ABORIGINAL SETTLEMENT IN NEW JERSEY DURING THE PALEO-INDIAN CULTURAL PERIOD ca. 10,000 B.C. - 6000 B.C.

by

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Statement of Purpose

This overview of the Paleo-Indian Period of human occupation in New Jersey will define the "Paleo-Indian" concept and discuss Paleo-Indian site distribution, preservation, and protection. While focusing on evidence from New Jersey, this paper will also examine typological indications of both culture change and technological specialization derived from work in surrounding areas of eastern North America. In addition, this paper will review environmental factors which archeologists hypothesize influenced Paleo-Indian subsistence and settlement.

Paleo-Indian artifacts provide the earliest documented evidence for human occupation in New Jersey. Occasional isolated finds characterize the bulk of the area's data base. Recorded undisturbed Paleo-Indian sites yielding representative artifact assemblages are few in number. Since insufficient data limit analyses of Paleo-Indian subsistence and settlement systems, New Jersey Paleo-Indian studies have often focused on fluted point technology. The testing of cultural models derived from Paleo-Indian studies in other areas will contribute to filling in many of the present data gaps.

Protection and preservation of Paleo-Indian sites through management and research represent the only means available for investigation of cultural systems from the late Pleistocene and early Holocene periods. Potential data provided by these sites give archeologists a basis for comparing the cultural strategies of Paleo-Indian groups in different areas of North America. This will further an understanding of man's interaction with his environment not only in this one period but throughout time. Public education programs must stress that unsystematic artifact collection destroys sites and distorts the interpretation of past human behavior. Destructive practices from the private and public sectors skew the interpretation of man's impact on his environment in all time periods but especially in the Paleo-Indian where sites are so fragile and poorly known.

This presentation recommends both surveys and management/preservation of the New Jersey Paleo-Indian data base. Use of the physiographic divisions of the state serve as a starting point since the data do not suggest obvious cultural patterns which could be incorporated into management plans (Map 1). Suggestions regarding environmental features as well as types and densities of sites should serve as a basis for developing hypotheses to direct research and management of New Jersey's Paleo-Indian cultural resources.

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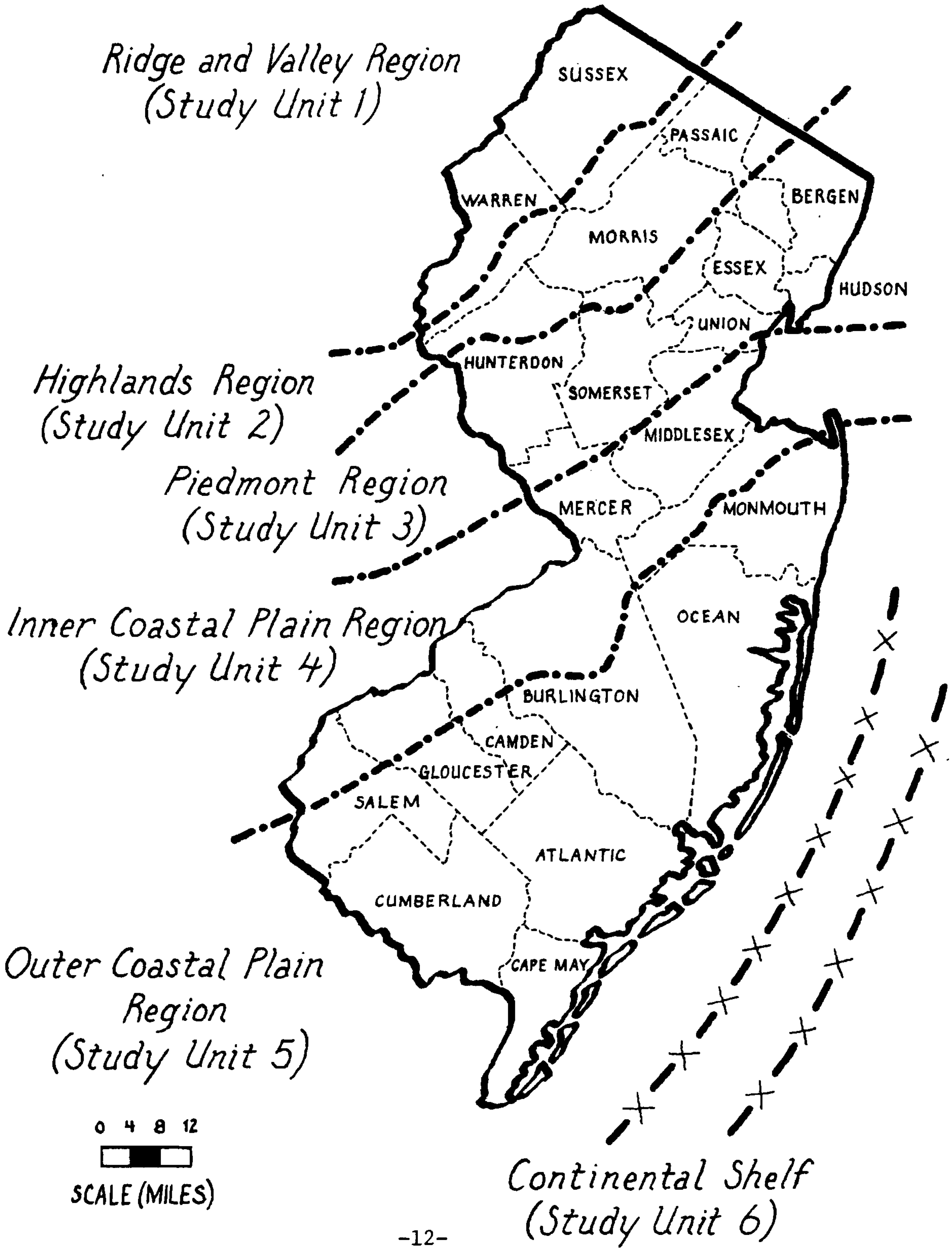
MAP 1. Physiographic Regions of New Jersey: Proposed Study Units

(Based on Robichaud and Buell 1973:32)



Introduction to the Concept "Paleo-Indian"

Paleo-Indian refers to archeological evidence of perhaps the earliest human occupations in North America. To archeologists, it suggests models of technology, chronology, and socio-cultural behavior within the context of a continually changing environment following the recession of the Wisconsin ice sheet after 13,000 years ago.

A distinctive tool kit typifies Paleo-Indian sites. A pointed, relatively thin, lanceolate-shaped implement, manufactured by fine bifacial flaking techniques (flakes removed from two sides of the artifact) represents the earliest Paleo-Indian sites (Figure I). These Clovis-like fluted points represent part of a tool assemblage which also typically includes such unifacial (flaked on only one side) tools as endscrapers and sidescrapers as well as utilized and non-utilized stone flakes. Poor preservation conditions in northeastern North America are probably responsible for the lack of bone and wood tools in association with the aforementioned stone tool types that archeologists recognize as Paleo-Indian.

The archeological record demonstrates a pattern of technological development from Clovis-like fluted points to unfluted lanceolate forms comparable to Plano point styles found in the southwest and the plains. At the stratified Thunderbird Site in Shenandoah Valley, Virginia, Gardner (1974) documents this trend from fluted lanceolate to unfluted or partially fluted trianguloid to notched points (Figure II). Point types comparable to the early Clovis points and the later Plano forms also occur in New Jersey though, thus far, in an unstratified context (for example, see Plenge Site artifacts, Figure I).

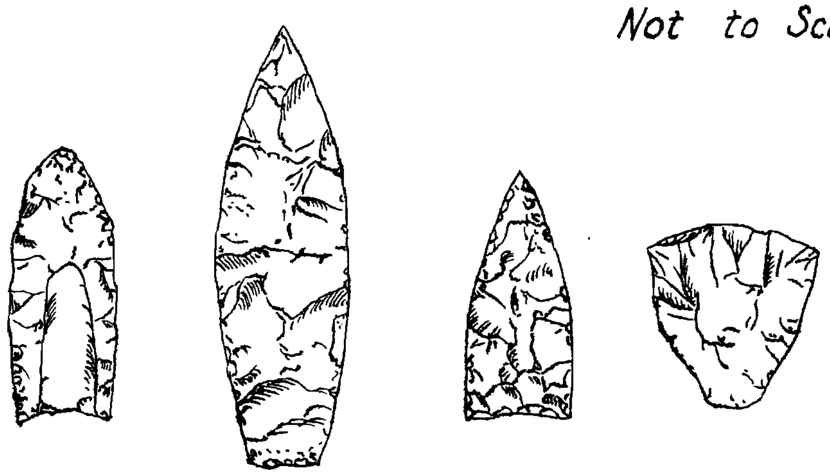
Chronometric dates, geologic context, and faunal associations place the beginning of the Paleo-Indian Period at about 10,500 B.C. (Funk 1978). It was in 1926 that archeologists first recognized the antiquity of Paleo-Indian sites based on the association of a distinctive stone tool form known as the fluted point with remains of extinct fauna at Blackwater Draw in New Mexico. The associations of cultural materials with Pleistocene megafauna at sites throughout the plains and southwestern states suggested that Paleo-Indians were big game hunters (Willey 1966:34-36). Reports of comparable point types in the eastern United States and other areas of the country, though lacking faunal association, indicated that people using fluted point technology inhabited many areas during the late Pleistocene-early Holocene time period.

Funk (1978) divides the Paleo-Indian Period into two stages. He views the Early Paleo-Indian stage as extending from about 10,500

FIG. I: SELECTED PALEO-INDIAN ARTIFACTS FROM PLENGE SITE

(Kraft 1973: 67, 68, 70)

Not to Scale

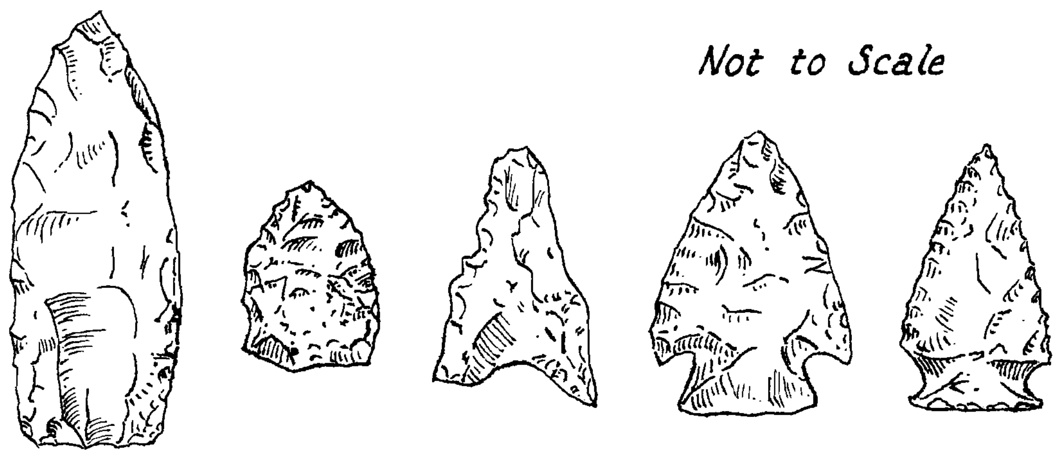


Fluted Point (Type 1c) — Unfluted Lanceolate Pt. (Type 10a) — Unfluted Triangular Pt. (Type 11a) — End Scraper (Type 23a)

FIG. II: PALEO-INDIAN POINT PHASES FROM THE FLINT RUN COMPLEX

(Gardner 1974: Figure 14)

Not to Scale



Fluted Point Phase: Clovis Sub-Phase — Middle Paleo Sub-Phase — Dalton-Hardaway Sub-Phase — Corner Notched Point Phase — Side Notched Point Phase to 8000 B.C., marked by Clovis-like fluted points and associated assemblages. The Late Paleo-Indian stage, represented by non-Clovis fluted points and a separate group of stemmed or lanceolate, usually parallel-flaked points, spanned the period 8000 to 6000 B.C.

Gardner (1974, 1980) presents an alternative subperiodization. He places the earliest eastern Paleo-Indian sites at 9500 B.C. Relying on his work at Thunderbird and other related sites of the Flint Run Complex in the Shenandoah Valley, Virginia, Gardner argues for division of the Paleo-Indian Period into two phases and then into subphases: the Fluted Point Phase subdivided into the Clovis, Middle Paleo, and Dalton-Hardaway subphases; and the Notched Point Phase with subphases Palmer, Kirk, Kirk A, and Warren (Figure II). Through this model, Gardner includes in his Notched Point Phase, cultural material which many archeologists separate as representative of the Early Archaic Period rather than as part of the Paleo-Indian Period. In this way, Gardner emphasizes his interpretation of the Early Archaic as a direct development out of the Paleo-Indian cultural period. He feels that these periods represent a continuum in cultural development. The subphase distinctions represent stylistic changes in artifacts rather than drastic indications of cultural change (Gardner 1980). Gardner places the Fluted Point Phases at 10,000 to 8000 B.C. and the Notched Point Phases at 8000 to 6000 B.C. (Gardner 1975:8).

Funk (1978) agrees that the Archaic cultures evolved from Late Paleo-Indian expressions of the southeast and midwest. In his view, the Early Archaic can be placed in time from about 8000 - 6000 B.C. The main difference between the two models presented are that Funk views the Early Archaic as a subperiod of the Archaic Period and places Gardner's Notched Point Phase within this subperiod. Gardner views Early Archaic as a subperiod of the Paleo-Indian/Early Archaic Period (Gardner 1980).

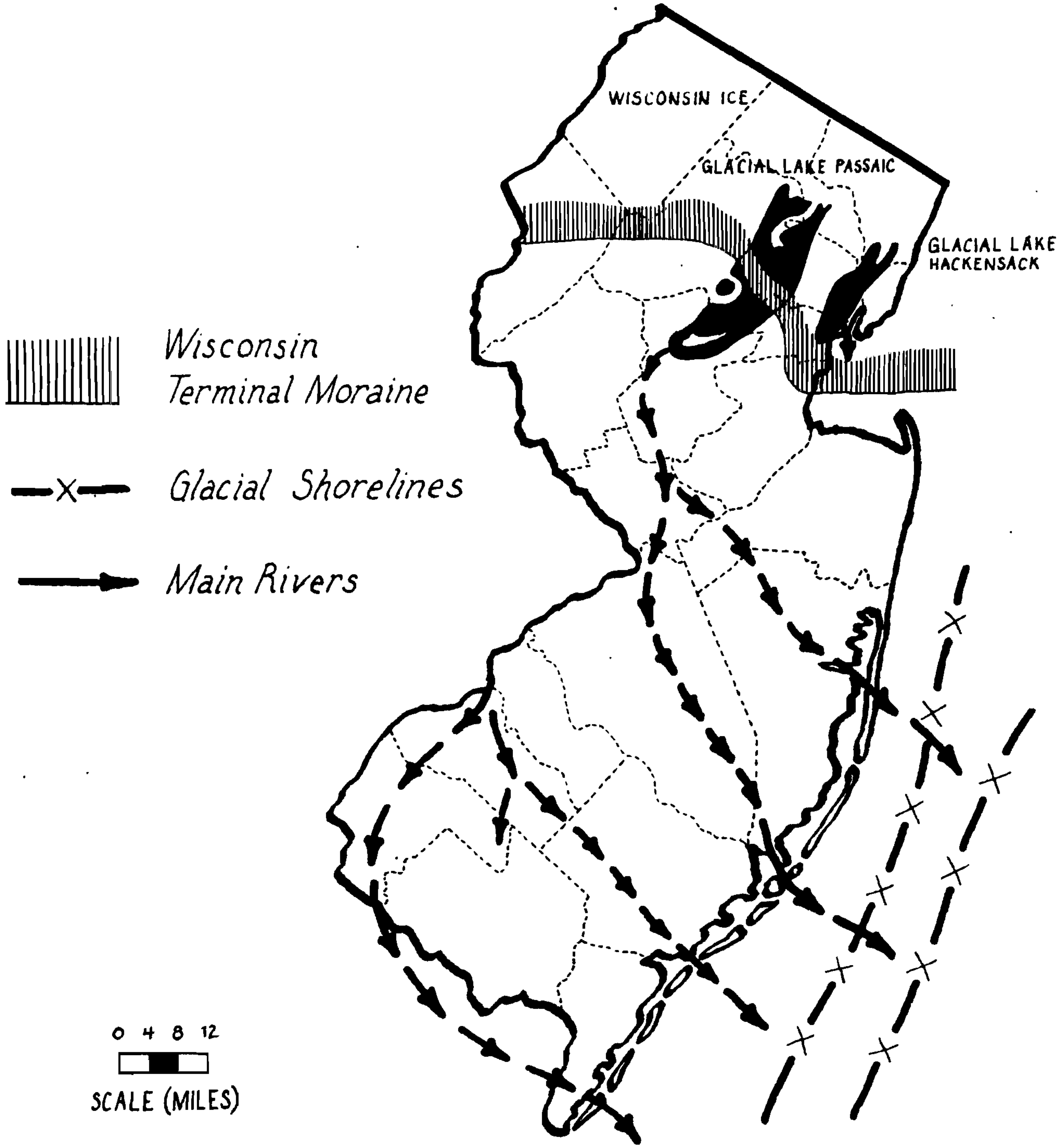
This paper recognizes that Early Archaic Notched Point forms are cultural adaptations developing out of early Paleo-Indian cultural adaptations and that these forms may in fact overlap in time and geographic distribution with unfluted lanceolate Plano-like point forms of the Late Paleo-Indian Period as suggested by Funk (1978). The following discussion will focus on cultural manifestations subsumed within Funk's Early and Late Paleo-Indian subperiods. Cultural forms placed within the Notched Point Phases of the Paleo-Indian Period by Gardner and within the Early Archaic by Funk will be discussed by Kraft and Mounier in their paper on the Archaic Period in New Jersey.

Environmental Setting

During the Paleo-Indian Period, the dynamics of the recession of glacial ice greatly affected New Jersey's environment (Map 2). The drainage of glacial meltwaters and lower sea level affected the conditions of habitable areas in the state.

MAP 2. Ice Age (Pleistocene) New Jersey

(After Widmer 1964:116)



Pollen profiles provide the primary record of the state's climatic history. Unfortunately, they exist for only a few areas, limiting the precision of climatic reconstruction (Sirkin et al. 1970; Sirkin and Minard 1972). The general pattern of ecological succession indicates a predominantly herbaceous vegetation following glaciation (i.e. sedges, mosses, and lichens), sometime around 17,000 years ago. This was succeeded by open parkland vegetation and then by mixed forest zones with pine and spruce predominating at about 13,000 years ago. The pollen profile from northwestern New Jersey suggests that about 12,000 years ago, pine predominated. Sometime thereafter, stands of birch and oak are noted. By 8,500 years ago, oak and hemlock predominated (Sirkin and Minard 1972). In central New Jersey, pine predominated sometime after 12,000 years ago. By 8,500 years ago, oak and hemlock predominated (Sirkin et al. 1970).

As suggested by pollen profiles, physiographic variation contributed to variation in the distribution of vegetation in New Jersey. Ecological succession occurred within a mosaic pattern with pockets of tundra, spruce, pine, and deciduous forest occupying microniches which provided the requisite conditions (Barber 1979; Carbone 1974, 1977; Eisenberg 1978; Marshall 1981). Tundra-like vegetation persisted in the vicinity of the end moraines at least until about 14,000 years ago (Sirkin 1977). As warming trends had their effect through time, glacial melting created dendritic drainage systems and, in some areas, lakes and swamps. Glacial Lake Passaic and Glacial Lake Hackensack were predominant features during glacial times (Map 2). Where glacial lakes once existed, marsh and swamplands developed in their places. The Great Swamp near Chatham and Troy Meadows near Whippany are remnants of Lake Passaic. The Hackensack Meadowlands are remnants of Glacial Lake Hackensack. Greenwood Lake, Lake Hopatcong, and Budd Lakes are all glacially formed lakes.

Following glaciation, soil development in the upland areas increased providing areas where vegetation could eventually take hold. Valley areas, depending upon latitude, provided microniches with dominant vegetation ranging from spruce parkland to mixed coniferous-hardwood forest to hardwood forest. It should be considered that biomass availability in valley areas would have been greater than in upland areas. Vegetative differentiation suggests that the different microniches would be attractive to different types of animal species.

Overall, animal resources potentially available for exploitation by early Paleo-Indian hunters included mammoth and mastodon, fox, fossil bear, seal, great beaver, fossil peccary, white-tailed deer, elk, moose, bison, horse, and caribou (Ritchie 1969: 10-11; Funk 1972; Eisenberg 1978). Distribution of these animals as well as exploitable vegetation would have depended greatly on physiographic and climatic features throughout the region. Barber (1979) summarizes evidence indicating that mammoths, primarily grazers, preferred grassy portions of tundra-like or parkland environments while mastodons, more generalized browsers, preferred more wooded spruce dominated zones. This would suggest that mastodon might have been available in valley zones; while, mammoth would have been found at higher elevations perhaps near bogs and swamps where tundra-like vegetation persisted longest (Sirkin 1977).

Contemporaneity of early Paleo-Indian hunters (Map 3) and these animals has been established by radiocarbon dated remains of the megafauna excavated from areas in northern New Jersey, New York, and Pennsylvania (Map 4). For example, the Bojak Mastodon from a site near Liberty Township, New Jersey yielded a date of 10,995±750 B.P. and the Highland Lake Mastodon from Vernon, New Jersey yielded the date 10,890±200 B.P. (Kraft 1973:63). Megafauna remains have also been dredged from the submerged Outer Continental Shelf (Map 4) (Edwards and Emery 1977; Edwards and Merrill 1977; Whitmore et al. 1967). Direct evidence of hunting activity focused on these megafauna by Paleo-Indians is lacking. Extinction of mammoth and mastodon certainly occurred by 10,000 years ago.

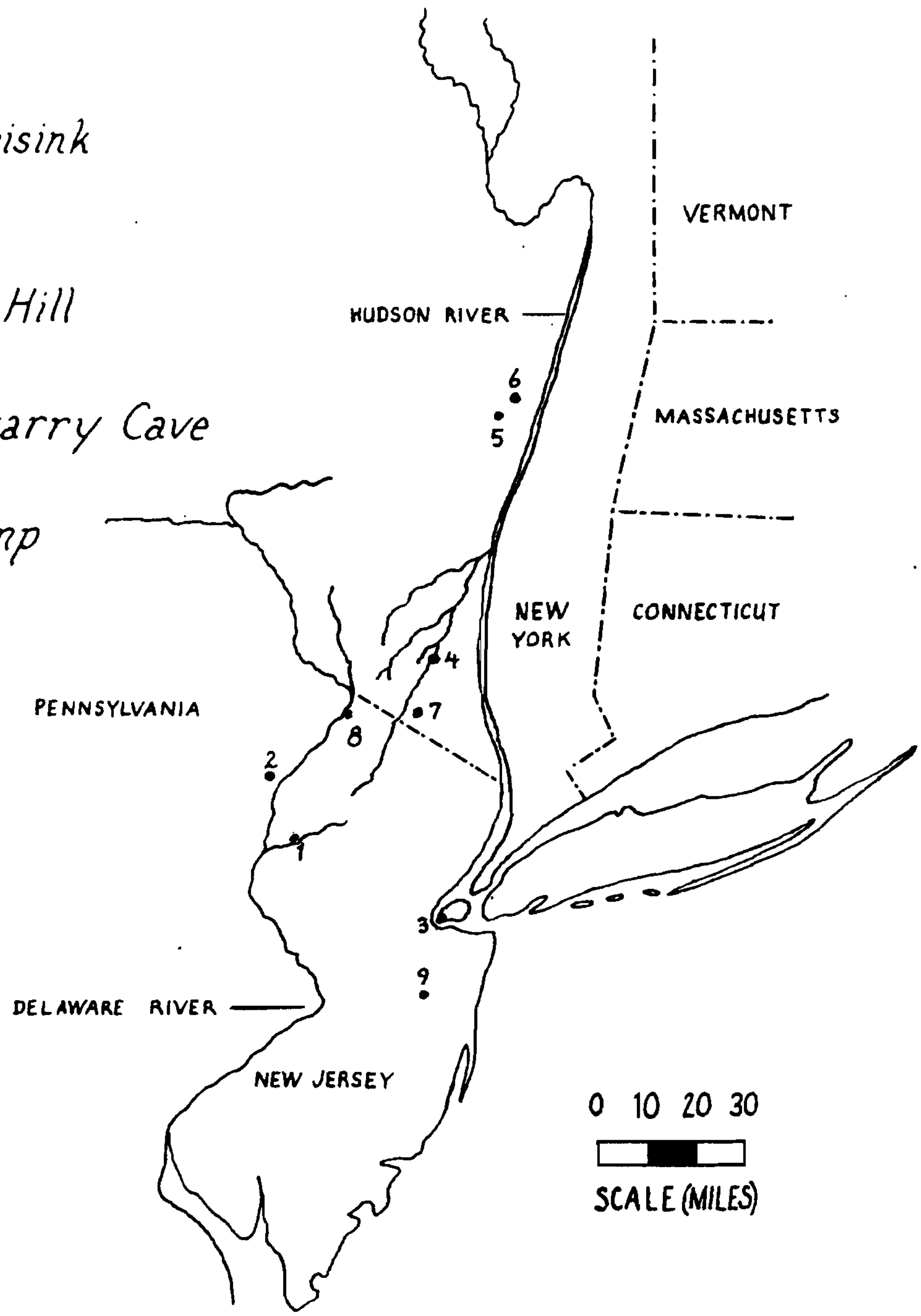
In the late glacial or early postglacial period, the range of caribou herds extended at least as far south as Orange County, New York. Caribou are grazers that prefer tundra or open parkland environments. The identification of a caribou bone at the Dutchess Quarry Cave Site, dated to 10,580±370 B.C., in the same stratum as a fluted projectile point, suggests that caribou were hunted by Paleo-Indian people (Funk et al. 1969; Funk et al. 1970). The extension of caribou into the mid-Atlantic region probably continued beyond the time of megafauna extinction. As stands of oak increased throughout the area, increasing numbers of white-tailed deer were probably supported.

The question of Paleo-Indian utilization of coastal areas is complex when one considers that the lowered sea level during glaciation exposed about 100 kilometers of additional land supporting some inland vegetation such as spruce, pine and fir trees, and perhaps stands of tundra-like vegetation around swamps and in higher relief zones (Whitmore et al. 1967; Emery et al. 1967). From 15,000 to 12,000 B.P., the relative sea level rose rapidly. Deltas were inundated and formed mud flats, sea marshes, and low marshy islands. The salt water permeating these islands probably precluded the growth of tree species adapted to the climate.

MAP 3. Paleo-Indian Sites

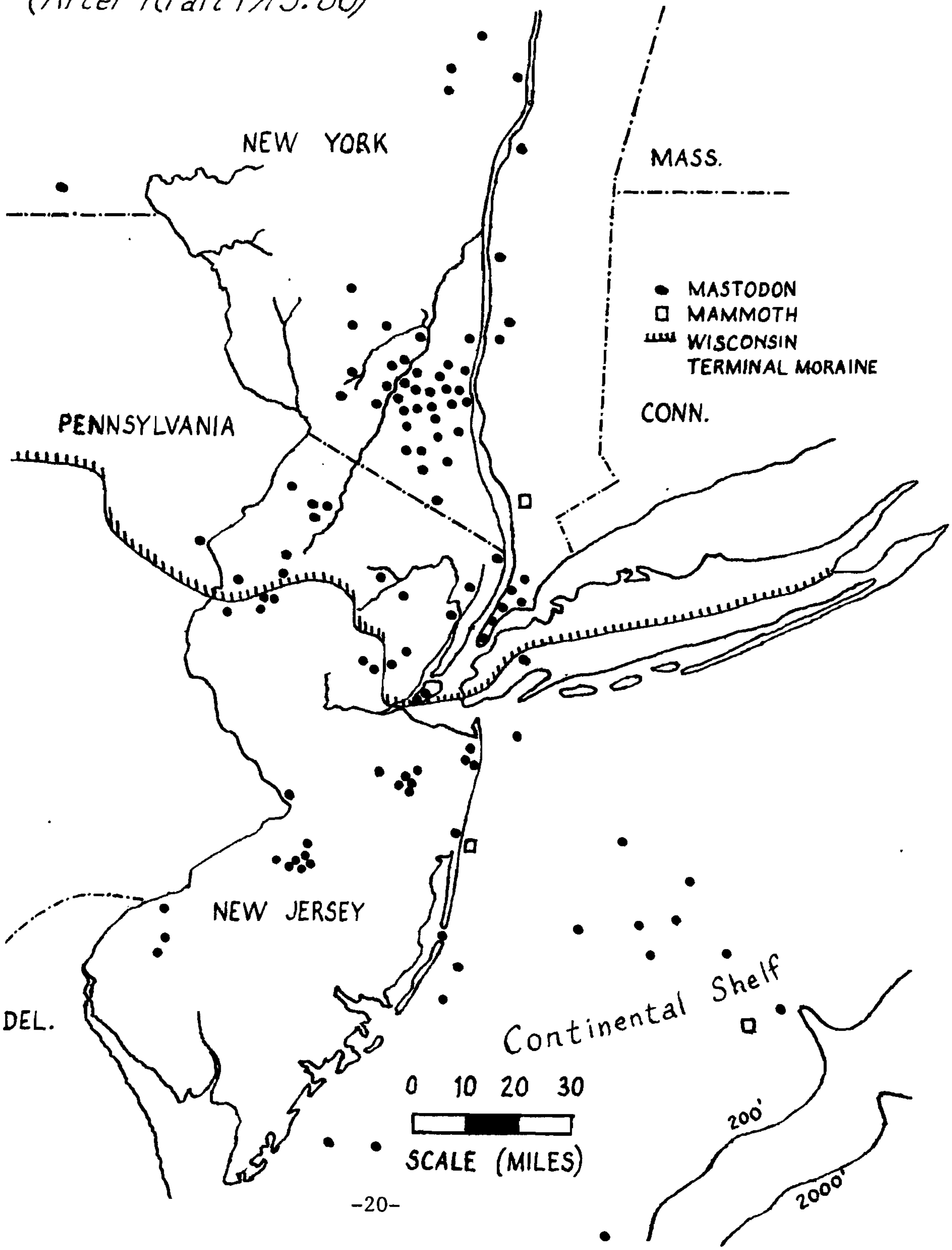
(Redrawn from Eisenberg 1978:6)

1. Plenge
2. Shawnee-Minisink
3. Port Mobil
4. Twin Fields
5. West Athens Hill
6. Kings Road
7. Dutchess Quarry Cave
8. Zierdt
9. Turkey Swamp



MAP 4. Distribution of Mammoth and Mastodon Remains in the New Jersey Area

(After Kraft 1973:60)



Coastal estuaries stretched far up major rivers and salt marshes developed along these valleys. From 12,000 to 7000 B.P., the rapid relative sea level rise continued. The development of barrier islands and spits began. The lagoons they enclosed largely replaced mainland and cliff-bank beaches. During this time, deltas disappeared completely and the coastal relief was very low. Salt marshes and mud flats became very extensive and coastal estuarine environments reached their greatest sizes. Fringing salt marshes and mud flats became much more extensive. Continued sea level rise and extremely shallow gradients produced inland shifts of environments and probably limited the development of salt marshes (Barber 1979).

Barber (1979) defines four environmental zones on the Continental Shelf: full coastal; estuarine; valleys; and uplands. The relative sea level greatly affected habitability and resource availability in these paleoenvironments. Potential resource availability changes through time in these zones. During the period 15,000 to 12,000 B.P., Barber hypothesizes low densities of fish in the full coastal zone; high densities of anadromous fish, low to medium densities of other fish, and medium densities of marine molluscs in the estuarine zones; high densities of anadromous fish, and low to medium densities of other fish in the valley zones where mammoth and mastodon would have been present; and medium densities of anadromous fish and low densities of other fish in the uplands. Mammmoth and mastodon would have also been present in the uplands.

During the period 12,000 to 9000 B.P., the full coastal zone would have been characterized by low densities of non-anadromous fish and high densities of marine molluscs. In the estuarine zones, mastodon might have been present while anadromous fish would have been present in high densities and other fish available in low to medium densities. In the valleys, there were low densities of nuts, low to medium densities of white-tailed deer, low to medium densities of caribou, high densities of anadromous fish, and low to medium densities of other fish. Mastodon might also have been present. In the uplands, low densities of white-tailed deer, anadromous fish, and other fish would be found with low to medium densities of caribou and low to high densities of nuts. Again, mastodon may have been present (Barber 1979: Table II-9).

As with the inland areas, valleys offered greater available biomass than uplands. Barber (1979) also indicates that estuaries had more resources than full coasts. Overall, the tundra, early parklands, and non-oak forests had less abundant resources than did oak forests. This suggests that as ecological succession began to include increasing stands of oak, resource availability increased as did the potential for greater human population density.

In addition to food materials, other resources may be determinants in any culture's subsistence-settlement patterning. The Paleo-Indian tool assemblage depends very much upon supplies of cryptocrystalline cherts. Gardner has found that site distribution during the Paleo-Indian Period is "restricted to some distance from outcrops or riverine deposits of cryptocrystalline material" (1980: 4). He finds this pattern repeatedly from Delaware to Florida, including Alabama (Gardner, personal communication; Custer, personal communication).

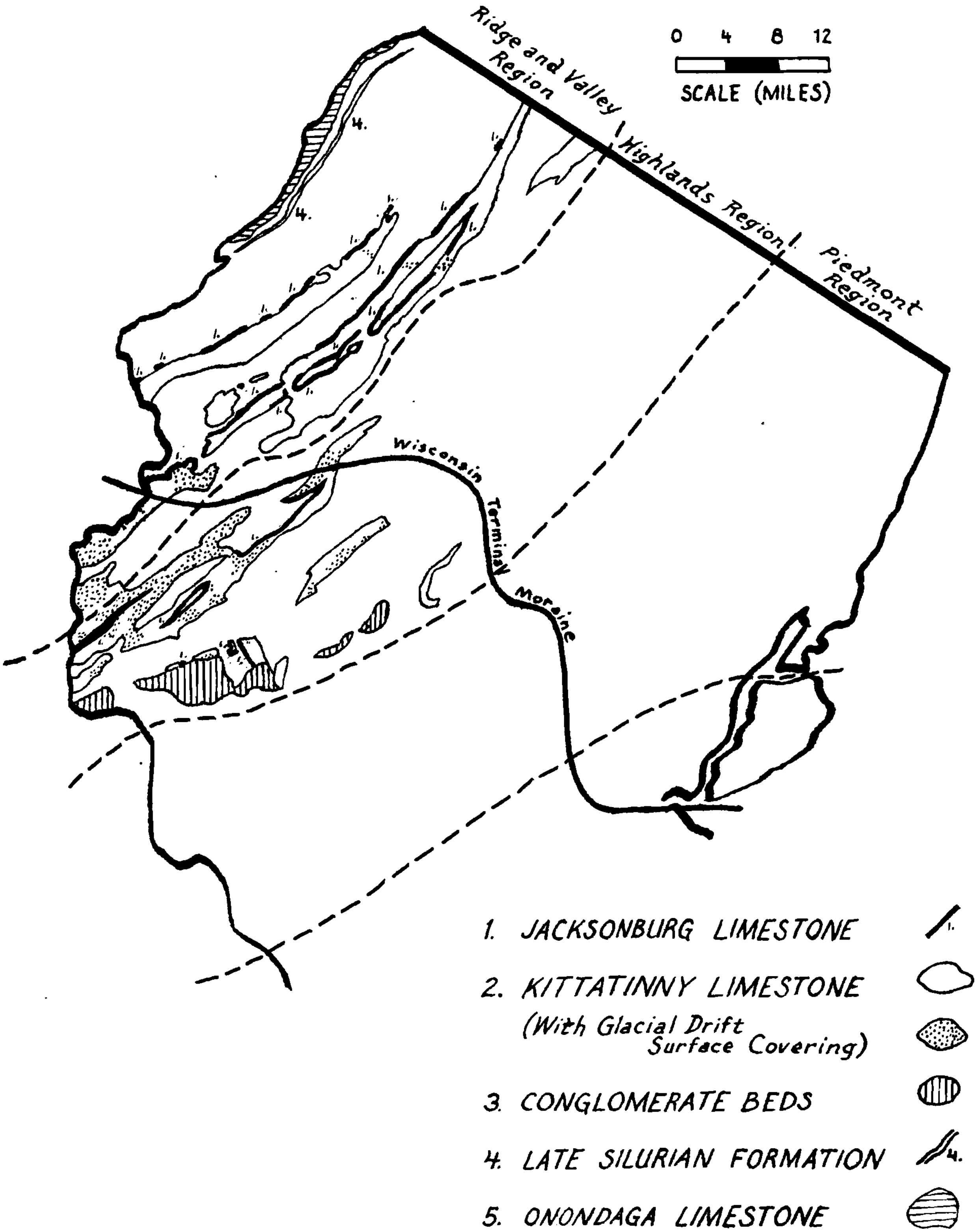
While there are no reported primary chert sources in New Jersey which archeologists know to have been used by Paleo-Indian people, there are several areas which should be investigated for possible evidence of utilization (Maps 5 and 6). In the Ridge and Valley Region, thin-bedded cherty Onondaga Limestone has been mapped under Marcellus Black Shale in the Delaware River below Port Jervis. Late Silurian formations (noted as 4 on Map 5) include limestone deposits which may contain cherty material. Jacksonburg Limestone which occurs in very thin deposits may also yield small percentages of cherty material. Upper deposits of Kittatinny Limestone which are more extensive and also occur within the Highlands Region are characterized by thin and thick gray or blue cherty magnesium limestone. In addition to the traces of Jacksonburg Limestone in the Highlands Region are conglomerate beds with quartzite or limestone pebbles in red matrix found outlying the Brunswick Lockatong and Stockton Formations (Lewis and Kummel 1910-1912). Moraine deposits from the Wisconsin and earlier glacial episodes might be potential secondary sources for chert cobbles and pebbles.

In the Outer Coastal Plain Region (Map 6), the extensive sand and gravel deposits of the Bridgeton Formation include varying percentages of pebble cherts (Harper and Widmer, personal communcation). Some of these materials may have been suitable for artifact manufacture. The more localized deposits of the Beacon Hill gravels also include some pebble cherts (Harper and Widmer, personal communication; Owens and Minard 1979). Considering that Cavallo (1978) reports the presence of some cores with pebble cortex in the Paleo-Indian assemblage at the Turkey Swamp Site, archeologists should not assume that all lithic materials at New Jersey sites were brought in from nonlocal sources.

Many of the lithic materials recognized within Paleo-Indian assemblages are attributable to outcrop sources in the Hudson Valley: Normanskill outcrops in Green County, New York (Funk 1973); Deepskill sources; Fort Ann outcrops; eastern Onondaga, Heldeberg, and Esopus chert sources, to name a few (Eisenberg 1978). Brown, red, and variegated jaspers are often associated with outcrops in Berks and Lehigh Counties, eastern Pennsylvania (Richards 1941). Recent reports have discussed chert outcrops at Iron Hill, Delaware, and in Cecil County, Maryland (Gardner, personal communication). Materials from these sources and others may have been brought into New Jersey either through direct access or through other cultural mechanisms such as exchange systems.

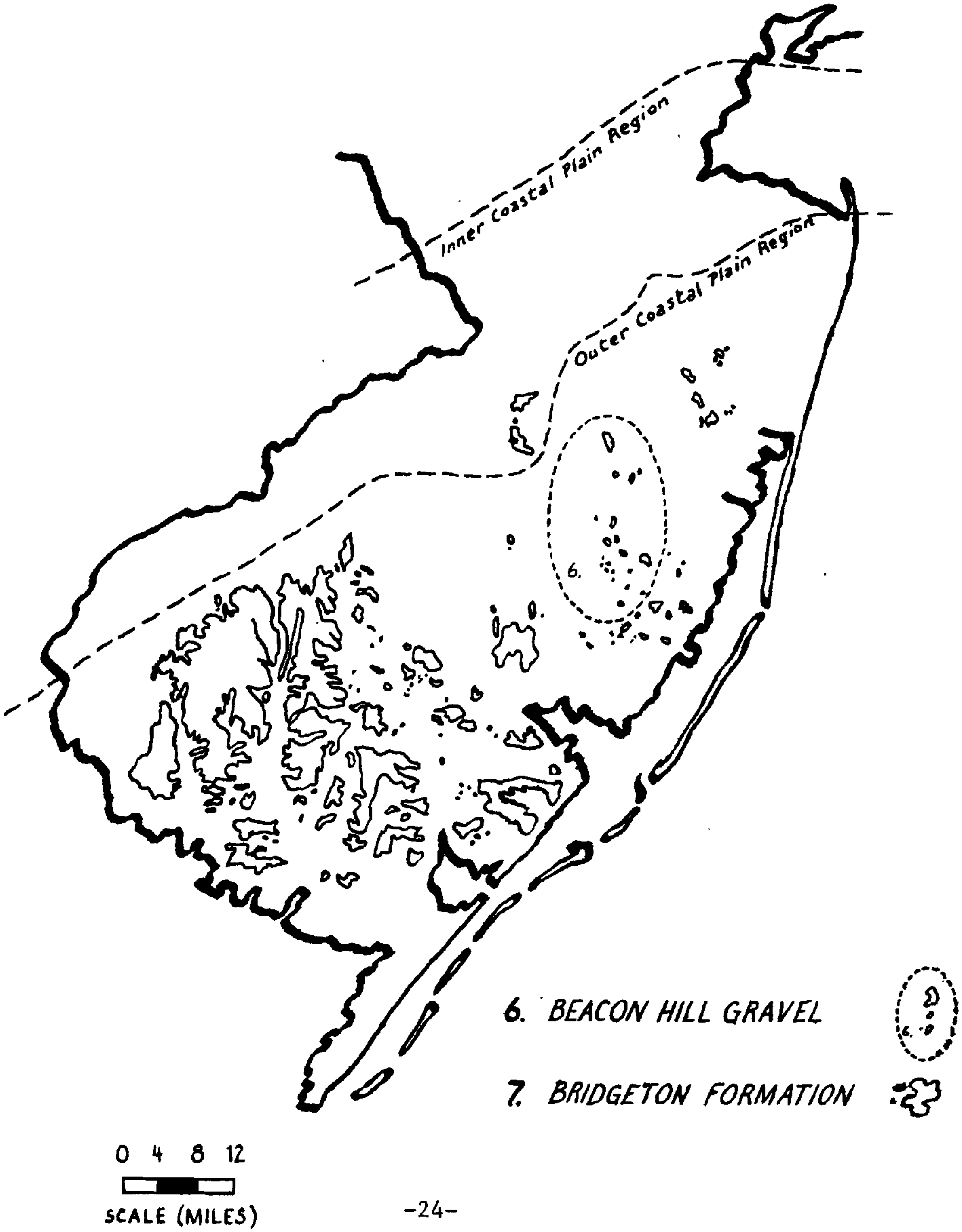
MAP 5. Possible Chert Sources in Northern New Jersey

(From Lewis and Kümmel 1910-1912)



MAP 6. Possible Chert Sources in Southern New Jersey

(From Lewis and Kümmel 1910-1912)



Paleo-Indian Archeological Resources

Discoveries of fluted points are known in nineteen of New Jersey's twenty-one counties. Through interviews with avocational archeologists and examinations of some of their collections, Mason (1959) and Kraft (1977a) have expanded the state's inventory of recorded Paleo-Indian cultural material (Table I). While the points in the New Jersey sample exhibit the basic Paleo-Indian fluted characteristics discussed in this paper, they also display some distinctive differences. Analysts study point variation trying to discern patterns which suggest cultural behavior. Differences in size, shape, and workmanship underlie considerations of classification and interpretation. In addition to aesthetic considerations, point variability might relate to a number of factors: adaptation to resources within particular regions or microniches; quality and availability of the lithic materials used in manufacture; or technological change through time.

Looking at the variation in attributes of length and width, Kraft (1977a) noted that the gamut of point sizes occurs throughout the state (Figure III). Testing for significant differences between the recorded point samples within counties and physiographic regions of the state, this author demonstrated that the variations in point size lie within the expected normal curve of a single population (Table II). The data do not indicate a significant relationship between point size and physiographic region. Gardner (personal communication) strongly points out that a single variable such as length has no meaning other than use history and resharpening, raw material, or chronology (when considered with other co-variables).

The quality of the lithic materials used in tool manufacture affects fluted point variation through limitations of the material's workability and through its availability. Table III outlines the frequencies of representation of the different utilized stone materials in each county and Figure IV illustrates the proportions of occurrence of these materials in each of the state's physiographic regions. (Identification of these lithics depended upon superficial recognition of the types of stone rather than on more sophisticated techniques such as trace element analysis.) With little deviation, the pattern of lithic resource exploitation is much the same in each physiographic region. Jaspers, gray chert, and black chert predominate while other cherts, chalcedony, quartz, and quartzite occur in very small percentages in all regions except the Ridge and Valley. Small percentages of argillacious material occur in the Piedmont and in the Outer Coastal Plain. Possible sources of chert materials both in New Jersey and outside of the state were discussed in a previous section of this paper.

Changes in point style seem to be a marker of chronological significance. To a certain degree, technological changes represent cultural responses to resource exploitation patterns and perhaps correlate with environmental shifts which affected game resource

TABLE I: FLUTED POINT DISTRIBUTION IN NEW JERSEY

County	Number of Reported Fluted Points	Number Measurable	Length/Width Ratio Means
Ridge and Valley Region			
Sussex	10	9	1.99
Warren	82	49	1.87
Highlands Region			
Passaic	1	1	2.54
Morris	6	6	1.81
Hunterdon	8	8	2.25
Piedmont Region			
Bergen	4	3	1.95
Hudson	0	0	--
Essex	2	1	1.23
Union	0	0	--
Somerset	3	2	2.33
Mercer	10	7	1.57
Inner Coastal Plain Region			
Middlesex	2	1	1.09
Camden	1	1	1.52
Gloucester	17	11	2.17
Salem	12	10	2.03
Outer Coastal Plain Region			
Monmouth	18	13	2.12
Ocean	1	1	2.12
Burlington	22	15	2.29
Atlantic	2	1	1.88
Cumberland	5	5	1.92
Cape May	1	1	1.97
TOTAL:	208	171	

FIG. III: FREQUENCIES OF FLUTED POINTS BY LENGTH AND BY REGION

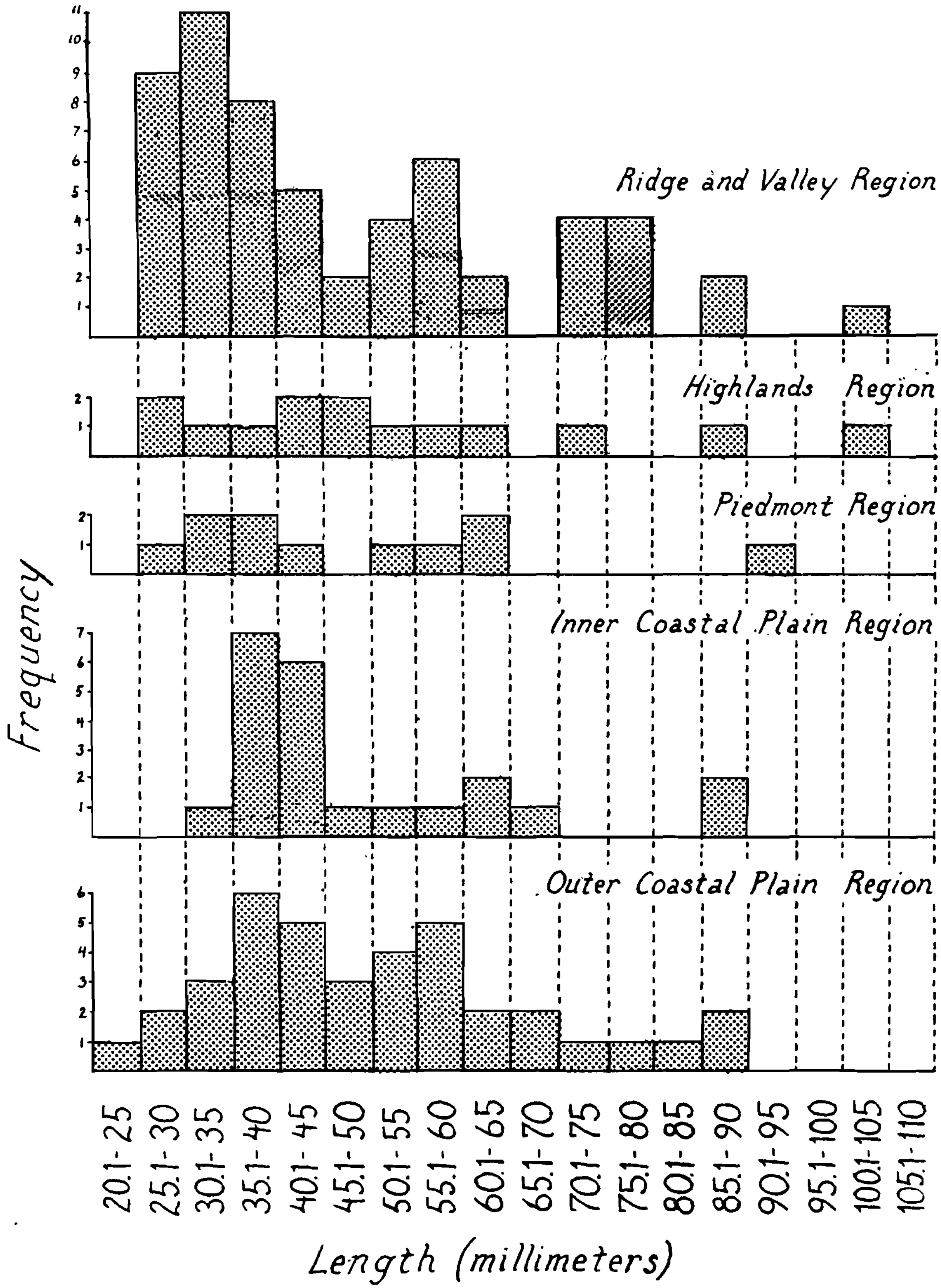


TABLE II: RESULTS OF STUDENT'S t TESTS* COMPARING FLUTED POINT LENGTH-WIDTH RATIOS BETWEEN COUNTIES AND BETWEEN REGIONS

H_o: = 2 H_1: 1 2

Samples Compared X	Y	Degrees of Freedom	Observed t	Critical Value Student's t distribution .05 Level of Significance	Ho Accepted or Rejected
Counties Within Same Physiographic Region					
Sussex	Warren	55	.06	2.000	Accepted
Monmouth	Burlington	26	.71	2.056	Accepted
Gloucester	Salem	19	.70	2.093	Accepted
Bergen	Mercer	8	.14	2.306	Accepted
Morris	Hunterdon	12	1.33	2.179	Accepted
Physiographic Regions					
Ridge & Valley	Highlands	70	1.43	2.000	Accepted
Piedmont	Inner Coastal Plain	34	1.71	2.042	Accepted
Outer Coastal Plain	Inner Coastal Plain	57	.79	2.000	Accepted
Ridge & Valley	Outer Coastal Plain	91	.74	1.999	Accepted
Ridge & Valley	Piedmont	68	.93	2.000	Accepted
Ridge & Valley	Inner Coastal Plain	78	1.67	1.999	Accepted
Highlands	Piedmont	26	1.70	2.056	Accepted
Highlands	Inner Coastal Plain	36	.25	2.042	Accepted
Highlands	Outer Coastal Plain	49	.35	2.021	Accepted
Piedmont	Outer Coastal Plain	47	2.35	2.021	Rejected

* Student's t Test compares sample means to determine whether differences are due to real differences between populations or whether the disparity between the samples should be attributed to chance alone (Thomas 1976:235).

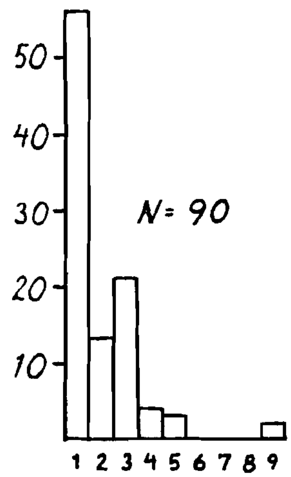
$$t = \frac{(\bar{X} - \bar{Y}) - \quad_{x-y}}{S_{x-y}}$$ (formula from Thomas 1976:237)

TABLE III: LITHIC MATERIALS USED FOR FLUTED POINTS

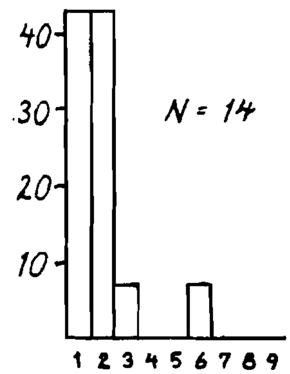
County	Jasper	Gray Chert	Black Chert	Other Chert	Chalcedony	Quartz	Quartzite	Argillite	Other
Ridge and Valley Region									
Sussex	4	3	2						
Warren	46	9	17	4	3				2
Highlands Region									
Passaic	1								
Morris	2	2				1			
Hunterdon	3	4	1						
Piedmont Region									
Bergen	3	1							
Hudson									
Essex		1							
Union									
Somerset	1	1			1				
Mercer	6	1	1	1				1	
Inner Coastal Plain Region									
Middlesex	1								1
Camden	1								
Gloucester	14		1				1		
Salem	8	1	2			1			
Outer Coastal Plain Region									
Monmouth	9	2	3	1			2		
Ocean	1								
Burlington	12	4	2				1	1	2
Atlantic	1	1							
Cumberland	4	1							
Cape May		1							
TOTALS	117	32	29	6	4	2	4	2	5
N = 201	58%	16%	14%	3%	2%	1%	2%	1%	3%

FIG. IV: RELATIVE FREQUENCY OF LITHIC MATERIAL WITHIN EACH REGION

1. Jasper
2. Gray Chert
3. Black Chert
4. Other Chert
5. Chalcedony
6. Quartz
7. Quartzite
8. Argillite
9. Other

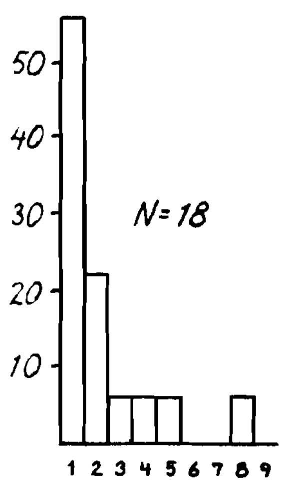


Ridge and Valley Region

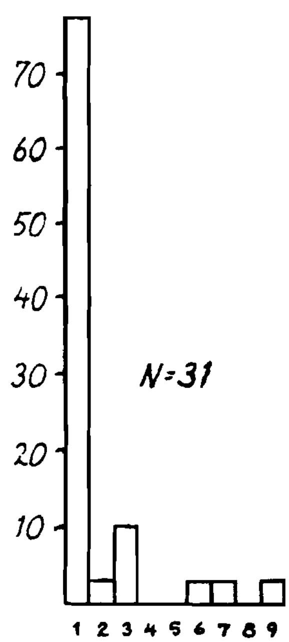


Highlands Region

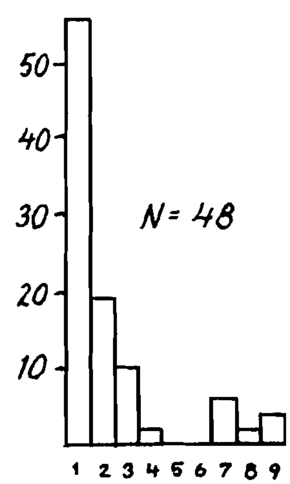
Scale:
1 mm. = 1%



Piedmont Region



Inner Coastal Plain Region



Outer Coastal Plain Region

availability. The New Jersey sample of Paleo-Indian points and assemblages is sorely lacking chronological control as might be offered by associated radiocarbon dates and stratified site context.

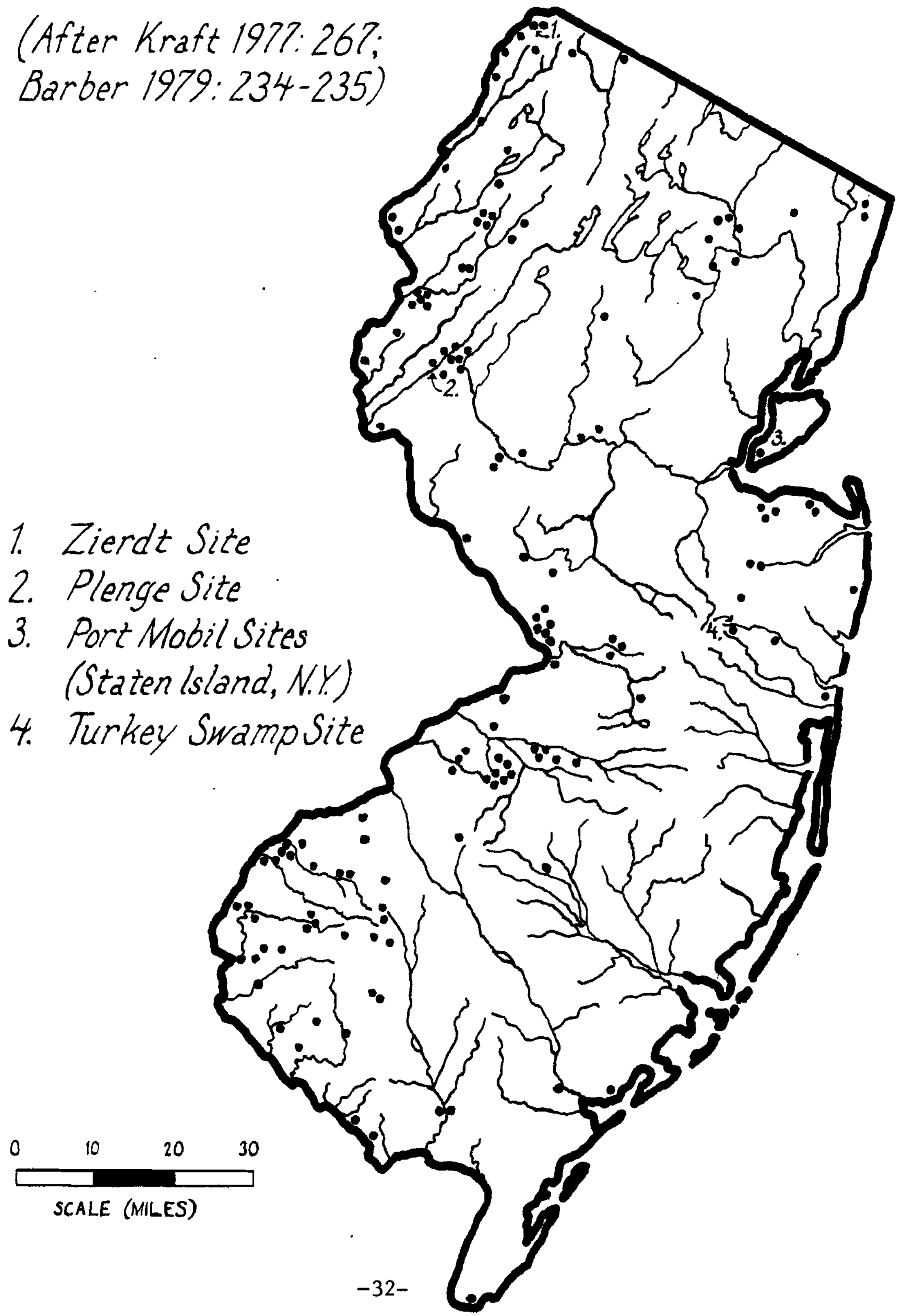
The 208 fluted points in the state occur in varying frequencies in the five physiographic regions: the Ridge and Valley Region yields 45 percent of the sample; the Highlands Region yields 7 percent; the Piedmont Region yields 9 percent; the Inner Coastal Plain yields 15 percent; and the Outer Coastal Plain yields 24 percent (Map 7). While considering that collectors' preferences for some areas and not others skew the overall picture, the differential distribution of fluted points probably reflects the general Paleo-Indian settlement pattern.

The few New Jersey sites which yield Paleo-Indian assemblages in combination with additional sites located outside of the state provide the basis for model building and cultural interpretation. These sites help archeologists to formulate hypotheses about Paleo-Indian subsistence and settlement which can then be tested through systematic investigation.

The Zierdt Site in Sussex County is located on a high sandy terrace formed by glacial melt waters, about 300 feet south of a small brook. The Delaware River lies about one half mile to the northwest. Werner (1964) records three geologic strata each associated with artifacts from different time periods. Zone C, a light tan sandy stratum, yielded one fluted point and seventeen other Paleo-Indian artifacts, over one hundred waste flakes, a small hearth composed of medium sized river cobbles, and two small, circular charcoal stains about fourteen inches in diameter. The Paleo-Indian artifacts, with the exception of one jasper item, were made from what Werner identifies as Hudson Valley lithic materials. He concludes that the spring-fed brook was the major attraction of the site. In addition to supplying drinking water, it probably also served as an attraction to animals that these people hunted.

The Plenge Site, found on a gently sloping terrace about 200 feet from the Musconetcong River, Warren County, is an extensive surface site yielding Paleo-Indian and more recent artifacts. Almost ten percent of the fifteen hundred items collected are fluted points or preforms which Kraft (1973) has characterized into six discrete types with a number of subtypes. Just on the basis of morphological similarity, some of Kraft's types are comparable to Early, Middle, and Late Paleo points in Gardner's chronological model, and to Early and Late Paleo points in Funk's model (Figures I and II). The heterogeneous fluted points from the Plenge Site span Kraft's (1977a) size categories. Associated with the Plenge points are various types of knives, scrapers, gravers, various unifacial tools, waste flakes, and hammerstones. Most of these artifacts are in the possession of a few avocational archeologists who have spent years investigating this site. Kraft interprets Plenge as a place which Paleo-Indian hunters revisited periodically, perhaps en route "from the Delaware River to the mucklands and lake regions of

MAP 7. Distribution of Fluted Points in New Jersey



northern New Jersey and into the Wallkill Valley and New York State ..." (Kraft 1977a:269). Based on his observations of the artifact collection, Eisenberg (1978) characterized the site as a base camp where a variety of exploitative and maintenance activities were carried out. More specific interpretation of the Plenge Site is difficult without tool association information. Mapped artifact distribution data would contribute to the identification of tool kits or possibly activity areas at the site.

In Monmouth County, near Freehold, the Turkey Swamp Site revealed evidence of Paleo-Indian through Late Woodland Period occupations (Cavallo 1978). Located on a floodplain along a tributary of the headwaters of the Manasquan River, the deepest artifact bearing zones of this site have yielded stone tools reminiscent of Gardner's Dalton-Hardaway Late Paleo subphase. Cavallo attributes the crudeness of some of the tool forms to the use of the lithic sources which, as demonstrated by several pieces in the assemblage, were small pebbles. Radiocarbon dates associated with these tools are as follows: 6104.6 B.C.; 6269 B.C.; 7041.9 B.C.; 5939 B.C.; and 6238 B.C. Cavallo classifies this lowest component within the Paleo-Indian tradition, viewing the artifacts and associated dates as representative of Late Paleo-Indian.

Through the course of a cultural resources survey for the New Jersey Department of Environmental Protection (DEP), a second site from the Manasquan River yielding Paleo-Indian cultural materials was discovered. The Timber Swamp Brook Site is located on a flat peninsular terrace at the confluence of the Manasquan River and Timber Swamp Brook near Farmingdale, Monmouth County. From auger tests and limited test square excavations, Grossman (1977) reports multiple cultural components including a fluted point and some associated stone flakes. He notes that the context of this discovery "suggests its derivation from a buried and undisturbed site of the Paleo-Indian Era" (Grossman 1977:2).

Additional evidence of the use of the Manasquan drainage during the Paleo-Indian Period again came to light through a survey conducted for the Federal Highway Administration and the New Jersey Department of Transportation. A single point from the Kandy Bar Ranch Site in Squankum, Monmouth County, was found within subsurface deposits of Pleistocene age (Grossman and Landberg, personal communication). The site context represents considerable compaction of the coastal sand deposits. The fluted point lacks direct association with any additional artifacts. No other Paleo-Indian material was uncovered during the 1979 excavations at the site (Grossman and Landberg, report in progress).

More tenuous evidence of a possible Paleo-Indian site comes from a survey initiated for the United States Environmental Protection Agency and conducted in West Windsor Township, Mercer County, south of Stony Brook and the Delaware and Raritan Canal. Shovel testing yielded an argillite point fragment with a flake scar reminiscent of a Paleo-Indian fluted point. The artifact was sealed stratigraphically by a Woodland house structure (Kardas and Larrabee 1978). Excavation of the site was conducted in the fall of 1979. No additional evidence was uncovered for Paleo-Indian occupation at the site. However, the investigation by Kardas and Larrabee yielded several house patterns, one of which was associated with a hearth assigned a radiocarbon date of 250±60 B.C. (Kardas and Larrabee 1982).

Investigations in Burlington County by Bonfiglio and Cresson (1978) have demonstrated the utility of using landform information for site survey. They have surveyed 105 freeze-thaw features and have found cultural materials of various time periods on 98. Fluted points have been collected on about 10 of these features, in some cases associated with artifacts diagnostic of more recent periods. Bonfiglio and Cresson have chosen to call these features 'pingos', a type of periglacial feature whose distribution in southern New Jersey is questioned by some geologists including former New Jersey State Geologist Widmer (personal communication). Whether or not they have chosen an appropriate geologic label for these features should not discount the apparent significance they hold for Paleo-Indian site distributional studies. Further survey work along these lines in addition to possible test excavation and geologic consultation would certainly contribute many answers regarding Paleo-Indian subsistence-settlement patterns in southern New Jersey.

Consideration of site data from areas outside of New Jersey broadens the perspective of Paleo-Indian cultural patterns. During the Paleo-Indian Period, the Port Mobil Site on Staten Island, New York, was situated on a high terrace above the Arthur Kill (Kraft 1977b). The artifact collection consists primarily of unifacial scrapers, fluted points, knives, and several other tool forms. Kraft interprets this site as a base camp where various domestic and tool making activities were performed. He also notes similarities between the Late Paleo-Indian triangular points at Port Mobil and those at Plenge, Turkey Swamp, and elsewhere. Kraft feels that these points may be transitional Paleo-Indian to Early Archaic cultural expressions (Kraft, personal communication).

Shawnee-Minisink is a multicomponent, stratified site located in eastern Pennsylvania on a terrace above the outwash plains of the Delaware River and the intersecting Brodheads Creek. Paleo-Indian artifacts, excavated from a sealed undisturbed stratum at the site, included more than one hundred unifacial scrapers manufactured primarily from local black chert, along with other tools including knives, utilized flakes, cores, thousands of waste flakes, and one fluted point made from a variety of Onondaga chert. Charred fish bone and wild hawthorn pits were found in the component which also yielded three radiocarbon dates: 8640±300 B.C.; 8800±600 B.C.; and 7360±1000 B.C. (McNett and McMillan 1974; McNett et al. 1977). Recent artifact analyses of the Paleo-Indian tools indicate that activities at the site probably focused on the processing of local resources, possibly riverine and plant resources including hard materials such as wood or bone. Clearly, the local black chert outcrops were important for the refurbishment of the occupants' tool kits (Marshall 1980).

In southeastern New York, on a high sandy bluff overlooking the Dwaar Kill, the Twin Fields Site yielded a small assemblage of Paleo-Indian artifacts. Eisenberg (1978) concludes that this is a temporary work camp for the processing of hard plant materials.

The West Athens Hill Site, located on an outcrop formation of Normanskill cherts in New York near Athens Township, Greene County, functioned as a quarry workshop and camp (Funk 1973). The site's assemblage was distributed in clusters which Funk interpreted as representative of nuclear family huts or domiciles. The variations in tools suggest a wide range of activities. The site seems to have been visited repeatedly, perhaps seasonally (Funk 1973).

A few miles north of West Athens Hill, on a small rise in the local clay flats, lies the Kings Road Site (Funk et al. 1969). The collection from this site indicates that Kings Road was a temporary workshop-hunting camp where limited ranges of activities centering around stone processing and hunting were performed (Eisenberg 1978).

These data represent parts of the complex milieu of activities which were the expressions of a vital cultural system. From these sites in New Jersey and its environs, archeologists have begun to recognize patterns of tool association and site location which contribute to an understanding of Paleo-Indian subsistence-settlement systems. Recognizing that people's settlement patterns reflect their cultural survival strategies in relationship to their environment, these data take on interpretive significance when considered in the light of a cultural model. Hypothesizing that Paleo-Indian peoples lived in a band organized society and depended on hunting and foraging for subsistence, the evidence can be interpreted within the perspective of a group's nomadic existence which included numerous sites occupied in a year's cycle of resource procurement, processing, and other activities. From an archeological perspective, these sites will have differing visibility potential, a problem with which the field archeologist must contend.

From his work with the Flint Run complex of Paleo-Indian sites in the Shenandoah Valley, Gardner defines several types of Paleo-Indian subperiod sites (Gardner 1974, 1975). The site types are characterized as follows:

1. Quarry Extraction Areas are located at lithic outcrops. The presence of hammerstones, many large and crude bifaces, and cores characterize these areas.

2. Quarry Related Base Camps yield assemblages which represent a wide variety of activities clustered in patterns suggesting the presence of dwellings. The superimposed living floors at the Thunderbird Site indicate that these camps were visited periodically. "In the Flint Run area, there was a strong tendency to settle next to spring-fed creeks immediately adjacent to the main river" (Gardner 1975:15). Gardner hypothesizes that the basic purpose of these sites was to refurbish the tool kit.
3. Revisited Hunting Camps are located near favorable microhabitats which served as game attractions, the loci of game drives, or migration routes.
4. Processing Stations may be at the same locus as the hunting camp. The tools will show a range of wear patterns indicating activities associated with the processing of hunted game, i.e. heavy chopping and crushing to fine cutting and scraping. Debitage clusters will be small with a high ratio of tools and utilized flakes to waste flakes.
5. Sporadically Visited Hunting Camps are small sites characterized by scattered finds of finished projectile points and tools of various classes. These sites will generally be found in upland locations which provide an overview of the area.
6. Reduction Stations may be found if the distance between the quarry and the base camps is great. At these intermediary sites, debitage clusters suggest activities involving the reduction of quarry materials into a more refined, easier to carry form.

Gardner views the fixed lithic resource locations as the focus of site settlement distribution where segments of a social unit could predictably find other members of the same unit. Scheduling of resource exploitation and thus smaller activity-specific sites would depend on the behavior patterns of animals and plant resources upon which hunting and foraging activities were directed.

Funk (1972, 1976) proposes a model based on ethnographic analogy with the Tuluaqmiut band of the Nunamiut Eskimo tribe of interior artic Alaska. In his model, Funk defines six site types corresponding to patterns of game animal procurement which he hypothesizes are analogous to Paleo-Indian sociocultural behavior.

1. Central Habitation Sites are located near major caribou routes and fishing grounds. Used in spring and summer and intermittently throughout the rest of the year by the whole band, these sites would probably accommodate ten to twelve surface dwellings.
2. Smaller Habitation Sites were used in the fall or winter. These sites were located in sheltered areas and were occupied by one or two families after seasonal fragmentation of Type 1 settlement. Localities near fuel and small quantities of game were chosen.

3. Hunting and Fishing Camps were occupied by a few males for short periods of time. Originated from Types 1 and 2, hunting and fishing camps were occupied at any time of the year. Locations may be at the heads of creeks or high in the mountains. These sites probably accommodated one makeshift shelter.
4. Single Shelters were occupied any time of the year. These shelters represent nonsubsistence pursuits, i.e. collecting lithic resources, wood, etc. One to eight persons might use these sites for a few days at a time.
5. Brief Visitation Camps were located outside usual boundaries of the band territory for the purpose of contacts with other groups for trading, visiting, or courting.
6. Overnight Camps were used while en route to other settlements.

Comparing sites in the Hudson and Delaware drainages in an attempt to determine their functions, Eisenberg (1978) concludes that a variety of resources were being exploited by the Paleo-Indian inhabitants. Eisenberg describes three types of sites:

1. Lowland Waterside Camps were located in or near areas which would have been coniferous swamps. Many of these sites would have been fishing camps found along large rivers.
2. Upland Bluff Camps were located in upland areas where deciduous trees were dominant.
3. Ridge-Top Camps were also located in upland areas where deciduous trees were dominant.

In Eisenberg's model, biological resources are the important factor in site location.

Recognizing that there is a certain amount of overlap between these three models, Tables IV through IX incorporate features of all three models through presentation of a series of predictions of site type frequency for each of New Jersey's physiographic regions and the Continental Shelf. Tests of the validity of these predictions should serve as the basis for model building, a necessary prerequisite to informed cultural resource preservation and management.

Survey Priorities for Paleo-Indian Studies

1. Paleoenvironmental Reconstruction. A representative collection of pollen samples from the state would contribute to recognition of the microenvironmental zones in which the Paleo-Indian hunters lived. More complete pollen profiles would document the environmental changes with which these early inhabitants contended from their first occupations in New Jersey to the cultural transition which archeologists recognize as the Early Archaic.

Using the physiographic regions of New Jersey as initial study units (i.e. the Ridge and Valley Region, Highlands Region, Piedmont Region, Inner Coastal Plain Region, and the Outer Coastal Plain Region, in addition to the Outer Continental Shelf), various paleogeographic features should be reconstructed. Paleodrainage systems should be redefined in subareas within the study units. These studies will contribute to increasing the capabilities for predictions of site distribution and will provide the groundwork for testing current models of Paleo-Indian subsistence-settlement systems.

2. Survey Planning. Reconnaissance level surveys and more intensive level surveys should be planned within each of the six study units. Sampling strategies which would provide a means for testing a cross section of microenvironmental zones should be used. Ideally, the goal should be to survey a statistically representative sample of each of the study units. As the survey work and analyses of findings progress, predictive models for site type distribution should be modified as appropriate. Negative survey information (i.e. lack of site discovery) will be equally as important as confirmation of predictions.

The survey plan should incorporate consideration of various environmental variables which may serve as reliable predictors of site location and culture utilization. Gardner (1974, 1980) determined that in areas of the southeastern United States, the locations of cryptocrystalline cherts determined to a large degree the distribution of Paleo-Indian sites. Judge (1973) notes three key environmental variables which characterized the Paleo-Indian settlement pattern in the central Rio Grande Valley, New Mexico: a source of water for both game and the human populations; an overview or ridge near the site which could afford a view of the hunting area; and a broad open area capable of supporting game animals which would have been the hunting target. This pattern may hold relevance for the eastern Paleo-Indian settlement system as well.

Eisenberg (1978) finds a high correlation between Paleo-Indian site distribution and landforms ranging in elevation between 320 and 360 feet above mean sea level. He also finds that Paleo-Indian sites appear to be located primarily on well-drained sands and loams rather than on poorly drained clay soils. Following the work of Gardner, and Bonfiglio and Cresson, Cavallo (1978) proposes fifteen variables which he considers to be optimum site predictors based upon his work in the New Jersey Outer Coastal Plain. Variables including slope of the site as well as distances from the site to streams, backwater swamps, and to lithic sources, just to name a few, could form the basis for survey in each of the study units. Some modification of the variable list would be necessary to suit the particular characteristics of each study unit.

Field techniques must accommodate the survey area. Floodplain areas and other areas of sediment accumulation require test excavation techniques including shovel testing, soil augering, chemical mapping, and remote sensing, where applicable, for location of subsurface cultural resources. Survey techniques must also take into consideration the many areas where dense vegetation obscures surface visibility.

3. Limited Test Excavation and Site Preservation. The Paleo-Indian Period is not well understood in New Jersey. The paucity of sites leaves much to the realm of speculation as far as cultural interpretation is concerned. Site protection and preservation must be a high priority for Paleo-Indian cultural resources. At the very least, areas yielding isolated fluted points should be recorded along with contextual information. Sites yielding assemblages of Paleo-Indian artifacts should be considered for maximum protection from natural and human impacts if their integrity remains undisturbed. Disturbed sites can still yield important information which would be lost if these resources were ignored or written off. Testing programs should take these factors into consideration. Where sites are worthy of nomination to the National Register of Historic Places, limited testing should be conducted to identify the limits of the site, depth of cultural deposits, range of artifactual material, etc. Such site investigation, however, should be designed to produce minimal damage while maximizing data recovery.

4. Define the Range of Paleo-Indian Sites in New Jersey. Intersite comparison of associated environmental variables (as mentioned under survey priority #2) and interassemblage comparison will reveal patterns of Paleo-Indian site utilization. Such comparative studies will serve as additional tests for the cultural models discussed in this paper.

5. Define Paleo-Indian Chronology. Better chronological control of Paleo-Indian cultural material is critical to understanding culture change and process. Associated chronometric dates would allow discernment of the sequence of technological change during the Paleo-Indian Period. Changes in subsistence-settlement patterning might also become apparent.

6. Update State Site Inventories. The statewide examination and description of private collections containing Paleo-Indian artifacts must be continued. Recorded site files should include reference to environmental variables, when possible.

7. Identify Lithic Sources. Investigations should be conducted to determine, through such techniques as trace element analyses, the lithic sources from which the state's Paleo-Indian artifacts were manufactured. Chert sources indicated on Maps 5 and 6 should be examined as potential areas of lithic procurement by Paleo-Indian people.

8. Outer Continental Shelf. This study unit presents a series of unique problems and challenges. Since little substantive data have been collected from the Continental Shelf, any information relating to Paleo-Indian cultural utilization of the area is significant. Following Roberts (1979), a number of recommendations can be made. Extant pollen cores should be analyzed so that reconstructions of the terrestrial climate on the Shelf can be made. The marine climate can be reconstructed based on studies of plankton remains in ancient sediments and from studies of element and isotope ratios in shells of marine bivalves. Offshore areas with cultural resource potential are characterized by any of the following features (Roberts 1979:225): lagoonal sediments; buried river/stream channels and surrounding areas; grassy sediments; exposed surfaces with limited scour; identifiable buried subareal surfaces; magnetic anomalies; and obvious surface features. These features, if threatened by human impact, should necessitate intensive survey.

Table IV:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

RIDGE AND VALLEY REGION

Relative Frequencies

X = present
1 = low frequency
2 = medium frequency
3 = high frequency

FOCAL ENVIRONMENTAL FEATURES	SITE TYPES (after Gardner 1974) Cobble/Pebble Extraction Area	Quarry Related Base Camp	Quarry Extraction Area	Revisited Hunting Camp	Animal Processing Station	(after Funk 1976) Central Habitation Site	Smaller Habitation Site	Hunting and Fishing Camp	Single Shelter	Brief Visitation Camp	Overnight Camp
Floodplains	2	2	2	X	X	2	2	1-2	X	X	X
Outwash Plains				3	2	X	1	2	2	X	X
River Valleys		2		2	2	2	2	2	X	X	X
Secondary Streams and Drainages	1			3	X			3	1	X	X
Kames, Kame Terraces	2			2-3	1			2-3		X	X
Eskers, Deltas	2			2-3	1			2-3		X	
Glacial and Kettle Lakes				3	3		1-2	3	1	X	X
Mucklands, Swamps, Glacial Drainages				3	3	1	2-3	3	2-3	X	X
Periglacial Freeze-Thaw Features											
Gravel and Cobble Deposits (Bridgeton and Beacon Hill Formations)											
Upland Areas (Bluffs and Ridgetops)	1-2		1-2	3	1-2		X	3	1-2	X	X

Table V:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

HIGHLANDS REGION

Relative Frequencies

X = present
1 = low frequency
2 = medium frequency
3 = high frequency

FOCAL ENVIRONMENTAL FEATURES	SITE TYPES (after Gardner 1974): Cobble/Pebble Extraction Area	Quarry Related Base Camp	Quarry Extraction Area	Revisited Hunting Camp	Animal Processing Station	(after Funk 1976): Central Habitation Site	Smaller Habitation Site	Hunting and Fishing Camp	Single Shelter	Brief Visitation Camp	Overnight Camp
Floodplains	2	2	X	X	X	2	2	1-2	X	X	X
Outwash Plains				3	2	X	1	2	2	X	X
River Valleys		2		2		2	2	2	X	X	X
Secondary Streams and Drainages	1			3	2			3	1	X	X
Kames, Kame Terraces	2			2-3	1			2-3		X	X
Eskers, Deltas	2			2-3	1			2-3		X	X
Glacial and Kettle Lakes				3	3		1-2	3	1	X	X
Mucklands, Swamps, Glacial Drainages											
Periglacial Freeze-Thaw Features											
Gravel and Cobble Deposits (Bridgeton and Beacon Hill Formations)											
Upland Areas (Bluffs and Ridgetops)	1-2		X	3	1-2		X	3	1-2	X	X

TABLE VI:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

PIEDMONT REGION

Relative Frequencies

X = present
1 = low frequency
2 = medium frequency
3 = high frequency

FOCAL ENVIRONMENTAL FEATURES / SITE TYPES	Cobble/Pebble Extraction Area (after Gardner 1974)	Quarry Related Base Camp	Quarry Extraction Area	Revisited Hunting Camp	Animal Processing Station	Central Habitation Site (after Funk 1976)	Smaller Habitation Site	Hunting and Fishing Camp	Single Shelter	Brief Visitation Camp	Overnight Camp
Floodplains	1			X	X	2	2	1–2	X	X	X
Outwash Plains				3	2	X	1	2		X	X
River Valleys				2	X	2	2	2	X	X	X
Secondary Streams and Drainages	1			3	2			3	1	X	X
Kames, Kame Terraces											
Eskers, Deltas											
Glacial and Kettle Lakes				3	3		1–2	3	1	X	X
Mucklands, Swamps, Glacial Drainages				3	3		1–2	3	1	X	X
Periglacial Freeze-Thaw Features											
Gravel and Cobble Deposits (Bridgeton and Beacon Hill Formations)											
Upland Areas (Bluffs and Ridgetops)											

Table VII:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

INNER COASTAL PLAIN

Relative Frequencies

X = present
1 = low frequency
2 = medium frequency
3 = high frequency

SITE TYPES	(after Gardner 1974) Cobble/Pebble Extraction Area	Quarry Related Base Camp	Quarry Extraction Area	Revisited Hunting Camp	Animal Processing Station	(after Funk 1976) Central Habitation Site	Smaller Habitation Site	Hunting and Fishing Camp	Single Shelter	Brief Visitation Camp	Overnight Camp
FOCAL ENVIRONMENTAL FEATURES											
Floodplains	1			X	X	2	2	1-2	X	X	X
Outwash Plains				3	2	X	1	2		X	X
River Valleys				2	X	2	2	2	X	X	X
Secondary Streams and Drainages	1			3	2			3	1	X	X
Kames, Kame Terraces											
Eskers, Deltas											
Mucklands, Swamps, Glacial Drainages											
Periglacial Freeze-Thaw Features				3	1-2			3		X	X
Gravel and Cobble Deposits (Bridgeton and Beacon Hill Formations)	2-3	1							X	X	
Upland Areas (Bluffs and Ridgetops)											

Table VIII:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

OUTER COASTAL PLAIN

Relative Frequencies

x = present
1 = low frequency
2 = medium frequency
3 = high frequency

SITE TYPES / FOCAL ENVIRONMENTAL FEATURES	(after Gardner 1974) Cobble/Pebble Extraction Area	Quarry Related Base Camp	Quarry Extraction Area	Revisited Hunting Camp	Animal Processing Station	(after Funk 1976) Central Habitation Site	Smaller Habitation Site	Hunting and Fishing Camp	Single Shelter	Brief Visitation Camp	Overnight Camp
Floodplains	1			X	X	2	2	1-2	X	X	X
Outwash Plains				3	2	X	1	2		X	X
River Valleys				2	X	2	2	2	X	X	X
Secondary Streams and Drainages	1			3	2			3	1	X	X
Kames, Kame Terraces											
Eskers, Deltas											
Glacial and Kettle Lakes											
Mucklands, Swamps, Glacial Drainages											
Periglacial Freeze-Thaw Features				3	1-2			3		X	X
Gravel and Cobble Deposits (Bridgeton and Beacon Hill Formations)	2-3	1							X	X	
Upland Areas (Bluffs and Ridgetops)											

Table IX:

FOCAL ENVIRONMENTAL FEATURES AND PREDICTED SITE TYPE FREQUENCY

OUTER CONTINENTAL SHELF

(After Barber 1979:
345-347)

X = very low frequency
1 = low frequency
2 = medium frequency
3 = high frequency

FOCAL ENVIRONMENTAL FEATURES / SITE TYPES	Camp	Fishing Camp	Shell Midden	Camp Along Coast	Camp in Piedmont	Camp in Uplands
(15,000 - 12,000 B.P.)						
Full Coastal Areas	X					
Estuarine Areas		1				
Inland Valley Areas		1				
Upland Areas	X					
(12,000 - 9,000 B.P.)						
Full Coastal Areas			2			
Estuarine Areas		2	2			
Inland Valley Areas		2			2	
Upland Areas						1
(9,000 - 6,000 B.P.)						
Full Coastal Areas			2			
Estuarine Areas		2	2			
Inland Valley Areas		2		2		
Upland Areas						1-2

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