 104). The fact that it is on the Delafield property and that Delafield was involved in this industry has led to the suggestion that, although it was not built by Delafield, it was operated along with his other kiln, in the 1830's (Stewart 1984: 9).

The site, as a surviving example of early industrial activity, may provide information concerning local trade and labor networks and craft traditions. In addition, its relationship to other local industries, such as tanneries and to shipping, as the principal means of transportation, may provide insights into the growth and development of commercial and industrial activities in the metropolitan region.

The significance of this site, in the context of early industry as well as Riverdale's relationship to commercial and industrial spheres, warrants further documentary research. The purpose of the research would be to establish when it was constructed and operated; to identify the owner or operator; to determine what the lime was produced for and to whom it was supplied; where the source of raw limestone was; how the finished product was shipped; and why the lime kiln was taken out of production. Sources that may contain such information include property deeds, tax records, bills of sale, advertisements, manufacturing registers, and correspondences.

Excavation will be directed toward identifying the type of lime kiln is represented and the date of construction and operation through examination of diagnostic elements of the structure (see Appendix II for descriptions) and artifacts associated with the kiln. The surrounding area will also be investigated to identify related structures/features, such as work sheds or platforms, associated with lime production, or structures to house the workers. In addition, the means of transporting the lime from the quarry and the location of the quarry itself will be investigated.

Prior to excavation of the lime kiln, all exposed elements of the structure will be mapped and photographed in order to record information that may be lost through prolonged exposure. Kilns, in general, are relatively fragile structures and require conservation measures to withstand long-term exposure (Rutch 1985: personal communication). Therefore, the issue of conservation will be addressed once the field investigation has been completed.

In addition to the lime kiln, there are two other historic features in the immediate vicinity. One consists of the remains of a partially exposed stone structure, located east of the kiln and may represent a related structure such as a shelter for the kiln operators. Therefore, the field investigation of this feature will be directed toward locating the remainder of the structure, determining its function, and whether or not it is associated with the operation of the kiln.

The second potential historic feature is a large depression, possibly a cellar hole, also located east of the kiln. This feature will be investigated to determine its function and potential relationship to the stone structure and lime kiln.

Historic resources in the northern section of the park

Documentary evidence indicates that this section of the park belonged to several estates throughout the nineteenth- and twentieth-centuries. The research conducted, thus far, has highlighted the major land owners but there are short periods for which ownership and occupancy is unclear. To achieve an unbroken succession of occupancy would require extensive review of appropriate documents. However, such in-depth research is beyond the scope of this project but should be conducted prior to a final clearance to proceed with the proposed restoration program.

A review of the maps of Westchester and the Bronx revealed the existence of several structures possibly located within the park.

An 1868 Beers map of Yonkers indicates the existence of a lime kiln with a structure to its east. This is probably the kiln that Delafield built with the "Canal House". The other kiln is not indicated. Also on this map is a brick structure with an encircling drive belonging to John Mott, the only reference we have found to this individual. No outbuildings are indicated.

An 1873 Public Parks map of Westchester County shows three structures, in all likelihood, the same three on the 1868 map.

On an 1888 Robinson map the property with this dwelling is owned by Samuel Thompson. The 1897 Bromley map indicates Percy R. Pyne as the owner.

A review of the 1924 Bromley map of the Bronx indicated the possibility of five wooden buildings in the vicinity of Dodge Lane. Four were listed as one story structures and one as a one and one-half story structure.

Map references to structures within the study area must be regarded with caution. The maps cover large areas and are not meant as property maps. Thus, attention to such details as the precise location of buildings and private roads cannot be assumed. The remains of these structures, aside from the kilns and Canal House, may not actually be on the park property but may appear so on the early maps. Additional documentary research would be required to establish whether or not they were, in fact, within the park. At present, there is no surface evidence of their existence.

Several other structures do exist in the northern half of the park that were not indicated on the maps reviewed during research. These include a stone stairway leading from the edge of the ridge to the shore, a cement/concrete building foundation, and a brick oven. In addition, there are two retaining walls at the edge of the ridge, one is dry-laid and the other is cemented, cut-stone. There are also three dry-laid stone walls.

The stairway and cut-stone retaining wall are believed to have been constructed by Perkins and resemble similar stonework on the Wave Hill complex (Peter Sauer 1985: personal communication).

The building foundation has been identified as a one-story brick building with pitched roof and adjoining shed built by Darwin Kingsley in 1923. Apparently, it was built on the remains of an 1877 fruit storage shed erected by Robert Colgate. The new building functioned as a tool storage shed with goats penned in its easterly section (Kornfeld 1983).

The brick oven was believed to have been part of a building no longer in existence (Peter Sauer 1985: personal communication).

The three dry-laid stone walls are presumed to have been walls dividing the properties of estates belonging to Delafield, Spaulding, and Appleton (Stewart 1984).

These historic structures and features present several research issues to be addressed in this study. The first, and most obvious, is to identify the date of their construction and use and their function. From this descriptive information it then may be possible to explore broad questions.

For instance, were estate grounds shared by neighbors or was activity confined to individual properties?

What does the function and use of the structures and properties reveal about domestic activities: For example, were the estates self-sufficient or did they depend on merchants for supplies?

Were the historic occupants engaged in commercial activities and what was the nature of these endeavors? Delafield operated a quarry and at least one lime kiln and housed the superintendant of this operation. Did other residents engage in similar industrial or commercial activities?

better answered by good historical research

Each of the historic structures will be investigated in relation to specific questions. The following is an outline and brief description of each of the known sites.

A flagstone foundation is visible on the surface, just south of Dodge Land. This is apparently the site of the Canal House, discussed in Section III, which has been described as the housing for the superintendant of the Delafield quarry. The flagstone surface may actually be part of a patio associated with a dwelling.

The first issue to be addressed is to locate the remainder of the structure and to determine its relationship to this "patio". If the structure is intact then the next step is to determine whether it is, in fact, a domestic dwelling belonging to Delafield's employee. This can be accomplished several ways, including the testing of foundation trenches, associated features, and deposits, if they exist.

If the testing of this site reveals intact deposits and features, there are a number of research questions that may then be addressed in further investigations. These include determining the social and economic status of the occupant/occupants; the number and relationship of the occupants; domestic and social activities; and, the time range of occupation.

historical research

In the immediate vicinity of this structure are additional evidences of historic land use. One is a partial stone foundation wall and what appears to be an adjoining square stone feature. The other is a large rectangular depression, possibly a cellar hole. These features may be elements of the same occupation or related activity as the flagstone foundation. Therefore, the investigation of these features will be directed toward identifying their function, date of construction and use, and relationship to the flagstone foundation.

The concrete foundation believed to be the Kingsley tool shed, located in the northernmost area of the park, will be investigated to determine the function and use of this site. For instance, the soil evidence suggests plowing in this vicinity. Is this activity associated with this structure? In addition, are there remains of the earlier structure built by Colgate?

The brick oven, located north of the concrete foundation, will be investigated to locate the structure once associated with it. At present, there are no visible remains on the surface, therefore, this will be the first task. The investigation will be directed toward determining the

date and function of this structure.

The remaining structures including the property walls, the stone stairway, and retaining walls will be recorded and the surrounding areas investigated for associated remains. For instance, the stone stairway may represent either a passage to the waterfront or may be part of a recreational complex. The retaining walls may have been constructed in areas where estate grounds were developed for recreational or domestic use.

The research potential for each of these sites may certainly be developed and expanded with the information gathered in the field investigation. At present, these sites will be explored with the most basic issues such as identification as the focus but the broader issues will be tested if the data is available.

V. FIELD INVESTIGATION

The purpose of the field investigation is to locate, identify, and document the archaeological resources that may be impacted by the proposed replanting and restoration program. This investigation will be directed toward the research issues outlined in Section IV.

One of the major concerns is to achieve this goal with minimal disturbance to the resources while still obtaining sufficient data to address the research questions and to assess the integrity and significance of the resources. Therefore, the field survey will incorporate several methods of investigation outlined below.

Methods

The presence of prehistoric and historic archaeological resources and the necessity for exploring previously untested areas requires the employment of several different survey methods. These include shovel test surveying; the excavation of a limited number of units; test trenching; and subsurface probing. The specific application of these methods is described under the following subsection entitled Strategy.

The shovel test survey is designed to locate potential archaeological in untested areas of the park. Here, the term is applied to small shovel excavations, measuring approximately 18 inches in diameter. The tests will be excavated by natural levels to sterile subsoil. Testing will be conducted on a grid system, varying throughout the park (for details, see Strategy subsection). All excavated soil will be screened through 1/4 inch mesh and all artifacts bagged by strata. At least one soil profile will be drawn for each test.

The excavation units are designed to retrieve information about archaeological resources suspected to be significant, under stratigraphically controlled excavation. As a rule, the units will be three square feet in size. (The size chosen for the units was based on the time it will take to complete such a small unit: no more than two days. An excavation exposed longer than this runs the risk of looting, given the almost complete lack of security for the park and the evidence for such abuse in the recent past.)

The units will be excavated to sterile subsoil and all soil screened through 1/4 inch mesh. Artifacts will be bagged by strata. Soil and flotation samples will be collected where appropriate. Soil profiles of each wall of the unit will be drawn and photographed. Formal planviews will be drawn as required.

Test trenching, in general, will be employed in the investigation of historic structures and/or features for the purpose of recovering information from building foundation trenches and exterior and interior deposits. It is designed to cover a larger area than an excavation unit but is essentially the same type of stratigraphic excavation. The size of the trenches will vary depending on the resource under investigation.

All soil will be screened through 1/4 inch mesh and all artifacts bagged by strata. Soil profiles will drawn and photographed for each wall of the trench. Formal planviews will be drawn as neccessary.

Subsurface probing will be used in areas where historic structures are indicated in the documentary research or are suspected based on the presence of visible historic remains. Probing will be conducted within grid squares for control. Buried historic structures will then be tested with trenches.

Strategy

The park has been divided into six study areas based on the background information and physical evidence (see Figures 2-4). The diversity of identified and potential archaeological resources necessitates the employment of this strategy as a management tool to adequately address the research questions and purposes of the survey in terms of identification and documention of the resources. Each study area presents a somewhat different set of problems to be managed such as a combination of prehistoric and historic evidence or the presence of and indication for extensive historic land use.

The potential questions proposed in Section IV and the field methods discussed above are applied to each study area where appropriate, depending on each unique set of problems. They are not restated here but are implied by the kinds of archaeological resources under investigation. The following is an outline of the strategies to be applied to the six study areas.

Study Area 1

Study Area 1 is in the southernmost part of the park (see Figure 2). This area contains several features that define it is as a study area. These include the presence of shell middens along the pronounced ridge that runs the length of this area; the relatively undisturbed nature of the terrain; and the presence of historic structures. This section does not include the low-lying area bordering the railroad tracks.

This area exhibits a high potential for prehistoric remains based on the presence of shell deposits and the evidence recovered in the preliminary study by Rothschild and Fenton. Therefore, a shovel test survey will be conducted at a grid interval of 50 feet to locate additional resources. As need arises, additional tests will be excavated to further define a particular find.

With the presence of cultural material in the shell middens established, the goal in the present study is to define the perimeters of the site, the cultural association, integrity, and significance of the remains, in terms of the proposed questions. Therefore, the investigation of the shell deposits will require the excavation of at least eight 3 feet by 3 feet units to retrieve information under stratigraphically controlled conditions.

Included in this area are the remains of a lime kiln, described in Appendix II. The investigation of this site will include testing of the interior of the structure to locate diagnostic elemnts to determine the

type of kiln represented here. The stone walls on the bank above the kiln will be exposed to identify the relationship to the kiln itself and their function. Limited testing will also be conducted to determine the method and date of construction. In addition, the surrounding areas will be investigated by probing and possibly trenching to explore the potential for associated features and structures. [depth of trenches + size]

The stonework, east of the kiln, will be exposed and tested to determine the function of the structure, the possibility of its association with the kiln, and when it was contructed and used. [how?]

The large depression will also be tested with a small excavation trench extending from the exterior to the interior to determine what it represents, when it was used, and its relationship to the other historic elements in this general vicinity. [grid]

The historic midden south of kiln will be tested with approximately two 3 feet by 3 feet excavation units to determine the stratigraphic integrity, date, and cultural association of the site. [why not with shovel tests?]

Study Area 2

This section is defined by the virtual absence of a definable ridge, the relatively undisturbed nature of the soil, and the apparent absence of historic resources (see Figures 1 & 2). It is now covered by an "oak forest". In addition, scattered prehistoric artifacts have been recovered on the surface. These finds and the apparent absence of intrusive activity suggests a potential for intact prehistoric remains.

In order to ascertain the presence of archaeological remains a shovel test survey of this area will be conducted. The tests will be excavated at a grid interval of 75 feet with additional tests as required to identify or determine the significance of a particular resource. [# of tests]

Study Area 3

This area is defined by the relatively wide, prominent ridge, the presence of several elements including Dodge Land and a flagstone surface, and the possibility of buried historic structures, as indicated by the map research (see Figure 2).

Subsurface probing and test trenching will be conducted to establish the presence of these structures and associated features. Probing will be conducted systematically in large grid squares. Structures located in this manner will then be cleared and tested. [be specific]

The site of the flagstone surface and nearby stone wall will be explored through the combined use of subsurface probing and test trenching to locate the remainder of these structures, and to address the proposed research issues relating to their function, time of construction and use.

The presence of historic structures and use of this area as estate grounds does not necessarily rule out the possibility of intact prehistoric remains. In fact, there are traces of shell eroding out of the edge of the ridge, possibly associated with prehistoric occupation. Therefore, a shovel test survey will also be conducted in this area, at intervals of 100 feet. Shovel test will be excavated at an interval of at least 30 [how many?]

feet along the ridge itself. Shovel testing may also aid in locating historic elements not recovered in the probes.

Study Area 4

This study area is defined by the presence of the ridge surrounding Alderbrook and the apparent absence of visible and documented historic remains (see Figures 2 & 3). Although this area was also part of several estates, there is the potential for prehistoric remains.

Alderbrook, once a large stream, would have been a source of fresh water and as such, may have also attracted game. The ridge is relatively high above the river, providing both good visibility and some protection. Idt overlooks a fairly large area that was once a swamp or mudflat, abundant in plant and animal resources.

how many tests

Therefore, a shovel test survey, at 50 feet intervals, will be cinducted on the ridge and in the low-lying area just above the wetland. The purpose is to locate and define potential prehistoric resources in terms of cultural association, integrity and significance.

Study Area 5

This area is located in the northernmost end of the park and is defined by the presence of several historic elements as well as scattered prehistoric artifacts. The historic resources include the retaining walls, the stone stairway, the concrete foundation, and brick oven. The prehistoric resources include a quartz biface and mammal bone fragment recovered in a surface inspection of the severely eroding slope. There are also traces of shell in this area.

how many tests – be specific

The presence of the historic structures and suspected land use may not have adversely impacted potential prehistoric remains. Therefore, a shovel test survey, at intervals of 75 feet, will be conducted. Where shell is visibly eroding out of the slope several how many 3 feet by 3 feet units will be excavated to determine the integrity, significance and cultural association of the suspected resources.

The concrete foundation will be tested with a small excavation unit in the interior to determine if there are any remains of the original Colgate structure and may also indicate the use of this building. A trench will also be excavated outside this structure for the same purpose.

The site of the brick oven will be investigated to locate buried remains of the associated structure and to address the proposed questions relating to function, date of construction and use. This will involve subsurface probing and possibly test trenching, if warranted.

Study Area 6

This section represents the low-lying area that extends nearly the entire length of the park along the railroad tracks (see Figure 3). This area is defined by the fact that it has received, for the most part, extensive disturbance by the construction and maintenance of the railroad. The original shoreline is difficult of define from the historic maps but it is clear that extensive filling in of marshes took place to establish the trackbed.

how many?

Therefore, there will be very limited shovel test investigation of this area. Tests will be placed sporadically, depending on the extent of visible damage to the area under investigation.

Field Recording

All excavation will be recorded on field forms, copies of which are in Appendix III. Two different forms will be used, one designed to record information from shovel testing; the other to record information from excavation units and test trenches.

Shovel tests will be labelled sequentially with numerical designations (ST 1, ST 2). Excavation units and trenches will be designated with a capital letter (EU A, EU B). A sequential catalogue number will be assigned to each shovel test and to each stratum in an excavation unit for the purpose of maintaining data control. The catalogue system is designed as a tracking system, not as a stratigraphic recording device.

In general, all excavation will proceed by natural level or stratum and will be assigned sequential stratum numbers within that unit. An alphabetic designation will also be assigned for consistency when excavation proceeds by arbitrary level. This will be done only to maintain temporal and spatial control in strata that extend beyond .5 feet in depth. For example, the first stratum will be 1a; the second, 2a; and an arbitrary excavation of stratum 2 would be labelled 2b. Elevation and provenience of each stratum will be recorded on the planview grid on the unit form.

Shovel tests will also be excavated stratigraphically and all material bagged by strata but will only be assigned one catalogue number. Elevations will be recorded on the profile grid on each form.

Provenience for individual artifacts will, in general, only be recorded for those retrieved in excavation units and will usually apply only to prehistoric artifacts for which such information may be critical to analysis and interpretation. These artifacts will be bagged individually with provenience information recorded on each bag.

At least one profile will be drawn for each shovel test. Profiles will be drawn of each wall in an excavation unit. Opening planviews of each level of excavation will be drawn on the field forms. Additional formal planviews will be drawn, as needed, on graph paper.

Black and white photographs will be taken of each profile in an excavation unit. Color slides may also be taken given the availability of another camera. Photographs of particular deposits, strata, features, and structures will be taken as needed. The camera currently available to this project is a Minolta X-700 with a 49mm lens.

Topographic maps of Riverdale Park have been provided by Ian McHarg, the landscape architect, and the Bronx Parks Headquarters. These will be used as site maps to which the location of all excavations and structures will be added.

The location and elevation of all excavations, features, and historic structures will be recorded to be plotted on the maps. A Zeiss EDM 42R infrared beam transit will be employed for this purpose. This service is being supplied by Greenhouse Consultants, Inc. of New York. In general, an site grid will be established for the park and all points of interest will then be located in relation to this grid and recorded in grid coordinates. All measurements taken in the field will be recorded in feet and tenths of feet for compatibility with the transit.

All excavation that is conducted prior to the transit survey will be marked with permanent stakes, including a datum stake for recording elevation. For the remaining areas that have not been investigated prior to the transit survey, a grid system with permanent stakes will be established with the transit for all necessary measurements. The intervals at which the stakes are placed will depend on field conditions and the field strategy to be employed in a particular area.

VI. LABORATORY PROCEDURES

This section is a brief description of the procedures to be followed in the laboratory and covers only the steps to be taken for preparing the collection for analysis. The proposal for the analytical and interpretative tools to be used is not included in this report. As stated earlier, this will follow in a separate document.

All archaeological material retrieved in the field testing will be processed in the laboratory at Wave Hill. The general procedures include washing, numbering, sorting, and catalogueing but do not include conservation measures. Artifact conservation will be handled only in emergency situations and will require outside assistance. For several reasons, this project is not equipped to manage the conservation efforts that the collection will ultimately require. The first, and most important, consideration is that conservation should be undertaken only under the advice and/or supervision of a professional conservator, not presently available to this project. Secondly, such conservation measures require the use of chemicals for which proper ventilation and storage is required. Wave Hill does not, presently have such facilities. Therefore, the necessary conservation efforts, although not addressed at present, will require future attention by this project.

All artifacts will be washed with the exception of those materials for which washing will be harmful. These will, instead, be dry-brushed and include most metal, some construction materials, and some organic materials.

The numbering of artifacts will follow the same guidelines as washing. Only those artifacts that will not be adversely affected will be numbered. The site number, assigned by the New York State Historic Preservation Office and the catalogue number will be used as the identifiers.

All artifacts will be tabulated. At present, a consultant, Jed Levin, is devising a system of computer codes to be used for the artifact inventory that will be compatible will the requirements of the project in terms of data analysis. Details of this program will be included in the report on data analysis and interpretation.

Until the computer inventory is completed the artifacts will be rebagged after washing and numbering. They will be sorted into categories based on type of material, not functional categories. Therefore, the artifacts will sorted into ceramics, glass, pipes, lithics, and so on. Sorting by functional category would be premature without the benefit of analysis.

VIII. CONCLUSION

This report is a documentation of the results of the literature research to date and the proposed research strategy for the archaeological field survey.

The purpose of this phase of the project was to determine the cultural sequence of Riverdale Park in order to formulate a research strategy for the field investigation. The goals of the field survey are to assess both the archaeological potential of the site and the integrity and significance of the resources.

The results of this project will form the basis for the management plan for the archaeological resources in Riverdale Park. The kinds of management to be recommended will depend on several factors including the integrity of the resources themselves and the proposed plan for the restoration program. Those resources that are in immediate danger of destruction through erosion will receive priority in the management plan.

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APPENDIX 1:

Summary of results of
Dr. Nan Rothschild & Mr. James P. Fenton's
RIVERDALE PARK SURVEY

The following is a summary of the results and recommendations presented in the report on the preliminary survey of Riverdale Park, conducted by a team under the direction of Dr. Nan A. Rothschild and Mr. James P. Fenton.

In November 1984 Rothschild and Fenton conducted limited test excavations in Riverdale Park in order to assess the importance of the archaeological sites within the park. The study was funded by the New York City Department of Cultural Affairs.

In order to locate and identify areas of human occupation, a strategy of field walking and limited, small test excavations was undertaken. The crew systematically investigated the entire park by walking along transects across the width of the park and then combing their way up the length, covering all but the most inaccessible of areas such as those covered with dense undergrowth. Through this method, a total of five areas were discovered and designated as potentially important sites.

Subsurface testing of each of the designated sites consisted of a number of approximately 1 foot by 2 foot shovel tests. All test pit investigations proceeded by natural level down to sterile subsoil.

Located at the extreme south of the park, on a heavily eroded, steep-sided promontory, Site One is an area of extensive oyster shell covering approximately 4,30 square feet. Clear distinctions in soil stratigraphy and the discovery of particular artifacts has led to the interpretation of two separate cultural components.

The recovery of industrial slag, coking fuel, wire nails, broken beer bottles, rifle-shells, and a railroad spike has been attributed to the Euroamerican component. Rothschild and Fenton believe the relative scarcity of these artifacts, though, seems to indicate intermittent use as a dumping ground and recreational area during the nineteenth- and twentieth-centuries.

The prehistoric component is represented by a large amount of oyster shell which has been interpreted as the remains of aboriginal foraging activity. Additionally, Rothschild and Fenton believe that the varying densities of shell suggests many occupational episodes over a number of years, rather than a single, continuous occupation.

Other prehistoric artifacts that were recovered include one small, worked chert flake and several pottery sherds. Two of the sherds, and possibly a third, bear incised decoration. Rothschild and Fenton suggest a possible association with the East River Incised Type, ca.1000-1450 A.D.

Stratigraphically, Site One is defined by three levels. The first stratum is brown/black humic layer varying in depth. It was in this uppermost level that the oyster shell concentration and the nineteenth- and twentieth-century artifacts were recovered. The second stratum, a gray/brown to yellow/orange silty sand, yielded some oyster shell as well as pottery and a single lithic. The third and final stratum was the sterile subsoil, a yellow/orange sandy soil.

Site Two is located in the southern third of the park, adjacent to the railroad tracks and consists of the remains of a lime kiln and adjoining stone wall. Rothschild and Fenton have proposed that the kiln was out of use by the time the railroad tracks were constructed because the river-side docking facilities would no longer have been accessible.

Three shovel test were excavated to investigate this area; one was placed inside the kiln remains, one outside the kiln and adjacent to the stone wall, and the third was placed slightly south of the structure. The kiln test pit yielded only Euroamerican artifacts including several pieces of modern bottle glass. The stratigraphy encountered consisted of approximately one foot of a powdered brick/brown sandy soil followed by at least one foot of gray lime/powdered brick/dark sandy soil.

The shovel test adjacent to the stone wall consisted of the removal of a black loam and an underlying lime and mortar matrix. This, in turn, overlaid a possible stone wall buried to a depth of 7 inches. The only artifacts recovered from this test were late twentieth-century glass, indicating recent recreational use of this area.

Only the shovel test located slightly south of the structure contained possible prehistoric artifacts; a large amount of oyster shell and several fragments of fire-cracked rock. Euroamerican artifacts of ceramic and brick were also recovered here.

Rothschild and Fenton recommended further investigation in order to determine the duration and time period of the prehistoric occupation in the area south of the kiln as well as further investigation of the kiln.

Site Three is located near the middle of the park, in what is labelled the "oak forest". Although stone tools had been discovered here prior to the survey, no artifacts were recovered from the three test pits. Recommendations were made for further investigation of this area based on the previous recovery of lithic material. Stratigraphy of the area indicates a dark sandy loam, followed by a yellow/orange sandy silt.

Site Four is located in the central portion of the park, near the end of what was once referred to a "Delafield" or "Dodge Lane". Two shovel tests were excavated; one in a large rectangular depression thought to be the remains of a house cellar; and one nearby. Excavation in the depression encountered a thick layer of ash with slate, coal, slag, and glass. It was suggested that this feature may represent a storage shed which had burned down or perhaps a cellar filled with wood ash and other household debris. Four pieces of glass, one of which shows evidence of intensive burning, and some ceramic and plaster fragments were recovered from this test.

The second shovel test uncovered a paved area of large stone slabs and, adjacent to it, a rusted iron pipe. Rothschild and Fenton believe this may represent the sole structural remains of either a farm outhouse or possibly a small tenant house. Further investigation of the site was recommended.

Site Five is situated on the western edge of a relatively wide and flat promontory in the central third of the park. The site is defined by the

visible presence of oyster shell on the surface, an area of approximately 200 feet by 30 feet in size. Nine shovel tests were excavated across the site, seven of which encountered oyster shell, varying from a high concentration to a "light scatter". Fenton and Rothschild propose that the varying amounts and occassional absences of oyster shell throughout the area suggests a number of discrete, horizontally stratified occupations rather than one long, continuous occupation.

Three of the nine tests recovered a total of eight fire-cracked rock fragments. Another test recovered a small core nucleus, the only worked stone found in this area. Probable nineteenth-century Euroamerican components of brick, glass fragments, a cut nail, and a small iron spike were also recovered from this site.

Although disturbed in some areas, the stratigraphy basically consists of a dark gray/brown humic layer that overlays a "sterile" orange/brown sandy soil. Although all artifacts were recovered from the uppermost, humic layer, in at least three of the seven tests, oyster shell was present at the interface between the first and second strata.

Rothschild and Fenton believe that the scarcity of historic remains and the presence of large oyster shell concentrations, fire-cracked rock, and a worked chert core suggests that the site may contain important prehistoric remains, offering an opportunity for a detailed study of prehistoric occupation along the Hudson Valley.

Recommendations for the further investigation of all five sites were presented. In addition, a more intensive survey with systematic random sampling techniques for the purpose of locating less visible areas of possible archaeological interest, was also recommended.

What
Provisions have been made for cataloging this collection?

This section is a description of the lime kiln in Riverdale Park, basic information regarding the construction and operation of kilns, and descriptions of lime kilns in Montague, New Jersey for comparative purposes. The Montague kilns were investigated by Mr. Ed Rutch of Historic Conservation and Interpretation, Inc. The general information on lime kilns and the descriptions of the New Jersey kilns were provided by Mr. Rutch. The information regarding the Riverdale Park kiln was obtained through initial field observations.

Riverdale Park and Montague lime kilns

Construction

The lime kiln in Riverdale Park, is a type called bank kiln. The term is applied to a kiln built into an existing slope or bank to facilitate the easy charging (loading) of the limestone to be calcined. The face of this kiln is oriented in a northwest direction, towards the river, and may have been either flat, or more likely, concave.

There are two types of early lime kilns, batch or continuous. The names indicate whether the lime was burned continuously or was loaded and burned in individual batches.

A batch, or wood-burning, kiln is indicated by a shelf in the interior, near the bottom, upon which the limestone was stacked. A wood fire burned below the lime. When the lime was calcined the wood ash was removed and the lime knocked to the bottom, also to be removed. In this way, the wood ash did not mix with the calcined lime. The burning process took approximately sixty hours and each time the process was completed the kiln was emptied and the process begun again.

In a continuous, or coal-burning kiln the interior of the throat was constricted with an iron grate at the bottom. Lime was continually fed through the kiln and when calcined, dropped through the grate to the bottom and was removed through the eye. Although this was a more efficient form, the lime mixed with the coal ash and was not as clean as wood-burned lime.

The most notable external feature of a kiln was a small opening called the eye through which a workman would enter and exit to construct the limestone arch to be burned, to load the wood and maintain the fire, and to empty the calcined lime. The lintel over the eye was constructed of either stone or iron railroad rails; the latter indicating a later construction technique.

The interior of the kiln was generally straight-walled or slightly tapered and was lined with a stone suitable to withstand the high temperatures of the burning operation. The Montague kilns, the Nearpass and Cox kilns in particular, were lined with "black rock", obtained from an Erie Railroad cut near Port Jervis, New York. The lining of the Riverdale Park kiln, on initial inspection, appears to be constructed of Manhattan schist, a locally available stone. Its interior measures approximately 10.7 feet in diameter.

Some kilns exhibit small niches located on the face near the eye that appear to be intentional construction elements. The function of these

APPENDIX II:

Riverdale Park Lime Kiln Site

niches is not known but according to Mr. Cox, interviewed by Ed Rutch, workers placed their lunches in the niches to keep them warm in the winter months.

At the base of the interior of a batch kiln is the bench which extends around the diameter of the kiln, except at the eye. The bench supported the first layer of limestone, upon which successive layers were stacked to form the arch or crown. The resultant dome, or crown, was held together or retained by a keystone at the top. Once this support was completed additional limestone could then be thrown in the throat, on top of the arch.

Operation

With the limestone crown completed, the fire was begun. According to Cox, the fire at the Nearpass kiln was started on a grate constructed of long, narrow limestone fragments placed over the bench at the eye. The fire was then pushed into the firepit and continued to burn, tended and fed by workers using "push-poles", for sixty hours. Thirteen cords of wood, which took two woodcutters ten days to cut, were required to maintain such a fire. Hardwoods were used because they burned with greater heat and less soot than softwoods.

At the Montague kilns, the fire was never begun after Thursday, which would burn until Saturday when the eye was closed. This would extinguish the fire and cool down the kiln until Monday morning, thus allowing the workers to take Sundays off. On Monday mornings the workers would empty the kiln and begin the process again.

The limestone was generally sorted at the site, into under- and overburned and dirty and clean lime. The dirty lime and wood ash was often used in agriculture while the clean lime was reserved for use in mortar or tanning (lime was used to remove hair from hides).

In the Nearpass kiln, wood was burned long after the popular and widespread use of coal. Rutch believes this may be related to the fact that wood burns cleaner than coal and produces a higher quality of lime, a necessity for the tanneries it supplied in Sparrowbush, New York, despite the fact that the tannery was supplied with only 50 bushels of the 500 bushels per batch that the kiln produced. Therefore, efficency and cost of production were not necessarily motives for changing or updating a particular system.

Documentary research on this site is currently being conducted by Mr. Larry Collorasi, a graduate student in the History Department at Lehman College, as part of a methodology study under the direction of Dr. Judd.

APPENDIX III:

Field Provenience Forms

RIVERDALE PARK PROJECT 1985

CAT. #

UNIT

STRATUM

No. OF BAGS

SOIL/TEXTURE DESCRIPTION:

PORTION OF UNIT EXCAVATED

WHOLE PART (SKETCH)

EXCAVATION METHOD:

SHOVEL TROWEL OTHER :

ARTIFACTS RECOVERED:

STRATUM ENCOUNTERED AT BOTTOM OF UNIT

ASSOCIATED FEATURES:

SAMPLES TAKEN:

SOIL FLOT OTHER:

COMMENTS/INTERPRETATION:

PHOTOS TAKEN:

ROLL/SHOT

PROFILES DRAWN:

RIVERDALE PARK SURVEY 1985

CAT.# _____

SHOVEL TEST_____ DATE_____ NO.OF BAGS_____

EXCAVATORS_____ GRID COORD_____

AREA DESCRIPTION:

ARTIFACTS RECOVERED (BY STRATA)

STRATUM ENCOUNTERED AT BOTTOM OF UNIT:

ASSOCIATED FEATURES:

COMMENTS/INTERPRETION:

SAMPLES TAKEN: SOIL FLOT OTHER:

PHOTO (ROLL/SHOT):

SHOVEL TEST DIAMETER:

PLANVIEW NO: