TENTH ANNUAL MIDDLE ATLANTIC ARCHEOLOGICAL CONFERENCE

Dover, Delaware
March 21, 22, 23, 1980

Friday, March 21

11:00-1:30 Registration

1:30-4:00 Regional Research Design

Chaired by Jay F. Custer, this session will involve presentations on research design, problems, and future directions. Audience feedback is essential.

Jay F. Custer, University of Delaware. "REGIONAL RESEARCH DESIGN IN THE MIDDLE ATLANTIC."

Joseph Dent, The Accokeek Foundation. "ONTOLOGICAL AND EPISTEMOLOGICAL ILLUSIONS AND REALITIES CONCERNING THE PALEO-INDIAN AND EARLY ARCHAIC PERIODS OF MIDDLE ATLANTIC PREHISTORY."
This paper addresses the problem(s) of understanding the archeological phenomena in the Middle Atlantic region known as the Paleo Indian and Early Archaic periods. Past and present attempts toward this goal are examined in terms of both their strengths and weaknesses. Comments are then offered on the future possibilities of undertaking region wide anthropological research on those two sociocultural periods within the Middle Atlantic region

Allan Mounier, New York University. "THE WOODLAND AND CONTACT PERIODS IN THE MIDDLE ATLANTIC."

Henry Miller, St. Mary's City Commission. "REGIONAL RESEARCH IN HISTORICAL ARCHEOLOGY."
This paper will briefly review the focus of Historical Archeology research in the Mid-Atlantic area. The need for regional problem orientations will be discussed in the light of increased emphasis upon Cultural Resource Management. A series of research problems of broad scale applicability will also be presented for consideration.

4:00-5:30 General Presentations

4:00-4:20 Clarence R. Geier, James Madison University. "THE HIDDEN VALLEY ROCK SHELTER, BATH COUNTY, VIRGINIA."
A discussion of new data concerning the progression of Woodland settlement in west central Virginia as presented by artifacts in the Hidden Valley Rock Shelter.

4:20-4:40 Karen Zuckerman, New York University. "ARCHEOLOGICAL SURVEY OF THE SLAUGHTER CREEK DRAINAGE, DELAWARE."

4:40-5:00 Robert Foss, SUNY Binghamton. "GEOGRAPHIC VARIATION IN PREHISTORIC SETTLEMENT OF THE BLUE RIDGE."
During the Summer of 1978, a systematic survey was conducted in the Shenandoah National Park. This survey was designed to shed light on numerous questions about prehistoric settlement and exploitation of the Blue Ridge Mountains. Two specific aspects of the project are discussed in this paper. First, data from the survey, as well as from previous archaeological work in the area, are utilized to construct a general model of Blue Ridge settlement. In this section, the focus is upon patterns of similarity throughout the survey areas. In addition to defining general patterns, however, the survey was designed in order to investigate deviations from this general model. In the second section of the paper, differences in prehistoric settlement between widely separated geographic regions are discussed. Finally, both the patterns of similarity and patterns of dissimilarity are placed in an ecological and temporal framework in order to refine our model for prehistoric settlement.

5:00-5:20 Dennis Curry, Maryland Geological Survey. "BURIAL OF LATE ARCHAIC COASTAL PLAIN SITES AS A RESULT OF AEOLIAN DEPOSITION."
Seven Late Archaic sites located in the Western Shore division of the Coastal Plain physiographic province of central and northern Anne Arundel County, Maryland contain strata apparently buried by aeolian sands. Components typically found buried at these sites are represented by Late Archaic projectile point types such as Brewerton, Bare Island, Poplar Island, and Susquehanna broadspear. It is postulated that localized climatic conditions prevalent during the drier Sub-Boreal period caused defoliation which allowed soil erosion and, thus, subsequent deposition

of wind-blown sediments responsible for site burial. Initial data seem to indicate that individual sites are not buried to a uniform depth, a situation possibly explained by various discrete natural (e.g., trees) and cultural (e.g., hearths) factors which served to control the amount of aeolian deposition. Due to the dynamics of localized dune formation, the same processes responsible for site burial may also result in site deflation. Hence, the question of whether or not these buried cultural deposits are actually found *in situ* remains unresolved.

Friday Evening

Open House and Reception at the Island Field Site. Schedule T.B.A.

Saturday, March 22

9:15-12:00

Historic Archeology Session
Chaired by Cara Wise

9:25-9:45

Cara Wise, Delaware Bureau of Archaeology and Historic Preservation. "THE ARCHAEOLOGICAL DATA RECOVERY PROGRAM FOR WILMINGTON BOULEVARD: AN APPROACH TO URBAN COMPLEXITY." The construction of Wilmington Boulevard will result in the destruction of archeological remains ranging in age from the early 18th Century to the present and including a wide variety of urban functions, e.g., residential properties, commercial properties, and manufacturing properties. The archeological data recovery program developed by the Delaware Bureau of Archaeology and Historic Preservation has been designed to recover a variety of data on the nature and range of variability of archeological remains in a complex urban context.

9:45-10:05

Alexander Morrison, St. Mary's City Commission. "EXCAVATIONS AT THE VAN SWERIGEN SITE: PROBLEMS AND PLANS."
Since 1974, the St. Mary's City Commission has been excavating on the 1-acre lot believed to have been surveyed for Gerret van Sweringen in 1672. Thus far, we have excavated a large (40 x 60'), L-shaped house; a 1-room outbuilding; a small cellar; and a series of trash-filled borrow pits. Artifacts recovered indicate that the site was occupied from ca. 1675-1750. But we have been unsuccessful in locating the lot's boundaries and corners--a key to determining the town plan of St. Mary's City in the late 17th century.
This paper will discuss the results of our

excavations to date and will outline our plans for sampling the rest of the site. In 1980, we expect to obtain sufficient data for distributional studies and hope to succeed in determining the boundaries of van Sweringen's property.

10:05-10:25 John McDaniel, Jim Adams, and Parker Potter, Washington and Lee University. "SCOTCH-IRISH HIGH HOLLOW SITES IN THE MOUNTAINS OF VIRGINIA."

10:25-10:45 Coffee, Smoking, and Joking.

10:45-11:05 William Kelso, The Jefferson Foundation. "A MONSTROUS LARGE GARDEN OF THE OLD MASTER: EXCAVATIONS AT MONTICELLO, 1979."
Archaeological test excavations were conducted during the Summer and Fall of 1979 in the garden area South of the Monticello house as part of the Thomas Jefferson Memorial Foundation's future reconstruction plans. Preliminary analysis indicates that more archaeological evidence of terraces, walkways, fences, entrances, stone walls and planting beds has survived nearly 200 years of erosion and plowing than was originally expected. The initial excavation also established that much could be learned concerning slave life and craft history through a future archaeological study of the outbuilding area south of the house.
Jefferson spent much time and effort in experimental agriculture and left voluminous records with which to interpret the resulting archaeological garden remains. His emphasis on making Monticello self-sufficient for the "comforts of life" left particularly rich archaeological deposits of material related to the several industries he developed near the garden area as well. But more encouraging still is the ability of historical archaeology at Monticello to define the landscaping ideas of Jefferson and how they may have been affected by and reflective of his time.

11:05-11:25 Ross McGuire and Perry Tourtellotte, Public Archeology Facility, SUNY Binghamton. "MILLSITE SURVEY: THE ARCHEOLOGY OF A NINETEENTH CENTURY RURAL INDUSTRY IN CENTRAL NEW YORK."
The paper will report on the initial season of an ongoing survey of hydropowered industrial sites in the drainage systems of Central New York. The results of field work will be

reported, and the groundwork for a preliminary model for mill site location will be presented.

11:25-11:45 Ronald Thomas and Sharon Burnston, Mid-Atlantic Archaeological Research, Inc. "THE CATOCTIN FURNACE CEMETERY."

11:45-1:15 LUNCH

1:15-5:30+ New Views on the Archaic
Chaired by William M. Gardner

1:20-1:40 Victor Carbone, Interagency Archeological Services, Atlanta.
"SETTING THE STAGE: THE ENVIRONMENT OF THE MIDDLE ATLANTIC DURING THE ARCHAIC."

1:40-2:00 Louis A. Brennan, New York.
"THE ARCHAIC OF SOUTHERN NEW YORK."

2:00-2:20 Allan Mounier, New York University.
"THE ARCHAIC OF NEW JERSEY."

2:20-2:40 Barry Kent, William Penn Museum.
"THE PENNSYLVANIA PIEDMONT ARCHAIC."

2:40-3:00 Michael Stewart, The Catholic University of America.
"ENVIRONMENT, SETTLEMENT PATTERN, AND THE PREHISTORIC USE OF RHYOLITE IN THE CUMBERLAND VALLEY OF MARYLAND AND PENNSYLVANIA."
William Henry Holmes' 1892 search for meta-rhyolite (rhyolite) quarries in the South Mountain areas of Maryland and Pennsylvania is an early example of archaeologists' necessary interest in a rock type that experienced widespread use by prehistoric cultures in the Middle Atlantic Region. The present paper examines the prehistoric use of rhyolite in portions of western Maryland and south central Pennsylvania near natural sources of the rock material. It is proposed that the degree to which rhyolite was utilized at various points in time is related to the changing environmental quality of the mountain and intermontane areas where rhyolites are found naturally, and the prehistoric settlement/subsistence patterns adapted to these environmental changes.
Sporadic use of rhyolite in the study area begins during late Early Archaic times and continues intermittently through the Middle Archaic and into early Late Archaic times. The intensive and prolonged utilization of rhyolite begins during the Late Archaic and

is exemplified by Broadspear-related cultures and a shift to scheduled periodic settlement movements that include the exploitation of the oak chestnut forests now dominant in mountain zones. The predominant use of rhyolite continues through the Early Woodland periods and is altered early in the Late Woodland , in large part as result of shifts in settlement patterns associated with a dependence on an agricultural subsistence base.

3:00-3:20 Joseph McNamara, Maryland Geological Survey. "ANALYSIS OF AN EARLY ARCHAIC ACTIVITY AREA AT THE THUNDERBIRD SITE (44-WR-11)." Arbitrary levels necessary in excavation may be impractical and restrictive during artifact distribution studies. The lithic material from the Early Archaic levels of Area 4 from The Thunderbird Site (44-WR-11) are studied by isolating specific lithic types, thereby removing much of the inherent bias of arbitrary levels. The association of debitage to tools within a lithic type and the measurement of spine-plane angles for utilized flakes is useful in inferring curated and/or expedient activity behavior from the archeological context.

3:20-3:40 Coffee, Smoking, Boasting, and Roasting.

3:40-4:00 Stephan Perlman, Virginia Commonwealth University. "HUNTER-GATHERER EXPLOITATION SYSTEMS AND LITHIC PROCUREMENT SYSTEMS."

4:00-4:20 Daniel Mouer, Robin Ryder and Elizabeth Johnson, Virginia Commonwealth University. "DOWN TO THE RIVER IN BOATS: THE LATE ARCHAIC IN THE MIDDLE JAMES RIVER VALLEY, VIRGINIA." A number of "shifts" in the archeological record of the Late Archaic and Transitional Periods of the Middle Atlantic have been observed. These shifts, and a number of the explanations offered by various authors are reviewed. A general model of Late Archaic societies is presented which contrasts riparian versus riverine adaptations and which has implications for artifactual, social and settlement data. The model is tested against data culled from a literature review of Virginia Late Archaic sites, and against the results of field work in the Middle James River basin. Improvements on the taxonomic definitions of "Archaic," "Transitional," and "Woodland" are offered, along with basic test implications of the model.

4:20-4:40

Theodore Reinhart, The College of William and Mary.
"THE VIRGINIA COASTAL PLAIN ARCHAIC."
A series of sites containing Archaic components have been excavated in the lower James River Basin. One of these, the culturally stratified Sassafras Springs Site, has produced a local sequence and suggests some hypotheses about Middle and Late Archaic demography, settlement patterns, and subsistence.
The Middle and Late Archaic cultural remains indicate an expanding population; but this trend does not appear to continue into the Early Woodland Period, at least in the lower James River Basin. Accompanying this population growth is a continuing diversification of subsistence patterns. Late Archaic settlement patterns with riverine base camps placed at the junction of several ecological zones also reflect a maximation of subsistence potential.
In addition, although the Middle and Late Archaic cultures in the lower James River Basin show affinities to regional cultural forms, the local cultures are not homogeneous throughout the subarea. These local cultures reflect influence from adjacent areas to both the north and the south. The river itself also appears to have been a cultural boundary in the Late Archaic Period as well as later during the Woodland periods.

4:40-5:00

Billy L. Oliver, The University of North Carolina-Chapel Hill.
"PERSPECTIVES ON THE ARCHAIC: A VIEW FROM THE CAROLINA PIEDMONT."
A major concern of recent archaeological research of the Archaic has been directed toward the isolation and identification of cultural change through time and space. Archaic settlement patterns, social organization, and other cultural manifestations have been hypothesized to be functionally interrelated with the economic and technological aspects of culture as a determining factor (Ritchie and Funk, 1973). Following this line of thought, artifact types have been employed as diagnostic markers of temporal change within the techno-subsistence subsystem of the culture to facilitate an understanding of change through time. This analytic procedure is dependent upon the presence of superimposed and stratigraphically separate materials which can be considered as artifact types representative of distinct cultural complexes (Coe, 1964).

Much of the Middle Atlantic area has yet to produce reliable stratigraphic sequences which could provide diagnostic artifacts to serve as indicators of cultural change and relative age. This lack of stratigraphic sequences and diagnostic types has led to much of the Middle Atlantic relying heavily upon the chronological sequence of projectile point types developed by Joffre Coe for the Carolina Piedmont and the interpretations of cultural change presented in The Formative Cultures of the Carolina Piedmont (Coe, 1964) have served not only to increase our understanding of the Archaic, but also as a standard by which to evaluate subsequent research, and as an index for the interpretation of archeological materials throughout the Middle Atlantic and Southeastern United States.

Unfortunately, this dependence upon Coe's chronological sequence in areas outside of the Carolina Piedmont has led to certain misinterpretations of the basic data concerning types and chronology. These misinterpretations range from simple errors of projectile point identification to inaccurate citations concerning a cultural discontinuity, or hiatus, existing between the Late Archaic and Early Woodland periods. These misinterpretations appear to result from a basic lack of understanding of "type" as a concept, a lack of familiarity with the original descriptive data concerning type and chronology, and a tendency on the part of many individuals to assume that they can simply "match the point with the picture" and determine type.

The focus of this paper will be to clarify some of these possible areas of misinterpretation by providing a review of certain aspects of the archeological research conducted by the Research Laboratories of Anthropology over the past forty years. Particular emphasis will be placed upon our knowledge of the Archaic in North Carolina, the sites which contributed to the development of the Piedmont chronological sequence (Hardaway, Doerschuk, and Gaston), and to the evolutionary relationships displayed by the projectile points which are considered diagnostic of the Archaic period in our area.

5:00-5:30 William M. Gardner, The Catholic University of America.
"MIDDLE ATLANTIC ARCHAIC: AN OVERVIEW."

8:30	Annual Business Meeting Location to be announced.
Sunday, March 23	General Presentations
9:30-10:00	Howard MacCord, Archeological Society of Virginia. "SOME THOUGHTS CONCERNING ARCHEOLOGICAL SURVEY."
10:00-10:20	Geoffrey Gyrisco, Historic Preservation Staff Archeologist, Government of the District of Columbia. "ARCHEOLOGY IN THE CAPITOL: A STATUS REPORT."
10:20-10:40	Kay Sparrow, Virginia Research Center for Archeology. "PREHISTORIC SURVEY IN THE LOWER YORK ESTUARY." An on-going field survey in York County, Virginia, has raised significant questions concerning lithic procurement and settlement location in the Archaic and Woodland periods. Further research aimed at answering these questions will call for testing submerged and semisubmerged sites, and detailed, multi-disciplinary studies of ancient estuarine environments.
10:40-11:00	Wayne Clark, Maryland Historic Trust. "CHARTING NEW COURSES IN MARYLAND ARCHEOLOGY; THE 1980's."
11:00-11:20	Tom Whyte, James Madison University Archeological Research Center. "THE PERKINS POINT ANNEX SITE." The Perkins Point Site is a Late Woodland/ Protohistoric palisaded Indian village in Bath County, Virginia. The site was occupied by a culturally diverse society whose primary subsistence base was hunting and gathering with agriculture as a supplementary food source. The site, which is radiocarbon-dated to the latter half of the 16th century, yields evidence of some of the earliest European trade items found in mountainous western Virginia.
11:20-11:40	John Cavallo, Monmouth College. "THE NEW JERSEY PINE BARRENS SURVEY."
11:40-12:00	Concluding Remarks

Stewart

BURIAL OF LATE ARCHAIC COASTAL PLAIN SITES AS A RESULT OF AEOLIAN DEPOSITION

Dennis C. Curry
Division of Archeology
Maryland Geological Survey

March 1980

ABSTRACT

Seven Late Archaic sites located in the Western Shore division of the Coastal Plain physiographic province of central and northern Anne Arundel County, Maryland contain strata apparently buried by aeolian sands. Components typically found buried at these sites are represented by Late Archaic projectile point types such as Brewerton, Poplar Island, Bare Island, and Susquehanna broadspear. It is postulated that localized climatic conditions prevalent during the drier Sub-Boreal period caused defoliation which allowed soil erosion and, thus, subsequent deposition of wind-blown sediments responsible for site burial. Initial data seem to indicate that individual sites are not buried to a uniform depth, a situation possibly explained by various discrete natural (e.g., trees) and cultural (e.g., hearths) factors which served to control the amount of aeolian deposition. Due to the dynamics of localized dune formation, the same processes responsible for site burial may also result in site deflation. Hence, the question of whether or not these buried cultural deposits are actually found in situ remains unresolved.

Recent archeological surveys and testing programs conducted in conjunction with various Maryland State Highway Administration projects have revealed the presence of buried archeological strata in settings previously believed unlikely to contain sub-plowzone components. This paper discusses the methods and causes responsible for burial of these archeological sites. In addition, the significance of these buried strata is addressed.

The area containing archeological sites with observed sub-plowzone components is located in northern and central Anne Arundel County, Maryland, roughly within the Baltimore-Washington transportation corridor (see Figures 1 and 2). Located in the Western Shore division of the Coastal Plain physiographic province, the area is bounded on the east by the Chesapeake Bay and roughly bounded on the north and west by the Patapsco and Patuxent Rivers, respectively. The southern boundary is rather amorphous and can be arbitrarily defined as a line drawn from the forks of the Big and Little Patuxent Rivers to the mouth of the South River. (These boundaries are employed only to grossly delimit the area discussed in this paper and, with the exception of the Chesapeake Bay, they are not to be construed as maximum limits for the distribution of buried sites on the Western Shore.)

Topographically, the area is fairly well-disected by numerous

Figure 1. Regional Map.

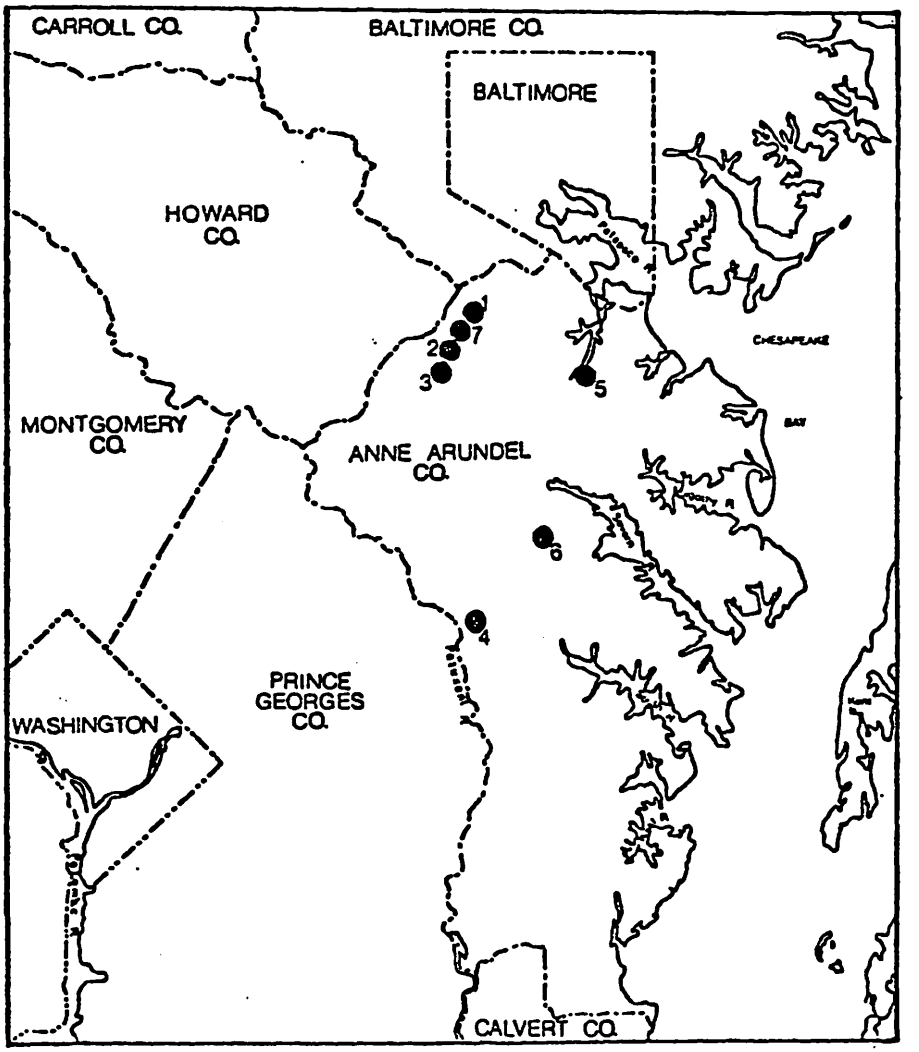


Figure 2. Detail Map Showing Site Locations.

1 - 18AN23	5 - 18AN178
2 - 18AN29A	6 - 18AN408
3 - 18AN29B	7 - 18AN489
4 - 18AN55	

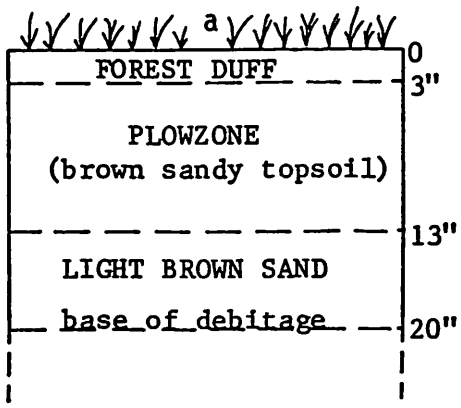
active streams and it increasingly resembles the rolling uplands of the Piedmont physiographic province as one moves from east to west towards the Fall Line (roughly approximate to the boundary line which separates Anne Arundel and Prince Georges Counties from Howard and Montgomery Counties). Elevation in northern and central Anne Arundel County varies from zero feet above sea level (along the Chesapeake) to circa 200 feet above sea level in the northwestern portion of the county.

The geology of the area is characterized by Cretaceous sands and gravels underlain by a Paleozoic(?) and Pre-Cambrian crystalline basement. This wedge of Cretaceous sediment probably varies from 600 to 1000 feet thick in Anne Arundel County, although maximum depths of 7157 feet are reached on the Eastern Shore along the Atlantic (Vokes and Edwards 1974: 45-7). The vast majority of the Cretaceous sediments in north-central Anne Arundel County belong to the Potomac Group, composed primarily of argillaceous sands with varying amounts of silts and clays. The remainder of the Cretaceous sediments in this area belong to either the Monmouth Formation (fine- to coarse-grained sands), the Matawan Formation (fine-grained sands and silts), or the Magothy Formation (loose lignitic sands and laminated silty clays).

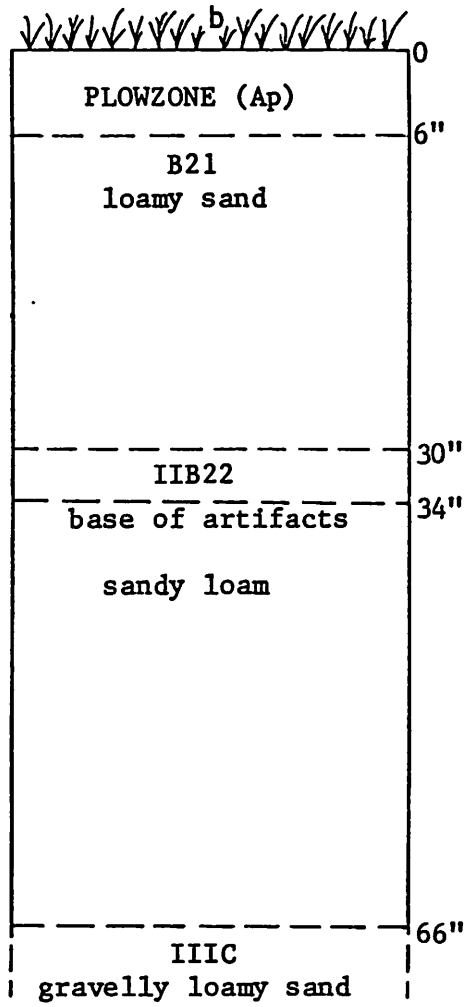
With respect to the archeology of northern and central Anne Arundel County, a wide range of sites (including lithic workshops, campsites, village sites, etc.) are represented. Chronologically, while Paleoindian artifacts are rare in the area (Brown 1979), Early and Middle Archaic projectile point types are not entirely uncommon. However, the majority of known sites are representative of either Late Archaic or Woodland occupations. The seven sites discussed below fall into this latter category.

Stearns #23 Site - 18AN23 (Figure 2:#1). Located on a gentle slope overlooking Lower Kitten Branch (a low order tributary of Stony Run), the site is situated on loamy sand (5-10% slope) belonging to the Muirkirk series. The site is located at an elevation of approximately 80 feet ASL, some 20 to 40 feet above Lower Kitten Branch. Stearns (1949) describes projectile points, steatite bowl fragments, and pottery sherds from the site which are diagnostic of the Late Archaic through Late Woodland periods. While Kinsey (1978) found no diagnostic artifacts during preliminary testing of the site, debitage was recovered from a sub-plowzone context to a depth of 20 inches below the surface. The soil stratigraphy exhibits an approximately one-foot deep plowzone underlain by light brown sand (see Figure 3a).

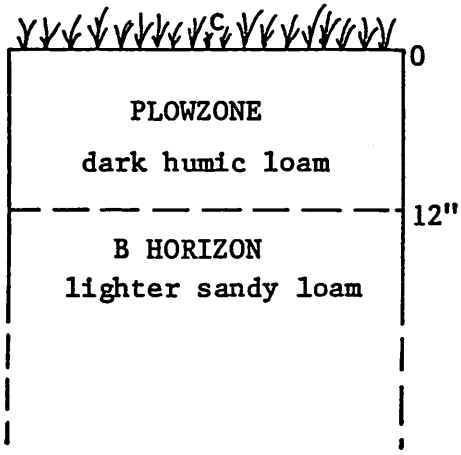
Harmans Site - 18AN29 (Figure 2: #2&3). In reality, there are probably two distinct sites represented here - 18AN29A, a very large multicomponent site, and 18AN29B, a much smaller site located approximately 1000 feet to the south. Both sites are located approximatley 80 feet above sea level on a terrace of Stony Run, a third or fourth order tributary of the Patapsco River. 18AN29A is situated on a fine sandy loam with a 2 to 5% slope (Sassafras series) while 18AN29B is situated on loamy sand (2 to 5% slope) of the Rumford series. Investigation of the two sites in the late 1960's recovered artifacts from 18AN29A which date from the Early Archaic through the Late Woodland; the artifacts collected from 18AN29B were primarily diagnostic of the Early and Late Woodland periods (Clark, personal communication, 1979).



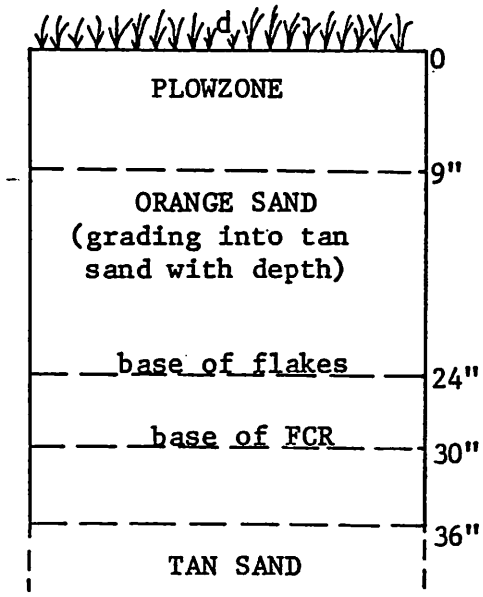
TYPICAL PROFILE AT 18AN23
(from Kinsey 1978: Appendix)



TYPICAL PROFILE AT 18AN29A
(from Kinsey 1979: 35)



TYPICAL PROFILE AT 18AN178
(extracted from Gardner 1978: 6-7)



TYPICAL PROFILE AT 18AN489
(from Curry 1978: Fig. 3)

Figure 3. Representative Soil Profiles.

Kinsey (1979) recovered diagnostic artifacts in buried contexts at both sites. At 18AN29A, two side-notched and two stemmed projectile points (all presumably Late Archaic) were recovered from between 20 and 27 inches below the surface, three cord-marked grit-tempered sherds were found between 6 and 22 inches below surface, and a hearth was located 19 inches below surface. At 18AN29B, one Orient Fishtail point was recovered from 24-30 inches below surface and one plain steatite-tempered sherd was found 16-22 inches below surface; a hearth and debitage were also exposed below the plowzone. A typical soil profile for 18AN29A is shown in Figure 3b.

Baldwin Site - 18AN55 (Figure 2: #4). This site is located on a bluff some 80 feet above (100 feet ASL) an unnamed third or fourth order tributary of the Patuxent River. The Baldwin site, situated on loose, coarse sand of the Galestown series (0-5% slope), is undoubtedly composed of a series of overlapping sites since surface artifacts extend one-third of a mile in an east-west direction. Artifacts diagnostic of the Late Archaic and Woodland periods are scattered over the entire surface of the site (Curry 1977a). However, to date, buried artifacts have been recovered from only the westernmost portion of the site. Here, several chipping clusters (primarily locally available quartzite) and a small number of Late Archaic stemmed and notched points have been found from 15 to 24 inches below surface (Longo, personal communication, 1980). The soil profile is similar to that shown in Figure 3d.

Harundale Site - 18AN178 (Figure 2: #5). Essentially three sites are located on this bluff which overlooks the embayed portion of Marley Creek some 40 to 60 feet below and to the north. Two areas of the site are situated on soil belonging to the Muirkirk series (very thick, sandy surface layer over a red clay lower subsoil), and contain only plowzone deposits dating to the Middle and Late Woodland periods (Gardner 1978). The third area of the site, 18AN178B, actually overlooks a low order stream tributary to Marley Creek and is situated on soil of the Evesboro series (loamy sand, clayey substratum, 0-5% slopes). A single localized buried feature (i.e., a hearth) comprised 18AN178B. Three projectile points were associated with the hearth: two side-nothched points found in the hearth and dating to circa 3000 B.C., and a stemmed projectile point found above the hearth and dating to circa 2000 B.C. (Gardner 1978:16). A generalized soil profile for 18AN178 is illustrated in Figure 3c.

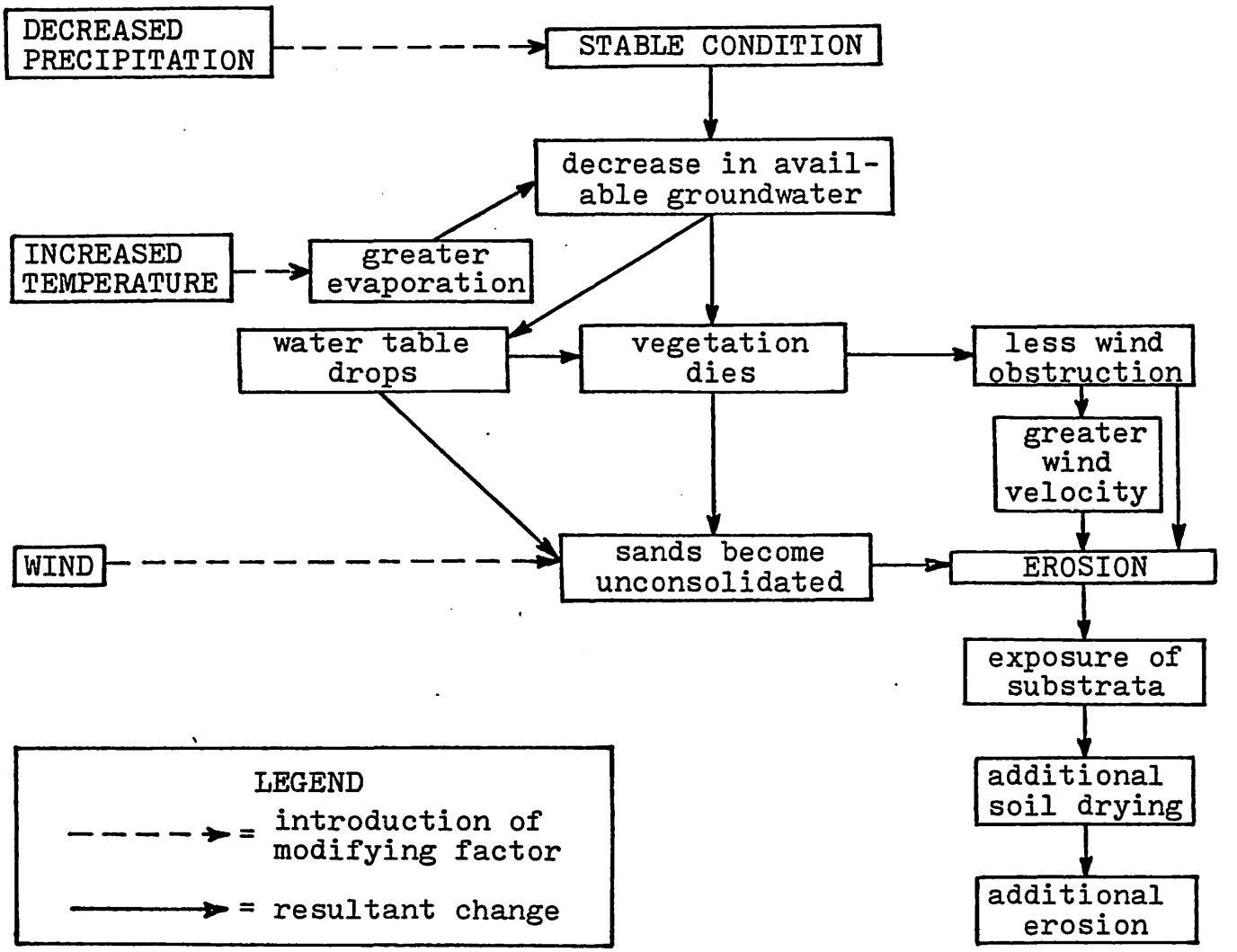
Edwards Site - 18AN408 (Figure 2: #6). Surface examination of this site indicates that it is confined to two low spurs overlooking an ephemeral headwater tributary of Bacon Ridge Branch. The spurs (elevation, 140 feet ASL) are elevated about 20 to 40 feet above the stream channel and are situated on loamy sand representative of the Collington series. Diagnostic artifacts recovered from the surface of the site include Late Archaic and Woodland point types such as Brewerton, Rossville, and Piscataway (Curry 1977b). Recent test excavations recovered a sizeable amount of quartz and quartzite debitage from the southernmost spur to a depth of 20 inches below surface (Epperson 1980). The soil profile for 18AN408 closely resembles that shown in Figure 3d.

Jones Field S Site - 18AN489 (Figure 2: #7). Results of extensive test pitting at 18AN489 indicate that the site is confined to the top (80 to 90 feet ASL) of a spur situated at the confluence of Lower Kitten Branch and Stony Run. The site, located approximately 60 feet above the two streams, is situated on medium and coarse sands belonging to the Rumford series. Late Archaic point types recovered from the surface of the site include Brewerton, Bare Island, and Poplar Island. Although no diagnostic artifacts have been recovered from the subsoil, a biface, fire-cracked rock, and moderate amounts of debitage have been excavated from up to 15 inches below the base of the plowzone (Curry 1978). Figure 3d presents a typical soil profile for 18AN489.

With the possible exception of 18AN29A and 18AN29B, the sites discussed herein are all situated in upland positions which preclude Holocene deposition by alluvial processes. Only 18AN23 is situated such that colluvial sediments could account for even a portion of the deposition responsible for site burial. Hence, aeolian deposition remains the only plausible solution to the question of how these sites were buried. The effect of aeolian deposition on sites in this area of Maryland has been touched on by others. Gardner (1975:4) alludes to aeolian deposition at 18AN178 when he states that "the sandiness of these zones [Ap, B] reflect their origins...as dunes." Later, Gardner (1978:7) concludes that the hearth found at 18AN178B had been buried by wind-blown sand. Both Foss (personal communication, 1979) and Kinsey (1979) postulate that aeolian deposition was responsible for burial of 18AN29A and 18AN29B.

Conditions necessary for aeolian movement of sand include (1) a supply of sand, (2) absence of surface vegetation, and (3) at least temporary dryness (Evans 1978:86). Of course, wind is also necessary, although a mild breeze of only eleven miles per hour is sufficient to begin movement of sand (Foster 1969:217). These factors can be viewed as operating in a somewhat cyclical fashion, with each factor dependent upon the others to ensure continuation of the process while, at the same time, creating circumstances which facilitate the process. For instance, the introduction of a drop in precipitation to a stable environment would result in a lesser availability of groundwater. Less groundwater would potentially have two results: (1) a drop in the water table, and (2) limited devegetation of the more moisture-sensitive flora. In turn, a progressive drop in the water table would result in the death of successively deeper-rooted plants as well as the progressive drying of the sands (i.e., less sediment consolidation) to greater depths. The disappearance of vegetation, likewise, has a two-fold effect: (1) greater susceptibility to erosion of the soil through loss of root networks and groundcover, and (2) less potential wind obstruction, thus leading to higher-velocity winds (Leopold et al. 1964:44). The combination of these factors results in erosion of the surface sediments, thus exposing previously protected substrata to erosion. Figure 4 attempts to illustrate, diagramatically, the various factors which affect wind erosion.

Figure 4. Conditions Affecting Wind Erosion.



The actual movement of sand as a result of wind stems from one of two processes (Strahler 1969:552): (1) saltation, or (2) soil creep. Saltation deals with air-borne sands and is the process responsible for sandstorms. The process begins as the wind forces individual sand grains to roll over, hit other grains, and bounce up. The individual grains follow a curved path through the air and strike the ground with considerable force. However, the grains strike at a low angle, thereby restricting the rebound of sand grains to between three and six feet above the ground surface. The second process, soil creep, is a by-product of saltation and involves downwind migration of sand grains along the surface. Due to the proximity of both activities to the surface, wind-transported sands are not moved great distances (although Evans (1978:72) believes the leap-frog action of saltation may be able to transport sand several kilometers).

The wind-blown sands are deposited in two fashions (Thornbury 1969:294-6): dunes and sand shadows. Dunes are not dependent on an obstruction for formation and result when wind velocity drops below that necessary for suspension of sediment. A common example of dune formation in Anne Arundel County is a parabolic dune which forms on the downwind side of a blowout or deflation hollow. A sand shadow, on the other hand, results when wind which is carrying sand hits an obstruction. The resulting decreased velocity causes the sand to settle on the lee side of the obstacle. Both methods of deposition will be discussed later with respect to archeological sites.

As demonstrated earlier, virtually all of the diagnostic artifacts found buried at these sites are representative of the Late Archaic period (circa 5000 to 3000 B.P.). This period corresponds to the xerothermic maximum achieved during the Atlantic/Sub-Boreal transition at around 6000 to 4000 B.P. (Carbone 1976:200; Ogden 1977:29). This climatic transition period, as described by Carbone (1976:189) for the Shenandoah Valley, was characterized by (1) expansion of oak-hickory forests along the hillsides and valley floors and with reappearance of grassy open areas, and (2) mesic forests restricted to higher elevations and along the floodplain. The Sub-Boreal, beginning at around 3000 B.P., was characterized by a pine dominant-oak accessory forest suggestive of a continued dry, warm period (Carbone 1976:27).

While it is not postulated here that this xerothermic period was one of constant blowing sand in north-central Anne Arundel County, it is believed that localized, seasonal climatic extremes in the marginally stable (warm, dry) environment could easily account for the over three feet of sand deposited in some areas in the past 3000 years. Certainly, this aeolian activity was not restricted to the Late Archaic (possible Woodland burial is evidenced at 18AN29). In fact, even today, during dry, hot summers in Anne Arundel County, vegetation dies off and the sands become highly mobile (Foss, personal communication, 1979). Department of Agriculture surveys show that the majority of the soils in this area are highly susceptible to erosion (see Table 1). However,

Table 1. Soil Data. (Abstracted from Kirby & Matthews 1973)

SOIL SERIES	SOIL TYPE	EROSION HAZARD	SITES INVOLVED
Collington	loamy sand	moderate-severe	18AN408
Evesboro	loamy sand	moderate-severe*	18AN178B
Galestown	loamy sand	moderate-severe*	18AN55
Muirkirk	loamy sand	severe	18AN23 18AN178
Rumford	loamy sand	moderate	18AN29B 18AN489
Sassafras	fine sandy loam	moderate**	18AN29A

* plant cover needed to prevent blowing of soil
** some of original surface layer lost through erosion

based on the dynmaics of aeolian deposition, it is evident that the greatest amount of activity is most likely to have occurred during the Late Archaic. Finding Woodland sites buried by aeolian sands is far less likely due to (1) climate less conducive to causing erosion/deposition and (2) greater chance of plow disturbance due to shallower deposits.

Despite finding artifacts more then three feet below the surface, the integrity of these archeological remains is still in doubt. Almost certainly, some of the features are, in fact, found in in situ contexts. However, several aspects of the aeolian erosion/deposition process necessitate a note of caution prior to accepting all of these buried features as undisturbed deposits.

The main reason for doubting the integrity of the artifacts centers around site deflation. The same process capable of burying a site can also be responsible for eroding it. Hunt (1972:141) posits that modern dunes are usually derived from the reworking of older dunes. Hence, when archeological materials are deposited on sand, aeolian erosion may gradually remove sand from around the artifacts, as in a blowout. The result is deflation of several archeological strata into one collective stratum (i.e., in the same way desert pavement is formed). Subsequent burial of this stratum would produce a seemingly undisturbed archeological feature. Nonetheless, it is unlikely that all portions of these sites are disturbed. In part, cultural features may have served to guarantee at least selective undisturbed burial of portions of the sites. For instance, a hearth lined with stones would both provide resistance to erosion and serve as a wind obstruction, thereby causing deposition in a sand shadow effect. (It is interesting to note that the only sub-plowzone archeological deposit found at 18AN178B was a hearth.) Natural sand shadows (such as individual or small groups of trees or shrubs) may have also served to ensure partial site burial. While areas of a site with more moisture-sensitive vegetation may be susceptible to erosion by deflation during dry conditions, natural wind impediments such as trees could have served to produce sand shadows on their lee sides and, thus, caused burial of other areas of the site.

Hence, we are likely to find that these sites are preserved in something of a checkerboard fashion: (1) artifacts from some areas of the site will be contained entirely within the plowzone, (2) artifacts from other portions of the site will be deflated and compressed into one or several disturbed strata which were later buried, and (3) artifacts will be found in situ.

In order to confirm this pattern of site burial, large areas of sites need to be opened in order to (1) examine the uniformity of intra-site burial and (2) determine the extent of site deflation based on stratigraphic position of diagnostic artifacts throughout the site. In the meantime, it is essential to execute subsurface testing programs during survey investigations in areas such as north-central Anne Arundel County. Both areas previously considered unlikely to contain buried deposits (e.g., upland knolls) and areas lacking artifacts on exposed surfaces (e.g., plowed fields) may contain strata buried by aeolian sands.

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Wayne E. Clark, Maryland Historical Trust, Annapolis.
John E. Foss, Agronomy Department, University of Maryland, College Park.
William Longo, Crofton, Maryland.

GEOGRAPHIC VARIATION IN PREHISTORIC SETTLEMENT OF THE BLUE RIDGE

by

Robert W. Foss
Department of Anthropology
State University of New York
at Binghamton

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Introduction

During the Summer of 1978, a systematic archaeological survey was conducted in the Shenandoah National Park. The park, stretching along the crest of the Blue Ridge for a distance of approximately 100 miles, encompasses a wide range of the environmental variability found within the Blue Ridge physiographic province. The general aim of the 1978 survey was to amass a body of data for making statements about prehistoric settlement and exploitation of the montane region.

The purposes of this paper are: 1) to present a general outline of the results of that survey; 2) to suggest a general model of settlement for the Blue Ridge; 3) to look at the possible development of that model in time and space; and 4) to suggest a series of alternative (or perhaps complementary) hypotheses for explaining observed variation in this model.

I wish to make it clear from the outset that this paper is not intended to provide answers to the questions raised. Although basic descriptive data are available, the hard task of interpreting those data within a holistic ans systematic framework is just beginning. It is my hope that a productive and cooperative dialogue can be generated so that significant gaps in the current data base can be bridged.

Furthermore, while the emphasis of this paper is on specific data from a limited portion of the Blue Ridge, the issues raised extend beyond the artificial boundaries of the Shenandoah National Park. In a more holistic perspective, the approach which is being advocated is that of a cultural ecological view which is concerned

not only with the natural environment, but also with the general social and evolutionary context in which archaeologically recognizable patterns developed.

Survey Design

Perhaps the primary advantage of the Shenandoah survey was that it provided an opportunity to investigate a range of environmental zones within localized settings as well as to look at variation between more widely separated areas. The 1978 survey was specifically designed in order to elucidate these sorts of questions.

The specific survey goals were:

1) To survey large portions of the Park in order to achieve a valid sample of the various environmental zones.

2) To conduct the survey within natural topographic zones so that a picture of the entire settlement/exploitative system could be obtained.

3) To sample areas separated geographically to determine if there were any variations or similarities between widely separated localities.

4) To intensively test a systematically chosen sample of sites with the aim of obtaining representative and comparable collections of the material remains present.

The remainder of this paper focuses on the second and third goals, with the results of the intensive testing program used in order to explicate some of the general patterns which are discussed.

In order to fulfill these goals, the survey was based on a series of transects which transversed the axis of the Blue Ridge from the Piedmont to the Shenandoah Valley. Four Areal Transects were purposely selected in order to maximize the environmental variability in each. In most cases, these Areal

Transects encompassed two major drainages on both the eastern and western slopes of the mountains. Transects were chosen from the Northern, North-Central, Central, and Southern sections of the Park, and together represent approximately 30% of the total area.

Reconnaisance survey was conducted in each of the transects. Sites were located on USGS maps and categorized according to landform association, hydrologic association, elevation, and geologic association. The intensive testing which followed on a selected portion of the sites was aimed at clarifying questions about site size, artifact density, lithic material preferences, and general morphological and functional characteristics of each site's assemblage.

Survey Results

A total of 90 prehistoric sites were located within the four sampling areas. In terms of overall gross statistics, the sites were distributed as follows:

Northern Areal Transect, 11 sites in 31 mile^2
North Central Areal Transect, 38 sites in 21 miles^2
Central Areal Transect, 21 sites in 14 miles^2
Southern Areal Transect, 20 sites in 29 miles^2

This uneven distribution suggests important variation between areas of the Blue Ridge; an issue I will return to in more detail as the paper progresses.

Sites were categorized according to their association with each of seven landform categories. These included: hollows, ridges, gaps, saddles, upland basins, mountain slopes, and foothills. It came as no great surprise that slightly greater than half of the sites (46 of 90) were located in the hollows, near the courses of primary or secondary streams. The prehistoric

importance of Big Meadows is reflected by the high frequency of sites associated with the upland basin landform. In terms of large, heavily utilized areas, the second-most important landform category is the saddle. This was particularly true in the North Central Areal Transect with five saddle associated sites. Ridges, though numerous throughout the Park, accounted for only 8 of the 90 sites in the sample and were all of small size and low artifact density. Much the same can be said of the mountain slope areas. Of 11 such sites in the sample, 7 were clustered near the head of Brokenback Run in the North-Central Areal Transect. Although gap associated sites are generally unimpressive in terms of size and artifact assemblages, they have been found in all gaps surveyed, thus supporting a long held belief that these gaps served as major transmontane routes of communication. Finally, the foothill zones were poorly represented in the sample, but did produce evidence for two sites along the western fringe of the Blue Ridge.

There is a high correlation between landforms and proximity to water sources. It is, therefore, not surprising that majority of the sites were in some way associated with the numerous hollow stream courses. When broken down into more specific categories, however, we find that, while as expected the largest portion of the sites are associated with perennial primary or secondary streams or confluences of two streams, a significant portion of the sites are not associated with reliable sources of water. In fact, 26 of the 90 sites were not in close proximity to <u>any</u> water source. This distribution is contradictory to many previous ideas about Blue Ridge settlement (cf. Gardner 1978: 29-36). These were generally small and low artifact density

sites which suggests the transient nature of these sites and possible functional differentiation.

The distribution of sites by elevation indicates that mid-range elevations, between 1500 and 3000 feet above sea level, account for greater than half of the sites in the sample. Majority of the larger sites were located in these mid-range zones. Not only are these areas ideally situated with respect to available water sources, but also they allow a central location for the exploitation of both lower and upper elevations.

When the sites were categorized by their geologic association, it is found that with the sole exception of quarry activities related to the Erwin quartzite formation on the western edge of the Blue Ridge, there is no significant correlation between geologic setting and site location,

Twenty-one of the 90 sites were intensively tested and have provided data for comparative purposes. Determination of site sizes proved difficult due to heavy vegetation. Although site size often seemed to correlate with available habitable area, it was usually possible to identify areas of heavier utilization within the larger areas. Sizes ranged widely from a few square meters up to several hectares, with sites falling into all intermediate sizes.

One measure of variability used was that of artifact density. This measure is expressed as the number of artifacts recovered from the equivalent of one cubic meter of soil. Density measures ranged widely among the sampled sites, from lows of less than 100 per cubic meters to high figures in excess of 1500 per cubic meter. In one case, at a quartzite workshop site, artifact density for the upper 10 centimeter level was

in excess of 30,000 per cubic meter.

Lithics comprised the overwhelming majority of the artifactual material at all sites. Of several materials available for use by prehistoric populations, quartzite constituted the predominant lithic type at all but two of the 21 tested sites. Second in frequency was quartz, which was most frequent at one of the sites. Third in importance were cryptocrystalline materials including cherts, jaspers, and chalcedony. This material was predominant at only on of the survey sites. Other material (Greenstone, rhyolite, slate, etc.) were generally infrequent. It seems clear from these data that, with the exception of sites associated with the quartzite formations, majority of the lithic material utilized was being transported into the mountains.

Functional analysis of the material suggests several features. In the first place, recognizable tool categories were generally infrequent at all sites. When available, these tools suggest predominantly hunting related activities, with projectile points knives and scrapers being the most common. In addition, several of the sites produced evidence of woodworking in the form of chipped stone axes and a variety of notched flakes. Fire proof vessels, including stone bowls and ceramics, were associated with several of the sites.

General Model

All of the various lines of evidence argue that previous models of Blue Ridge settlement which lump sites into general categories such as "transient camps" (Gardner 1978) or "simple camps" (Holland n.d.) are glossing over a wide range of variability in Blue Ridge sites. What these data suggest is

a recognizable hierarchy of sites which are articulated in a complex, overall settlement/exploitative system. The typology suggested here is analagous to that used by Custer in his work in the New River area (Custer 1979).

Based on a variety of criteria, including site size, artifact density, proximity to water, and artifact diversity, we can identify four general categories of sites within the Blue Ridge and further suggest the existence of a fifth type outside of the mountains. These types are viewed as functional grades and there is, therefor, no necessary evolutionary relationship postulated between them.

Grade 5 sites, or what we may term "Primary Base Camps" are large, functionally diverse sites situated either in the Piedmont or the Shenandoah Valley. "Secondary Base Camps", our grade 4 sites, are the largest and most diversified sites located within the mountains. These are generally situated in mid-elevation areas of hollows, on saddles near reliable springs, or in the upland basin landform at Big Meadows. Smaller, grade 3 sites, or exploitative camps, are generally situated near springs or along intermittent streams. Functionally less diversified than the secondary base camps, these sites may have been laocated in order to exploit a single, locally abundant resource. Grade 2 sites, or exploitative or transient stations, are the most ephemeral sites in the mountains. These are probable associated with single activities and, in many cases, may have been occupied only one time. The final site type, grade 1, is reserved for quarry and workshop activities, such as are found along the Erwin quartzite formation.

Each of these sites is seen as a component in a larger

eploitative system. It is suggested that seasonal migrations of populations from the more permanently settled Primary Base Camps would enter the Blue Ridge and occupy the Secondary Base Camps for period from several weeks to several months at a time. These grade 4 sites are seen as staging areas for wider exploitation of surrounding environmental zones, each ebing associated with a number of smaller Grade 2 and Grade 3 sites.

Chronology

In order to substantiate the relationships postulated within this settlement model, there is a need for rather explicit chronological controls. Unfortunately, such controls are seldom available for the Blue Ridge sites. In fact, only 14 of the 90 sites located in the survey have produced chronologically diagnostic artifacts. Such a paucity of dating materials necessitates a broader consideration of sites in the Shenandoah National Park. By taking a larger perspective we have a total of 60 sites with diagnostic material out of 171 sites presently known.

In very brief outline, we find that the earliest evidence for exploitation of the Blue Ridge occurs during the early Archaic period, with 13 identified sites. Twenty sites are known dating from the middle Archaic. During the late Archaic we find a flourescence of settlement with 34 sites providing evidence of occupation. This frequency drops of sharply during the Woodland period, with only 27 identified early Woodland sites and 17 late Woodland.

The Settlement Model in Time and Space

Working from this rough chronological perspective, we can begin to trace the development of the postulated model of Blue Ridge settlement.

During the early and middle Archaic periods, sites were sparsely distributed throughout much of the Park area. In terms of landform association, they are restricted predominantly to the hollows, foothills, and saddles. There are no clearly defined patterns of exploitation evident from either survey data or from the larger body of available information. Apparently, during this time span, populations were beginning to explore the mountain region, discovering the utility of the extensive quartzite deposits, and establishing some rudimentary campsites scattered throughout the mountains.

When looking at the distribution of sites dating from the late Archaic and early Woodland periods, we find that, not only are there more recognizable sites, but also they are both extensively distributed and, more importantly, beginning to concentrate in selected areas. Late Archaic and early Woodland sites follow similar patterns of landform distribution, with sites of both periods found in all seven of the landform categories. What is most significant for the overall model, however, is that during these time periods we can first recognize the establishment of a developed settlement system as outlined earlier.

By the late Woodland, populations no longer appear to be occupying and exploiting the same range of environmental zones as found during the preceding periods. Rather, we find late Woodland sites restricted, almost exclusively, to mid-hollow areas, where large Grade 4 secondary base camps represent the primary

manifestations of this period. This suggests a probable intensification and specialization of resource exploitation in contrast to the diffuse base suggested by the earlier pattern.

The evidence for this developmental pattern conforms to the sorts of changes hypothesized by Custer (1978) as responses to environmental changes. The general warming and drying trends associated with the period around ca. 3000 BC probably induced a greater interest in the montane region so that we find late Archaic populations exploiting previously little-utilized zones. The articulation of the settlement system further suggests that new patterns of scheduling were also developing in the seasonal round. Furthermore, the introduction and utilization of, first, the steatite bowl and, later, the ceramic container represents a new tool form associated with basic changes in subsistence activities.

Up to this point, I have considered the general settlement system and its development as if it applied equally to all areas of the Blue Ridge. Such is not, in fact, the case; as I alluded to earlier in this paper when noting the discrepancies between the Areal Transects. These discrepancies argue that there are important differences in settlement and exploitation of various areas of the Blue Ridge.

Two specific measures of this variation are noted. In the first place, there are differences in gross density of site distribution between the sample areas. Both the North-Central and Central Areal Transects contain numerous sites; sites which date throughout the entire span of Blue Ridge occupation. The Northern Transect, on the other hand, was hardly exploited at all, with only one heavily occupied are located.

The other measure is a crude index of the "maturity" of the settlement system which we see as simply the frequency of various site grades in the samples. By this measure, again the North Central and Central Transects demonstrate well developed exploitative systems. The Southern Transect, while containing numerous sites, is almost totally devoid of sites suggestive of other than very temporary or very specialized (that is, quartzite quarrying) activities. Moreover, an earlier (but less systematic) survey of Paine Run, another southern section drainage, yielded evidence for a "mature" system analagous to that found in the North Central and Central Transects.

Clearly then, the aim of surveying geographically separated areas has enabled us to avoid making rash and all-inclusive statements about Blue Ridge settlement based upon only a small sample. Had the survey focused solely upon the Northern Transect, we may have been forced to conclude that prehistoric occupation of the Blue Ridge was insignificant. On the other hand, had conclusions been based solely on the results from the North-Central Transect they would have overstated the overall intensity of settlement.

Explaining the Variation: Some Alternative Hypotheses

The problem confronted is clear: Why were some areas of the Blue Ridge more intensively exploited and settled than others? I have no simple answer to the question, though several alternative explanations can be suggested. Generally, the hypotheses suggested fall into four categories: archaeological, ecological, demographic, and social.

We must consider the possibility that the observed variation in site distribution is due to errors in archaeological sampling. Though I can make no claims to have covered 100% of the transects, nor that some sites were not located due to vegetation or other reasons, this possibility seems unlikely given the magnitude of the observed differences.

Ecological factors have great explanatory power and several hypotheses based on environmental conditions can be considered. Differential distribution of resources between areas could explain the observed variation. These would include such considerations as differences in the types of resources available, differences in the frequency of econtonal or edge areas, and differences in the density or biomass potential.

Differential distribution of prehistoric populations can be seen as a possible demographic explanation. If there simply were no primary base camps near the sparsely settled areas of the Blue Ridge, then we would not expect development of the postulated exploitative system. Given current ideas about prehistoric population density, however, this alternative appears unlikely.

Finally, in the social realm we may be seeing the manifestations of long termed development of traditional patterns of subsistence. Under this hypothesis, locally based groups exploited (or did not exploit) the mountains simply because the always had (or never did).

Conclusion

In concluding this paper I would like to say that we should become wary of a tendency to seek ultimate explanation of cultural process in a form of environmental determinism. While I would

be among the first to agree that environmental changes must have been accompanied by corresponding shifts in the subsistence bases and settlement patterns, such an awareness of the close interrelationships between culture and environment is only a portion of a larger picture. This is to say that even though we may confidently predict cultural change in response to environmental change, the actual content of those changes are not so easily predicted.

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ANALYSIS OF AN EARLY ARCHAIC ACTIVITY AREA AT THE THUNDERBIRD SITE (44 WR 11).

Joseph M. McNamara
Division of Archeology
Maryland Geological Survey

Abstract. Arbitrary levels necessary in excavation may become impractical and restrictive during artifact distribution studies. The lithic material from the Early Archaic levels of Area 4 from the Thunderbird Site (44 WR 11) are studied by isolating specific lithic types, thereby removing much of the inherent bias of arbitrary levels. The association of debitage to tools within a lithic type and the measurement of spine-plane angles for utilized flakes is useful in inferring curated and/or expedient activity behavior from the archeological contex.

ANALYSIS OF AN EARLY ARCHAIC ACTIVITY AREA AT THE THUNDERBIRD SITE (44 WR 11)

Joseph M. McNamara
Division of Archeology
Maryland Geological Survey

Introduction

The settlement model proposed by Gardner (1972:22) of Paleoindian and Early Archaic occupations in the Middle Shenandoah Valley, consists of relatively permanent, multi-purpose base camps in the floodplains and transitory limited camps in the uplands. The principle reason for settlement in the area is believed to be the extraction of jasper from the source of its occurence and the refurbishment of the tool kit. The Thunderbird site represents a multi-purpose quarry related base camp situated on the south facing slope of the then shallow and wide Shenandoah River. As can be expected, the artifacts recovered from such sites should be related to daily maintenance activities and to the refurbishment of the tool kit, whereas the upland hunting sites are expected to be of a specialized nature exhibiting parsimonious use of lithic raw materials away from the quarry base camps.

The aim of this paper is to highlight the results of an analysis of Early Archaic levels from a portion of the Thunderbird site (44 WR 11), a stratified Paleoindian through terminal Early Archaic period site in Warren County, Virginia. Research at the Thunderbird site began in 1971 as the core of the Flint Run Complex and has continued to the present. The data that forms the heart of this study was excavated during the 1971-1975 field seasons.

The basic method of analysis is the visual detection of nonrandom clusters of debitage and tools by determining artifact provenience from excavation floor maps. It is hypothesized that the spatial analysis of debitage and related tools from specific cores can help determine the existence of either a curated or expedient technology or both. A curated technology is distinguished by the discard of the tool(s) when it is broken or worn out. Tools produced in this manner are removed from the area of manufacture. Therefore, a curated technology can be distinguished by either worn or broken tools with no associated debitage, or by chipping debris with no finished tool association. An expedient technology is the manufacture, use, and discard of a tool in one place. Expedient activities should be distinguished by finished tools and their fragments associated with debitage from their manufacture. In addition, the measurement of edge angles for all utilized unmodified and retouched

flakes should reflect whether the selection of flakes for activity use may have been random or not.

Environmental Setting

The Flint Run Complex is situated in the northern end of the Shenandoah Valley. The valley is drained by the North and South Forks of the Shenandoah River, which join just north of Front Royal, Virginia. The two forks flow in a north to northeast direction separated by Massanutten Mountain which rises abruptly over 2000 feet above the valley floor. The Flint Run Complex is located between the Massanutten Mountains to the west and the Blue Ridge system to the east in the valley of the South Fork. The Thunderbird site is located on the inside of an incised meander of the South Fork on its west side. Paleoindian and Early Archaic components are found in the stratified deposits at the edge of a buried terrace and extend upslope where they become mixed in the plow zone on the remnant surfaces of old alluvial fans.

Area 4

At Thunderbird the Early Archaic is defined by its stratigraphic location above Clovis and Mid-Paleo components and the presence of Palmer and Kirk corner-notched projectile points (Figures 1 and 2). The artifacts considered in this study came from Area 4 situated on the buried terrace (Figure 3). Stratigraphically, the Early Archaic components in Area 4 are contained in arbitrary levels 3, 4, and 5. Within these levels two artifact concentrations, S190 line (8' x 15') and Feature #39 (7' x 17') extend over portions of five 10' squares (Figures 4 & 5) The size and shape of these concentrations are in direct contrast to some of the well-defined jasper chipping clusters examined by Gross (1974) in the lower Paleo levels, which appear to represent an individual's one-time activity. In comparison, the large sprawling Early Archaic concentrations display a wide variety of jasper types and may be a result of repeated short term visits.

The S190 line appears in the north half of Area 4 in S190E710 and S190E720 and is defined by high lithic quantities (Table 1). The other well-defined activity area is Feature #39 in the south half of Area 4. It consists again of a large quantity of lithic cultural material mixed with and overlying a gravel lens. It extends from S205E700 into portions of S200E710 and S210E710. Feature #39, unlike the other activity area, appears to have a distinct boundary prescribed by the limits of the gravel deposit.

TABLE 1

ARTIFACT COUNTS FROM EARLY ARCHAIC LEVELS - AREA 4

	3	4	5	TOTALS
S190E710	785	2564	2558	5907
S190E720	682	1515	1098	3295
S200E710	277	556	574	1407
S210E710	199	387	599	1185
S205E700	382	639	585	1606
Feature #39				4302
			TOTAL	17,702

FIGURE 1

Thunderbird Chronology

Regional	Thunderbird	Time Range
Paleoindian	Fluted Point Phase	ca
Early	Clovis Sub-Phase	11,000 B.P.
Middle	Middle Paleo Sub-Phase	
Late	Dalton Hardway Sub-Phase	
Early Archaic	Corner Notched Point Phase	
	Palmer Sub-Phase	10,000 B.P.
	Kirk Sub-Phase	9,000 B.P.
	Side Notched Point Phase	
	Kirk A Sub-Phase	
	Warren Sub-Phase	ca, 7,000 B.P.
Middle Archaic		

Figure 2

Thunderbird Floodplain: Archeological Cross Section
(Modified from Gardner 1972)

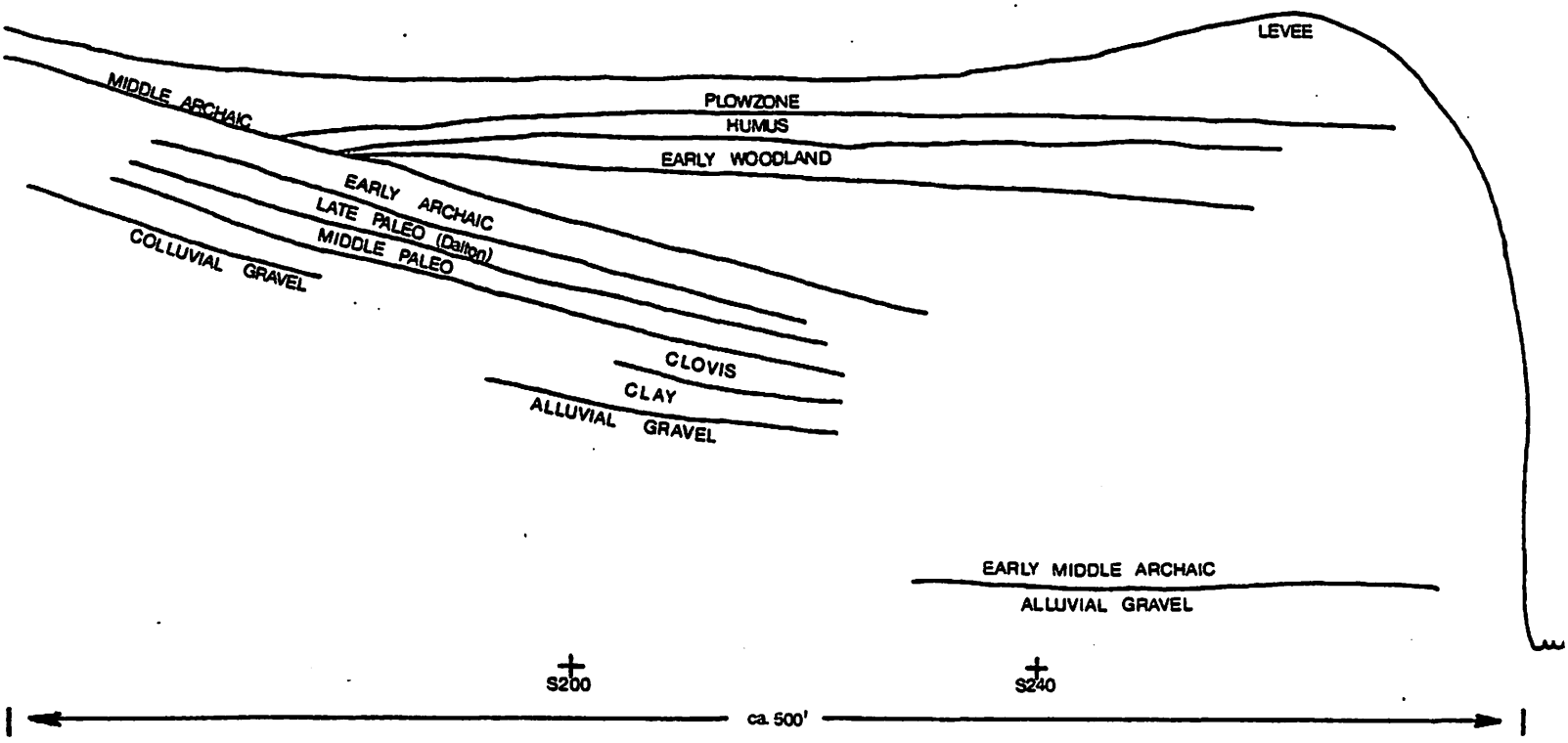
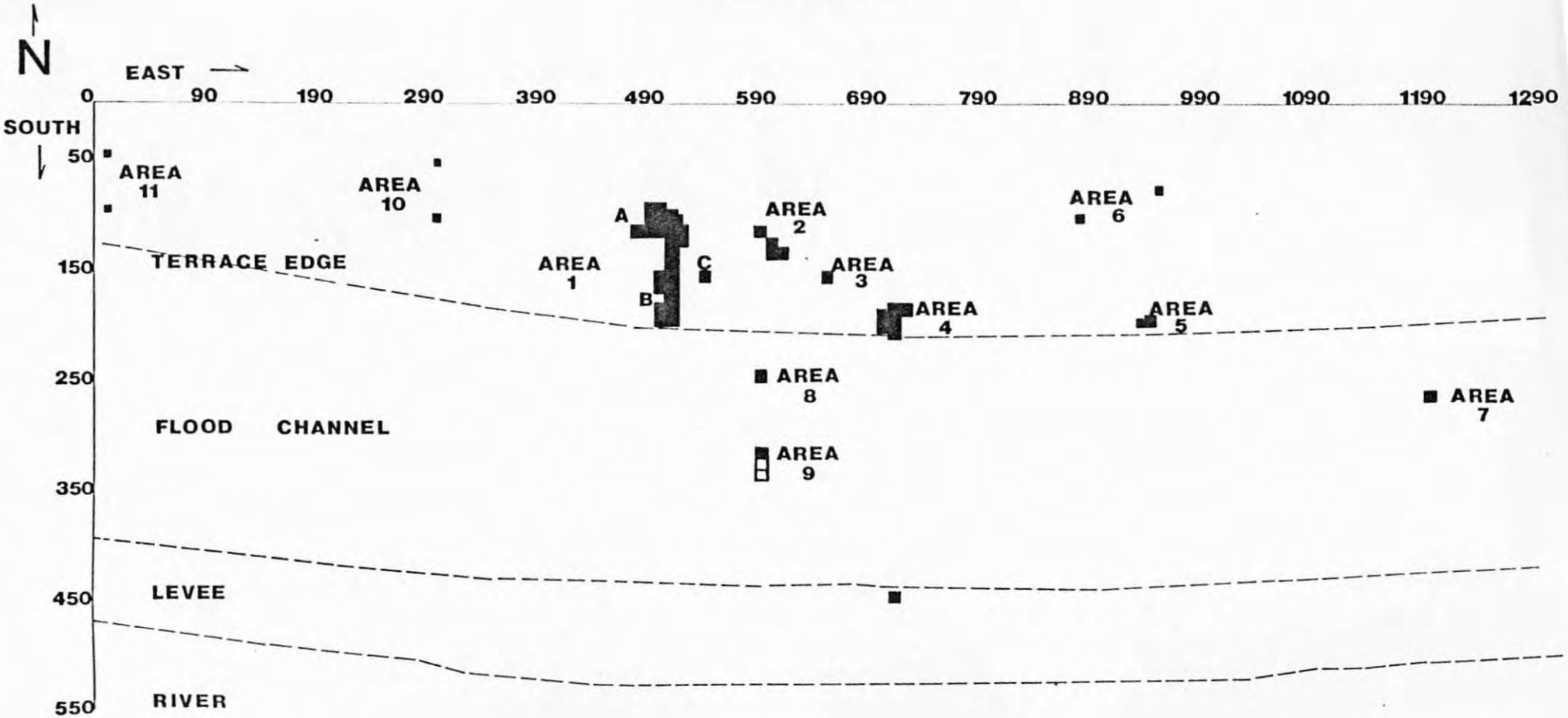


Figure 3

EXCAVATION PLAN

THUNDERBIRD



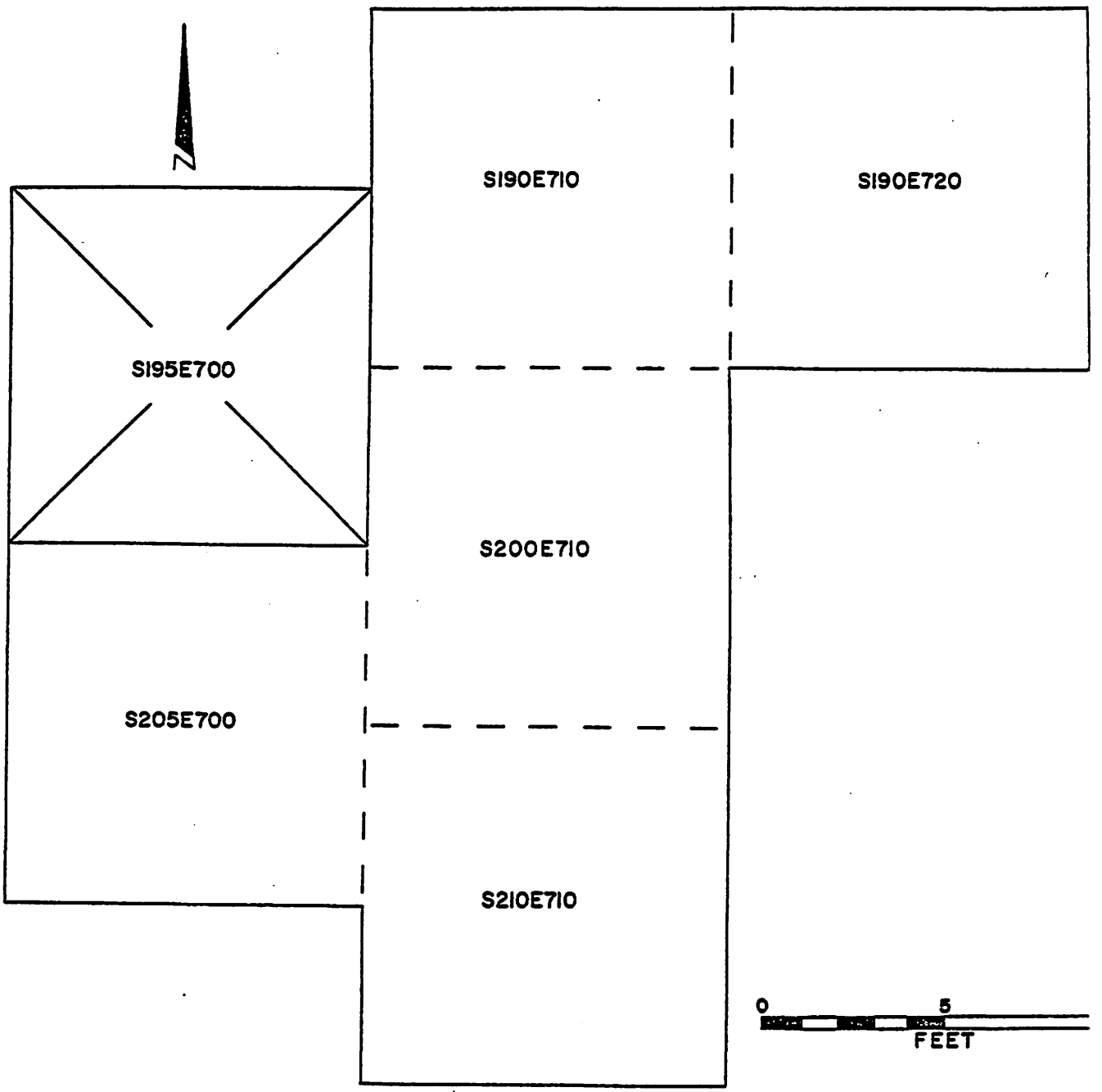

N
S190E710
S190E720
S195E700
S200E710
S205E700
S210E710
0
5
FEET

Figure 4

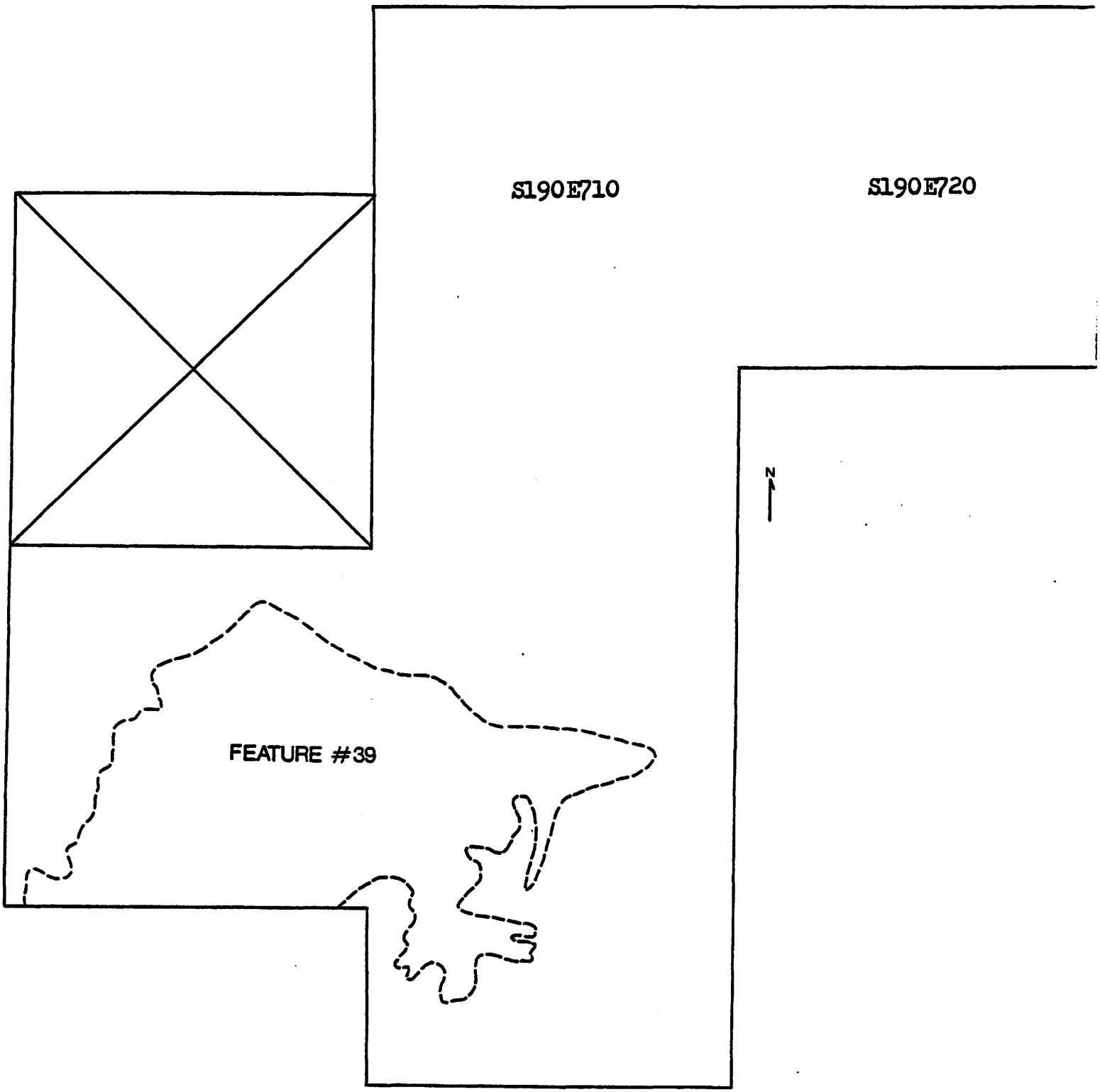


Figure 5

Analysis

Forty-five of some 200 different lithic types identified from the Early Archaic levels of Area 4 were chosen for study with 25 of the lithic types from the S190 line and 20 from Feature #39. Lithic types, predominantly jasper, were chosen because of their distinctive qualities that allowed an accurate sorting of refuse. Gross (1974), working with Clovis chipping clusters, observed that:

> 1) "Because the removal of a quantity of flakes from a single core results in a mass of chippage having low variation in color, texture, banding, translucence and crystal inclusions, the common origin of these is easily recognized.
>
> 2) The elements contributing to the variation of the flakes from any single core may be used as guides for fitting these flakes together into their original mass." (Gross 1974:100)

Gross was successful in reconstructing several chipping clusters, however, no attempt to do so is made in this study. The fact that refuse groups could be discerned in Clovis levels suggests that refuse sorting would be possible in the large Early Archaic concentrations. In Area 4 the sorting of Early Archaic lithic types was strictly judgmental. Types were derived solely by subjecting the universe of Early Archaic mapped artifacts from Area 4 to the attributes enumerated by Gross (1974:100). Each lithic type was plotted on a set of maps and a visual analysis was made to determine the degree of clustering. The idea behind isolating specific lithic types and tool categories and mapping their distribution was to determine if recurring patterns of discard can be observed. Spine-plane angles were recorded on all utilized artifacts using a stainless steel goniometer with 0° to 180° opposite graduations. Emphasis was on the measurement of only the spine-plane angle as a means of determining the degree or type of unmodified flake selected for recycling.

Tables 2 and 3 summarize the 45 lithic types and indicate which types display a degree of clustering. Among the 25 types from the S190 line (Table 2) some form of nonrandom patterning was visually detected among 15 types. Of the 15 types, those with more artifacts showed a higher degree of nonrandom patterning. Nonrandom patterning within a lithic type is arbitrarily determined by the visual aggregation of artifacts of the same lithic type (cf. lithic types 0140 and 0141, Figures 6 and 7). Tables 2 and 3 distinguish between diffused, loose and no groupings. The diffused clusters coincide with the more populous types and may represent a longer episode of chipping, therefore a greater chance for patterned debitage accumulation. Diffused clusters contain

TABLE 2

S 190 LINE

TYPE	GROUPING	BIFACES	RETOUCHED UTILIZED FLAKES	UNMODIFIED UTILIZED FLAKES	TOTAL ARTIFACTS
0136	Loose	1	0	4	110
0137	No	0	0	0	20
0138	No	1	0	0	12
0140	Diffused	0	0	0	69
0141	Diffused	0	0	0	154
0142	Diffused	0	1 (Graver)	1	172
0144	No	0	0	0	44
0146	No	0	1	3	27
0147	No	1	0	0	26
0148	Loose	0	1	0	21
0149	Loose	2	0	0	21
0150	Diffused	0	0	1	26
0151	Diffused	0	0	0	92
0153	Loose	0	1	0	31
0155	Loose	0	0	1	35
0156	Diffused	0	1	0	35
0160	Diffused	1	0	2	107
0163	No	0	2	1	34
0169	Diffused	0	0	0	34
0172	No	1	0	3	31
0174	No	0	0	0	3
0181	No	1	0	2	40
0183	Loose	0	2	1	77
0189	Loose	1	0	0	12
0139	No	1 (Projectile Point)	0	0	3
	TOTALS	10	9	19	1,236

TABLE 3

FEATURE # 39

TYPE	GROUPING	BIFACES	RETOUCHED UTILIZED FLAKES	UNMODIFIED UTILIZED FLAKES	TOTAL ARTIFACTS
0003	Loose	0	0	1	17
0005	Diffused	0	0	0	35
0007	Diffused	0	0	2	31
0008	No	0	0	0	16
0010	No	0	0	0	12
0011	Diffused	0	1	2	28
0014	Loose	0	0	3	19
0016	Loose	0	2	8	34
0017	Loose	0	0	1	23
0019	Loose	1	1	1	16
0022	No	0	2	0	11
0023	No	0	2	0	13
0025	Loose	0	1	0	11
0026	Loose	0	1	3	21
0028	Loose	0	0	0	21
0030	Diffused	0	0	6	45
0035	Loose	0	0	0	19
0066	Loose	0	1	2	14
0067	Loose	0	0	2	16
0069	Loose	0	0	1	7
	TOTALS	1	11	32	409

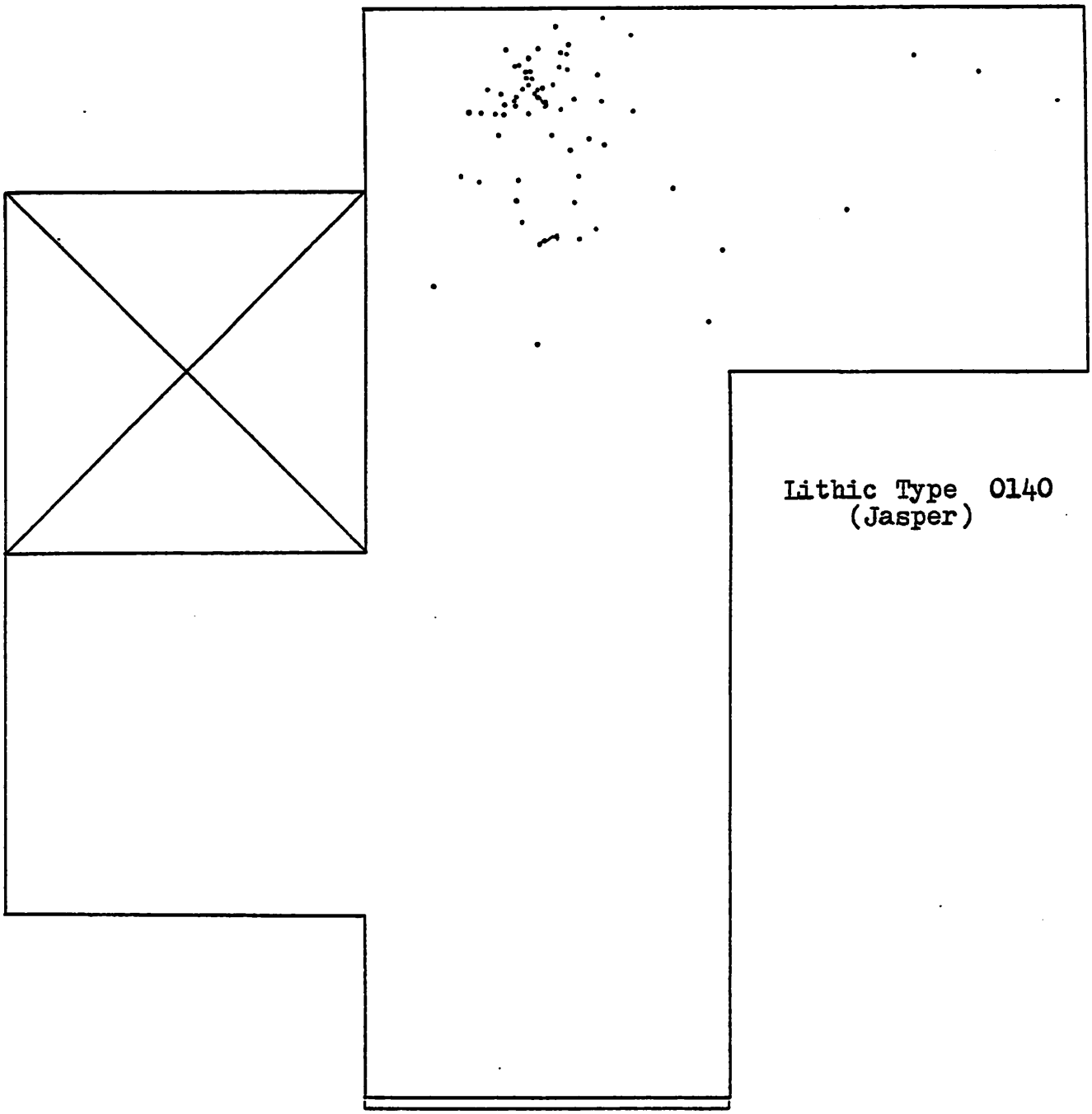


Figure 6

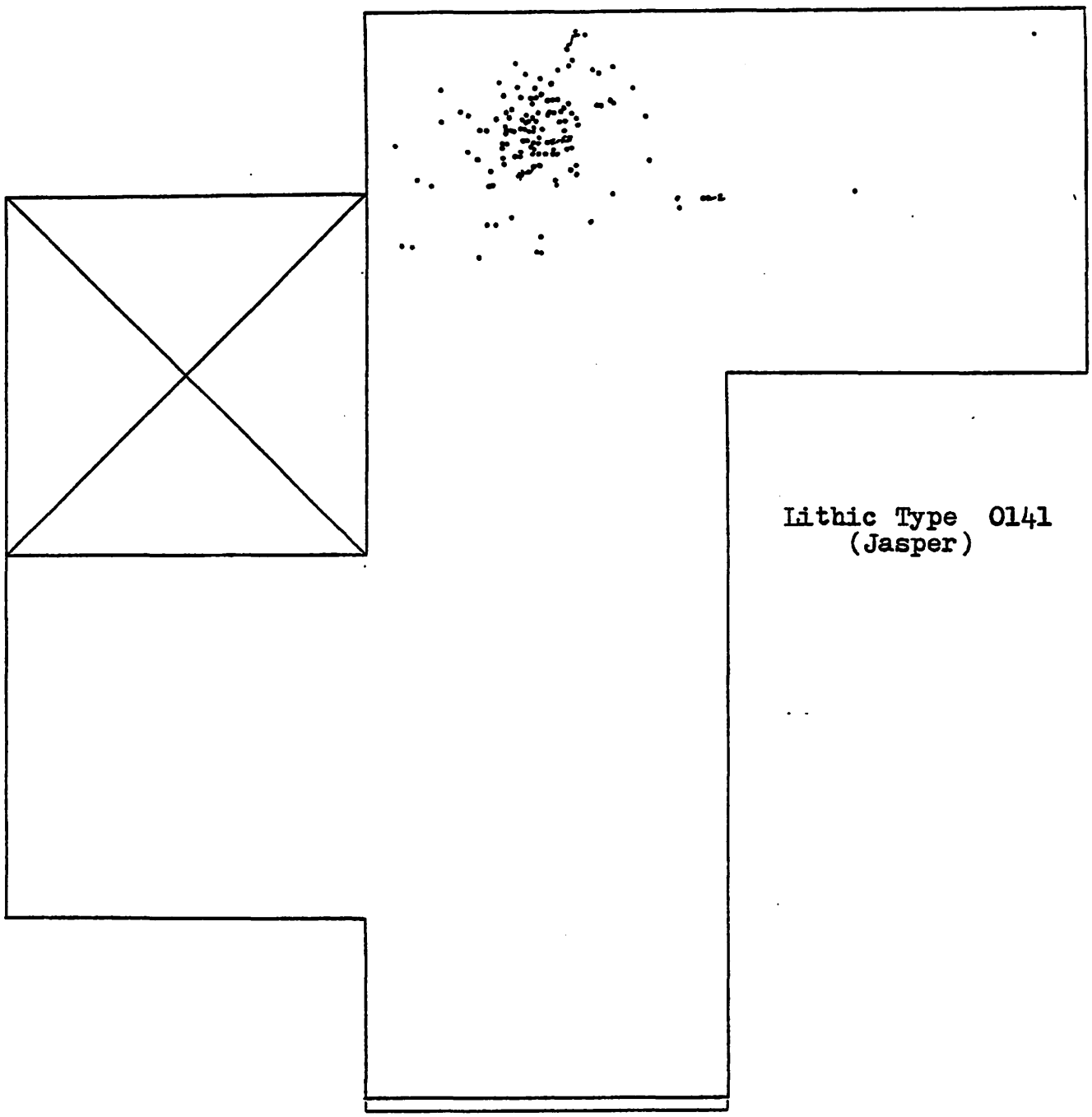


Figure 7

a central nucleus from which the remainder of artifacts radiate. In Table 2 the 8 types categorized as diffused clusters range from 26 to 172 artifacts. In all but type 0151, the concentration of artifacts was in the north half of the S190 line (north of S185). It can be assumed that several of these diffused clusters overlap with one another and may have been produced by the same flintknapper during a single sitting. This may be the case between types 0140, 0141, 0150 and possible 0156 and 0160.

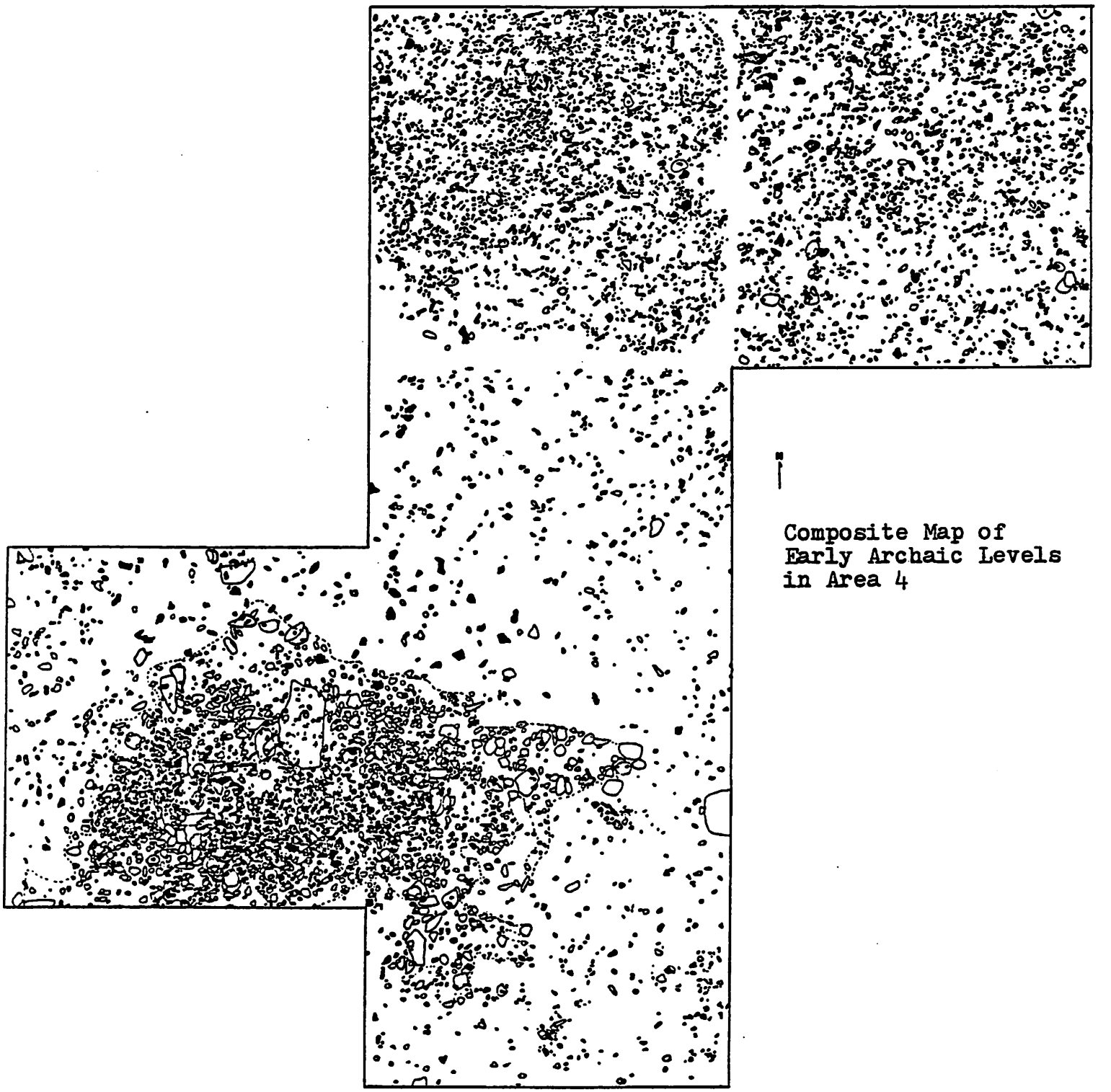
From Feature #39, four clusters have been categorized as diffused (Table 3). These aggregates range in size from 28 to 45 artifacts and when compared to the totals of the S190 line they overlap only 3 of 8 diffused clusters. Most of Feature #39 is in the south half of S205E700 and the NW quadrant of S210E710. The high degree of overlap which occurs in the Feature seems to correspond to the more elevated portions of the natural gravel deposit. As a result, it cannot be assumed that overlap of different types resulted from one individual's work. One possible overlap is between lithic type 0016 and 0030, however, unlike the debitage overlaps of 0140 and 0141, these 2 types have a working area that overlaps. Six unmodified utilized flakes and 2 retouched utilized flakes from type 0030 and 8 unmodified utilized flakes from type 0016 are distributed in the SE quadrant of S205E700.

Lithic types lacking cohesive centers but retaining a degree of aggregation are called loosely grouped. Along the S190 line there are 7 types that fall in this category. Of the 7, four are completely contained in S190E710. Only type 0189 is located firmly in S190E720. Some of the loosely grouped types do overlap, however, the lack of cohesive centers prevents temporal inference. From Feature #39 twelve lithic types fall in this category. Unlike those in the S190 line which range from 12 to 110 artifacts, Feature #39 averages only 17 artifacts.

From the S190 line and Feature #39 a total of 498 mapped bifaces and utilized flakes are listed with 305 from the S190 line and 193 from Feature #39. The most abundant tool categories are utilized unmodified flakes and retouched utilized flakes. Bifaces from the S190 line and Feature #39 are not considered to be tools but rather products of stone tool manufacture. Their distribution is similar to that of the utilized unmodified flakes and retouched utilized flakes. From the S190 line, 183 utilized unmodified flakes and 45 retouched utilized flakes were recovered <u>in situ</u> versus 136 utilized unmodified flakes and 31 retouched utilized flakes from Feature #39. Forty-six (46) bifaces and/or fragments of bifaces were recovered from the S190 line as opposed to only 14 from Feature #39.

The overall distributions of the tools (Figure 8) is similar to that of the debitage and can be compared to Figure 9 for a total picture.

Figure 8



Composite Map of
Early Archaic Levels
in Area 4

Figure 9

In Feature #39 the main occurrence of utilized unmodified flakes coincides with the center spine of the feature. Utilized unmodified flakes from the S190 line are dispersed throughout S190E710 and S190E720 with a greater number from the former. Figure 9 shows the distribution of artifacts in both areas and illustrates the compactness of Feature #39 and the western half of the S190 line (S190E710). The distribution of the retouched utilized flakes though not as numerous as the utilized unmodified flakes reflects the same context. Since the unmodified and retouched categories of utilized flakes are associated with the areas of detritus accumulation, it is assumed that they represent individual episodes of selective recycling. Brose (1975) in his microscopic analysis of experimentally produced lithic tools, indicates that animal fats accumulate rapidly on the cutting edge of significant numbers of stone tools, thus limiting the effective functional use of the cutting edge from 3 to 4 minutes. At sites proximate to lithic outcrops, such as Thunderbird, utilized artifacts can be discarded frequently without a need for parsimonious concerns. In Area 4 where quantities of debitage exist, activities such as butchering could be expected to make use of the available waste flakes. The short functional life of the utilized artifact would necessitate the use of flakes that require little or no modification, such as the utilized unmodified flakes. Therefore, in areas of abundant lithic resources involving activities that away from the quarry would necessitate frequent resharpening, dulled or worn artifacts can be replaced quickly with little or no modification by utilizing previously abandoned debitage. If such recycling was done selectively, and if Wilmsen (1968) is correct, the measurement of spine-plane angles for all utilized flakes should determine if the selection of flakes was random or not.

The spine-plane angle is measured from the plane of the ventral surface of the flake to the plane of the dorsal surface which is nearest the utilized edge. Wilmsen (1968) and others believe that the spine-plane angle is a determining factor in limiting the effectiveness of an edge in a particular task. In his analysis of lithic materials from 8 Paleoindian sites, he notes that edge angle (spine-angle) values display "a distribution with peaks in the 26° to 35°, the 46° to 55°, and the 66° to 75° range" (Wilmsen 1968:985). Wilmsen explains these peaks as being representative of different functional uses and suggests the following general categories of effectiveness: (1) 26° to 35° - cutting operations (butchering); (2) 46° to 55° - skinning and hide-scraping, heavy cutting of wood, bone or horn and tool-back blunting; (3) 66° to 75° - woodworking and bone-working.

From Area 4 both the S190 line and Feature #39 display a very similar pattern of spine-plane angles. Spine-plane values for both areas are characterized by a prominent peak between 20° and 25° which accounts for 36% (S190 line) and 30% (Feature #39) of the utilized flakes from each concentration. Two other sets of edge values can also be discerned for both areas, however, both are typified by a wide range. Table 4 demonstrates the similarity of edge angle groupings, range and cumulative frequencies between the S190 line and Feature #39.

TABLE 4

Spine-Plane Angle Series

S190 Line			Feature #39		
Series	Range	Percent	Series	Range	Percent
20°-25°	6°	36%	21°-25°	5°	30%
38°-65°	28°	43%	38°-62°	25°	36%
69°-81°	13°	12%	64°-77°	14°	18%
Outside Series		9%	Outside Series		16%
		100%			100%

The striking parallels of Table 4 between the S190 line and Feature #39 imply that the activities or sets of activities of the 2 areas are similar. The inferred functional tasks proposed by Wilmsen for edge angle groupings can be considered applicable in Area 4, however, functional uses of utilized flakes should be a topic pursued in future experimental research.

Conclusions

Lithic waste from tool manufacture comprises the major artifact class in Area 4. These artifacts pass quickly from manufacturing to discard as the by-products of tool-making. Removal of waste flakes from the lithic refuse returns these artifacts to use in the cultural system. Those artifacts not recycled exit the cultural system as abandoned refuse.

The 45 lithic types number 1,645 artifacts and represent 9% of the artifact total for Feature #39 and the S190 line combined (cf. Table 1). Twenty-seven of the lithic types investigated contain retouched utilized flakes and/or utilized unmodified flakes (cf. Tables 2 and 3). Only one of the 45 types (0139) includes a prepared tool (a chalcedoney Palmer projectile point). The almost complete absence of prepared tools from the sample of 45 types submits to the definition of a curated technology for prepared tools. In contrast, the relationship within a lithic type of utilized unmodified flakes and retouched utilized flakes to other elements of the type suggests that in every instance but one (Type 0016), utilization occurred away from the midpoint of the lithic type. From this it can be implied that recycling of selected chippage was not associated with the episode that produced the debitage.

The prevalence of utilized flakes as compared to prepared tools signifies a distinction between the curation of prepared tools and the expedient use of available chippage from tool production. The possibility that purposeful flake manufacture was practiced consistently is unlikely because of the large amount of unused chippage for each lithic type. If flakes were produced on an as-needed basis, a greater number of utilized flakes per lithic type would be expected as may be the case with type 0016. The clustering of spine-plane angles (cf Table 4) delineates 3 groupings of utilized edge angles. The range in degrees of utilized flakes are reflected in both the S190 line and Feature #39, including

a very tight cluster between 20° and 26°. Functional use studies by Wilmsen (1968, 1970), Brose (1975) and others have associated low edge angle use with cutting and butchering operations. The quantity of flakes with low edge angles support the hypothesis of selective recycling of chippage on the basis of edge angles.

In summary Area 4 can be divided into 2 types of activity. The first is the manufacture of stone tools, which is responsible for the durable elements that comprise the formation and initial structure of Area 4. Second are the use activities that appear to have made advantageou utilization of the discarded chippage, and in so doing created their own patterning by modifying the initial chipping patterns. The first activity curates the end product, while the second makes expedient use of the former's by-products. Therefore, repeated tool manufacture along the terrace edge created an accumulation of lithic debris of various shapes, sizes and edge angles. The concentration of lithic waste became a source of lithic materials for activities that did not require specially prepared tools. These non-tool manufacturing activities at Area 4 made expedient use of selected flakes, discarding them at the termination of their usefulness.

Future analysis of Early Archaic materials from Thunderbird should emphasize more definitive attribute studies that might aide the investigation of technological and functional strategies. Debitage analysis should concentrate on the identification of flake morphology, flaking instruments and stage(s) of reduction. Functional use studies, similar to the pilot study by Tringham et al (1974), should attempt to identify the formation of edge-damage on jasper artifacts through controlled experimentation. In addition, a better understanding of the effects of purposeful and indirect heat application to the different varieties of jasper recovered from Thunderbird is necessary.

Finally, the application of objective, statistical methods to the detection and analysis of nonrandom patterns of artifacts should be explored. Such methods as discussed by Whallon (1973:120) "provide the double advantage of producing consistently reproducible results and of allowing a probabilistic test of the significance of patterning observed for each item".

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A Proposed Site Data Form for Regional Archaeological Research

Jay F. Custer
Department of Anthropology
University of Delaware
Newark, DE 19711

It has been almost a year since Mel Thurman gave me the dubious honor of chairing the Middle Atlantic Archaeological Conference Committee on Regional Research. Throughout the last year I have spoken with many people concerning just what an appropriate role for the MAAC might be. No one seemed to really know, however, everyone agreed that we should do something. My approach to deciding just what we should do took two paths. For myself, I reserved the task of looking at other research cooperatives in the U.S. and trying to figure out what they did right and wrong. I hoped that this would reveal certain options among which the MAAC could choose. The second path of the approach was to take the various time periods of Middle Atlantic culture history and have people devise large scale regional problems that could be approached at meetings and through the various kinds of research done in the area. Joe Dent dealt with Paleo-Indian and Archaic, Alan Mounier dealt with Woodland and Contact, and Henry Miller dealt with the historic periods. Each worked independently and will offer their recommendations in turn. For my part I would like to present my own recommendations for regional research approaches at a more general level.

In reviewing the various regional approaches to research in North America I found that the range of examples was rather small and that most of the attempts were rather bad. Two good examples did stand out, however. The first of these is the Washington Area Research Council. WARC is an action group which takes contracts of various kinds and tries to administer a review process for all work in their area. Given the kinds of feelings in the Middle Atlantic about undertaking these ventures as well as the non-organization organization of the MAAC I do not feel that we want to try to define a role for ourselves that would be modeled upon WARC. Also, WARC runs into some of the problems mentioned by Tom King (1978 Appendix E) such as setting up archaeological territoriality and old-boy networks that stifle archaeological creativity.

The other possible model for an approach to regional research can be taken from the Southwestern Anthropological Research Group. SARG is set up as a cooperative venture to share information concerning ecological data as it relates to locational data for prehistoric sites. The members share a basic research goal of wanting to understand the distribution of prehistoric population aggregates. Their own individual ideas of how to go about obtaining this understanding vary greatly and there can certainly be no claims that SARG's format stifles archaeological creativity as a simple perusal of one of their collection of papers indicates (Euler and Gummerman 1978). The key to the success of SARG is the maintenance of an archaeological data bank containing ecologically sensitive site location data. I would like to recommend that the MAAC think about moving in this direction.

Setting up a system like that employed by SARG requires an institutional base. The base for SARG is Arizona State University and Sylvia Gaines maintains the system. I would like to offer the University of Delaware as the center for a similar data base system in the Middle Atlantic. I will take on the task of maintaining and building the system. While this might sound like an onerous task it is really not all that bad. Through our present research grants administered by the Division of Historical and Cultural Affairs, State of Delaware, we have been able to encode ecologically sensitive data for almost all the sites in Delaware. This data has been input to the computer system at Delaware for manipulation and mapping. For the next year I will be asking the states of Delaware and Maryland to cooperate on a venture to put all the sites on the Delmarva penninsula on the system. One advantage to running this program through the University of Delaware is the advanced remote sensing analysis that can be carried out. Next year, in cooperation with Dr. Vytautas Klemas, College of Marine Studies, we will be attempting to use ERTS data to map out environmental features that could be sensitive indicators of prehistoric site locations. This initial cross-state cooperation makes an ideal place for the Middle Atlantic to begin to build a regional data base.

In running a program like this from the University I would ask the Middle Atlantic Archaeological Conference only for its good will, blessings, and the use of its name as a group which supports the endeavor. I would take care of raising the necessary funding and the University of Delaware has committed itself to the institutional support of the endeavor in terms of release time, space, and administrative support. It is my expectation that the necessary funds could be raised from the various SHPO offices' survey and planning funds. The establishing of a data base that has predictive value is a key to their management programs and that sort of work is what the survey and planning money was intended to fund. Additional funding sources within Interagency Archaeological services could also be tapped as well as the National Science Foundation. I would stress again that I would take the responsibility of raising the necessary funds and doing the work. All I would like is the good will of the Middle Atlantic and the use of its name.

The expected results of the building of the system would be a computer file that would contain archaeological site information. Exactly what data would be included is discussed later at a presentation of the site data forms. The information in the file would be accessible to all legitimate researchers and any given state office would have the ultimate say in who could look at data from their state. Also various classes of information, such as specific locational data could be suppressed as the various states would see fit. Progress within the system could be reported by a newsletter that would be available on a subscription basis. Anyone wanting to add to the file of information could gladly do so using the forms described later in this paper. The ultimate check of the information and computer entry of data would be carried out by the organization based at the University of Delaware. Updates of the information would be carried out as necessary and various agencies in their scopes of work could specify that it would be necessary to provide data from any recent field work to the data file. Mapping of the data using the computerized routines would be possible as would be remote sensing analysis, however, there might be a slight charge for these services.

The actual composition of the data file would be modeled after the system we are currently using at the University of Delaware. A copy of the site form is supplied along with this paper. The form was originally devised to be general enough for application throughout the Middle Atlantic. The basic structure of the form is drawn from the SARG form with some modifications. Though the form is long it is made to be filled out fairly easily with check list entries used as often as possible. Coding is done right on the sheet using the spaces along the left hand margin. The types of environmental data recorded is drawn from ecological studies done within the Middle Atlantic. Cultural historical data are drawn from the major works in the area. A basic consideration in the choice of the variables and their format was to produce a set of data that could be subjected to computer mapping and that would interface with the available ERTS data. Dr. Vytautas Klemas and Dr. Court Willmott, both from the University of Delaware assisted in this preparation to ensure the possibility of interface of the various systems. In the form presented the data is amenable to both the Harvard Graphics package and the various ERTS data manipulation techniques.

In general, the data categories included in the form are self-explanatory. Page 1 is self-explanatory. On page 2, General Geomorphological setting is intended as a descriptive statement (ridge, terrace, flat) while Terrain Description is a more quantitative method described on the attachment to the site form (from Plog, et al 1978:178-180). Soil associations and Series can be determined from county soil reports. Special designations allow any further descriptions. For example, in Delaware we will be using engineering soil descriptions from the USGS Hydrologic Atlas Series and Dr. J. C. Kraft's categories of coastal geomorphological settings. Pages 3 and 4 are self-explanatory as are pages 5 and 6. In any places on the form where codes are needed it is expected that a central record of codes could be maintained at the University of Delaware and disseminated via a Newsletter. Ultimate completion of the forms, coding and information storage would be carried out at the University of Delaware. Much of the data would be discernable from maps, however, in many cases on-site inspection would be necessary. The funding for this part of the research would be obtained as part of the research grants described earlier.

In sum it seems as if there is going to be any regional research the first thing that is needed is the mechanism for maintaining a data base. I feel that the only way for this to happen is for someone to go out and get started on the project. I would like to take this responsibility with the blessings and in the name of the Middle Atlantic Archaeological Conference. I feel that at the University of Delaware there is the necessary resource base, which is willing to be committed, to successfully carry out the project.

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Site Data Sheet - page 1, card 1 - General Information

Site Number _____ Site Name _____
(col. 1-9)

UTM Coordinates meters north _____
(col. 11-17)

meters east _____
(col. 18-23)

USGS 7.5' Quad _____
(col. 24-27)

Condition of Site (Circle one)
1) Intact
2) Partially Destroyed
(col. 28) 3) Completely Destroyed
4) Information not available

Source of Information (Circle as many as applicable)

1) surface examination
2) subsurface testing
3) intensive excavation
4) collector interview, but not field checked
5) collector interview with field check
6) general heresay
7) published report
8) museum collections
(col. 39-36)

If published report list references:

If museum collection, give location:

CRS #- _____

SPO Map #- _____

Soil Map #- _____

Site Data Sheet - page 2, card 2 - Topography, Geology, and Soils Information

Site number _____ (col. 1-9)

Physiographic Province _____ (col. 11-13)

General Geomorphological Setting _____ (col. 14-16)

Mean Elevation _____ (col. 17-20) Slope _____ (21-22) % Aspect _____ (col. 23)

Terrain Description - 100 meters
North __:_____ South__:_____ East__:_____ West__:_____
(col. 24-39)

Terrain Description - 1 kilometer
North __:_____ South__:_____ East__:_____ West__:_____

Soil Association _____ (col. 56-58)

Soil Series (start with largest and list in order of decreasing area)

1) _____
2) _____
3) _____
4) _____

(col. 59-74)

Special Designations

1) _____
2) _____

(col. 75-80)

2

Site Data Sheet - page 3, card 3 - Water Sources and Lithic Sources

Site Number _____ (col. 1-9)

Primary Drainage _____ (col. 11-12)

Secondary Drainage _____ (col. 13-16)

Closest Water Source

Distance in meters _____ (col. 17-19)

Rank _____ (col. 20)

Nature (pick 1, col. 21)
1) perennial
2) seasonal
3) extinct

Type (pick one, col. 22)
1) flowing stream or river
2) Carolina Bay, Pingo, or sinkhole
3) pond or lake
4) marsh or swamp
5) estuarine bay
6) ocean front

Second Closest Water Source

Distance in meters _____ (col. 23-25)

Rank _____

Nature (pick 1, col. 26)
1) perennial
2) seasonal
3) extinct

Type (pick 1, col. 28)
1) flowing stream or river
2) Carolina Bay, Pingo, or sinkhole
3) pond or lake
4) marsh or swamp
5) estuarine bay
6) ocean front

Water Sources represent Stream Confluence (y/n) _____ (col. 29)

Primary Lithic Outcrop within 100 meters (y/n) _____ (col. 30)

within 1 kilometer (y/n) _____ (col. 31)

List up to three types of raw materials in primary outcrop (col. 32-37)

1) _____ 2) _____ 3) _____

Site Data Sheet - page 4, card 3 - Water Sources and Lithic Sources (ctd.)

Secondary Outcrop within 100 meters (y/n) _____
(col. 38)

Within 1 kilometer(y/n) _____
(col. 39)

List up to 5 kinds of lithic raw materials in secondary outcrops or deposits (col. 40-49, start with most abundant)

1)_____ 2)_____ 3)_____

4)_____ 5)_____

Lithic Raw Materials in use. List up to 10 lithic raw materials present in the artifacts. Start with most abundant and go to least abundant. (col. 50-69)

1)_____ 2)_____ 3)_____

4)_____ 5)_____ 6)_____

7)_____ 8)_____ 9)_____--___

10)_____

Site Data Sheet - page 5, card 4 - Cultural Information

Site Number _____ (col. 1-9)

National Register Status (pick 1, col. 11)
1) on register
2) in process of nomination
3) eligible for nomination
4) not eligible for nomination
5) insufficient data

Site Type (pick 1, col. 12)
1) habitation
2) special use
3) other
4) unknown

Degree of Natural Sheltering (pick 1, col. 13)
1) open, no shelter
2) partially open, partially sheltered
3) completely sheltered

Summary Description (check as many as applicable, col. 14-24)
1) surface scatter
2) subsurface living floors
3) subsurface features
4) burials
5) house structures
6) midden
7) mound structures
8) hearths
9) petroglyph
10) stockades
11) quarry location

Artifacts - mark as follows: 0 if not present
(col. 25-36) 1 if estimated at less than 50
2 if estimated 50 - 500
3 if more than 500
4 if unknown

___ 1) ceramics
___ 2) chipped stone tools
___ 3) chipped stone debitage
___ 4) ground stone tools
___ 5) bone artifacts
___ 6) non-artifactual bone
___ 7) shell
___ 8) textiles
___ 9) wooden artifacts
___ 10) metal
___ 11) glass
___ 12) steatite bowls or fragments

Site Data Sheet - page 6, card 4 - Cultural Information ctd.

Cultural Components - mark 0 if absent
mark 1 if present (col. 37-56)

1) Paleo-Indian	11) Piedmont
2) Clovis	12) Late Archaic/Transitional
3) Mid-Paleo	13) Broadspear
4) Dalton-Hardaway	14) Fishtail
5) Early Archaic	15) Early Woodland
6) Kirk	16) Middle Woodland
7) Palmer	17) Late Woodland
8) Middle Archaic	18) Woodland I
9) Bifurcate	19) Woodland II
10) Notched	20) Contact

List up to 12 ceramic complexes and their codes if applicable

1) _____ 2) _____

3) _____ 4) _____

5) _____ 6) _____

7) _____ 8) _____

9) _____ 10) _____

11) _____ 12) _____

Stewart

THE ARCHAIC

William M. Gardner
Anthropology Department
Catholic University
Washington, D.C.

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Introduction

The purpose of this paper is to present another chapter in the continuing crystallization of my thoughts concerning Late Pleistocene through Middle Holocene prehistoric cultural adaptation in the Middle Atlantic. Although this presentation will focus on the Archaic, in order to provide insight into the convoluted paths my thought processes have traveled it will be necessary to begin with the Paleoindian and Late Pleistocene and move forward in time. The geographic area from which my mental paths have been enriched is principally the Middle Atlantic but I must confess to some minor carpet-baggery in that some of the fertilizer leading to this enrichment is derived from the South Atlantic. In this particular instance, I am refering especially to a recent overview of the prehistory and paleoenvironment of the South Atlantic in which I was involved in connection with the development of predictive site models for the South Atlantic Outer Continental Shelf. In addition, I have recently been directing a major project in the Savannah River Piedmont of Georgia and South Carolina.

Some statements I will make have been discussed to some degree in previous presentations (Gardner 1978 and Gardner and Walker 1979). Other aspects have not yet been expressed in public, not necessarily because I am ashamed of them but because the pages on which they are inscribed are still in the review and/or draft stage and are not available for public consumption. This paper is but another of my attempts to short circuit the time between data gathering, review and redrafting, and final availability to the archeological community. In many ways, although there are decided shortcomings with such a format, I use the format of these meetings to assuage the pangs of conscience which I develop as a result of my flitting from one contract to another.

Environmental Background

Starting with the environmental history and simplyfying to the extreme, the following can be highlighted for the appropriate time intervals (for greater elaboration on this see Whitehead 1965, 1972, 1973; Carbone 1976; and Delcourt and Delcourt, n.d., and for a completely contrasting interpretation see Edwards and Merrill 1977):

Full Glacial ca. 26,000-16,000 B.P.

At the end of this temporal range, the Late Wisconsin glaciation had reached its maximum extent and was ready to begin its retreat. Throughout the Middle and South Atlantic, the overall character of the non-riverine floral community was scattered forest with extensive open areas. In the non-riverine Middle Atlantic, this was an open spruce forest. In the Piedmont and Coastal Plain south of central North Carolina, this yielded to an oak-hickory-pine forest in which pine was probably dominant over most of this area. Extensive open areas were still maintained. It is probable that along the floodplains south of the effects of glacial meltwater d deciduous species were present in some numbers. Full glacial bone beds invariably contain browsers and grazers and edge, grassland, and deciduous and coniferous forest adapted species. Sea level was at its maximum low stand. From Cape Hatteras south to Key West, this has recently been placed at a maximum of 60 meters, or one-half the depth previously calculated. A similar depth probably holds true to Delaware Bay, but from Long Island north the older maximum depths remain (which is related to differences in geologic structure). It is perhaps significant to note that most of the finds of now extinct fauna which have been dated fall within this time period or in the next two millenia.

Late Glacial 16,000-12,000/11,000

Spruce appear to be even more prevalent in the Middle Atlantic during this period but other pines and numerous deciduous elements are also common. Oak-hickory dominates in the southeast. Forests appear to be relatively open but some reduction in open space is noted. Finds of extinct fauna dating after 14,000 B.P. are uncommon and rare, and seem to be absent, after 12,000. Evidence from Dismal Swamp and Carolina Bays indicate an infilling process as sea level is only 25-30 meters below present levels.

Early Post Glacial 12,00/11,000-10,000/9,000

Beech-hemlock-birch with considerable numbers of oaks in Middle Atlantic, oak-hickory in southeast. Open areas are increasingly restricted. Pleistocene fauna in Middle and South Atlantic are extinct. Only herd animals remaining are caribou, which are located to the north of our area. Deer and elk,most likely radiated in considerable numbers into the space abandoned by the extinct fauna and along the rapidly fluctuating edges and forest compositions.

Early Atlantic 9,000-6,000 B.P.

Oak-Hickory dominates in both areas. Fluvial and other types of swamps increase and spread in the Coastal Plain. Marked seasonality becomes evident.

Late Atlantic-Mid-Holocene Xerothermic 6,000-4,000 B.P.

Forestsreach climax and closure is complete. Oak-hickory-pine, oak chestnut forests in Middle Atlantic. Forest closure and reduced edge result in lowered deer populations. Wild turkey, acorns, hickory nuts, and chestnuts occur by area in abundance. Sea level rise slows down, estuarine zones become stabalized and small fish and anadromous fish radiate in considerable numbers in the Coastal Plain and eastern Piedmont. In the interior rivers, the fluvial environment becomes ideal for the radiation of freshwater mussels and scooling fish. Deer populations are probably concentrated at the most extensive edge aones, e.g. near fresh water in the riverine and estuarine zones.

Chronology

In viewing the projectile point styles from the Middle and South Atlantic dating from the Paleoindian, Early Archaic, Middle Archaic, and early part of the Late Archaic, it seems apparent that the styles are essentially the same. A number of workers (c.f. Goodyear et.al. 1979) have begun to refer to the "corner notched horizons", "side notched horizons", "bifurcate horizon" etc. It has been my experience that the style is essentially the same no matter what physiographic horizon is involved. It appears that marked stylistic change across space does not begin to appear until we are on the fringe areas of an area like the Midwest. The earliest separation of style zones that I see is a differentiation in the Late Paleoindian period between Dalton points to the south and Plano-like points to the north (the dividing line being somewhere between northern Maryland and southern Pennsylvania). It is not until the Late Archaic that any further major stylistic differentiation occurs and this is in the broadspear horizons (Savannah River and Susquehanna) and this is only true in the northern protion of the Middle Atlantic. After this, of course, there is increasing differentiation.

I feel that this can be carried over into other aspects of the cultural systems but I d o not think we can any longer refer to abrupt disjunctions. What we appear to be seeing is a change along continuum with no abrupt boundaries. This means we have to rethink out chronologies and the chronologies should in some way reflect this. My own inclination at present is to avoid the introduction of new terms but to continue within the framework in which we have been operating but at the same time to alter it. With this in mind, the chronological scheme in which I am now operating utilizes the period concept as an indicator of major change; sub-period as an indicator of significant change; and phase as a reflection of nothing other than (on the basis of present information) than stylistic change. The scheme presented for the Middle Atlantic below hopefully reflects my ideas concerning continuity and change during the appropriate time interval.

Period	Sub-period	Phase
Paleoindian/Early Archaic	Paleoindian	Clovis Mid-Paleo Dalton
	Early Archaic	Palmer Corner Notched Kirk Corner Nothhed Kirk Side Notched Warren Side Notched Kirk Stemmed
Middle Archaic	Early Middle Archaic	Lecroy (bifurcate) Stanly Morrow Mountain
	Late Middle Archaic	Guilford Halifax
Late Archaic	Braodspear	Savannah R. Susquehanna Gary/ Holmes

It is important to note that there are some substantive differences between this particular scheme and others which are being used. In the first place, I no longer have any problems with continuity. Earlier I suspected there was a major disjunction between the end of the Early Archaic and beginning of the Middle Archaic. There is change but we now have enough data to demonstrate continuity and gradual change which begins as early as the Kirk Side Notched phase and is almost complete by Kirk Stemmed and is complete by Lecroy. Enough data, however, has turned up in some material I have examined notably collections from the Shenandoah Valley; the upper stratigraphy at the 50 site; and the Chance site material reported by Jean Messick and Paul Cresthull (Messick 1967; Cresthall 1971). In this latter case, very good continuity is demonstrable between Kirk Stemmed and Lecroy and the overall tool kit links it back with other Early Archaic and Paleoindian sub-period phases. I have been tempted several times to coin new "Transitionals" but in the long run, every phase is transitional to something else.

Pattern Highlights

Recent investigations go even further to convince me that Paleoindian sub-period sites are restricted to some distance from outcrops or riverine deposits of cryptocrystalline material. This is true from Delaware to Florida, including Alabama's. As one moves away from these outcrops, reported sites and projectile points drop off markedly. The actual area exploited out from any one quarry varies according to a number of environmental factors. We can point to something like 20-30 miles in the Shenandoah Valley to 80 miles as in the Williamson site quarries-Dismal Swamp and Allendale Quarries-Savannah River. Sometimes the movement corridors are along river systems, as seems to be the case throughout most of the Piedmont. In more productive environments, e.g., the Great Valley and Coastal Plain, movement can be irrespective to rivers.

The basic factor which controls Paleoindian sub-period sites away from quarries is biotic resource distribution. The resources on which these populations focused, I am still convinced, were game animals. This is not to deny that an occassional fish or a stray hackberry seed was not consumed. I still maintain, however, that the projectile points, scrapers, gravers, burins, wedges, knives, bifaces, etc., were not manufactured for fish or hackberry seed procurement and processing. The three sites of which I am aware that put forth these food quest options all have interpretive problems. Meadowcroft Rockshelter is being met with increasing skepticism by an increasing number of researchers and will probably wind up dating not much earlier than one of the middle phases of the Early Archaic sub-period. Levi Rockshelter was basically butchered and the hackberry seeds could be from any time period. I have recently discovered that the fluted point from the Shawnee-Mininsink site came from several feet outside of the hearth which was dated. I have also been informed that the dates on the hearth and immediately adjacent charcoal cover a range of something like 8600-7200 B.C. In discussion with Dr. Charles W. McNett he feels that statistical manipulation of the dating vagaries, contamination and laboratory decontamination problems, and the soil horizons support the association of the hearth and its contents with the fluted point. The Early Archaic is supposed to be vertically isolated by some considerable distance, yet it is acknowledged that a corner notched point came from just above or in contact with the Paleoindian soil horizon. Based on this information, it is quite possible that the hearth and its fishbone and hackberry seeds could well be associated with a middle Early Archaic sub-period phase.

In a certain sense, this site is crucial. In another sense it is not because no one would say that people hunted to the exclusion of any other subsistence pursuit. I am only talking about emphasis. But if they hunted, what did they hunt and where are the faunal remains? Everytime I send a reprint to Dr. James B. Griffin, I immediately receive a post card which asks me this question. Dr. Robert Funk would have them hunting caribous. I will go along with this, at least in the Northeast, but not because of the Dutchess Quarry Cave data. Before I go into this, I would like to say that I think the absence of associated faunal remains is simply a reflection of preservation. A cop-out perhaps, but faunal remains are generally absent from open sites until very late in prehistory, except under rare and exceptional circumstances. Yet, we have to accept the fact they ate. Closed sites have better preservation but I am having a difficult time accepting <u>any</u> rock shelter evidence.

Without becoming too deeply involved in this since I am supposed to be dealing with the Archaic, I think that Paleoindian sub phase populations were not hunting the mastodons and mammoths of our fondest dreams. I feel that these animals were by and large extinct when Clovis phase populations moved into the open forests of the East. I would suggest, however, that deer and elk were available in considerable numbers. If we compare fluted point distributions in the Middle and South Atlantic with similar distributions in the Northeast, we find both a much wi der scatter and, excluding quarry related base camps, much smaller sites in the Middle and South Atlantic. These two areas have nothing comparable to the outlying hunting sites like Shoop and Debert. In my opinion, Paleoindian sub-phase populations were hunting solitary and small group animals such as deer and elk in the Middle and South Atlantic. In the NOrtheast, among the other creatures they were hunting, was the caribou the sole herd animal to survive the end of the Full Glacial and beginning of the Late Glacial.

Change into the early phases of the Early Archaic sub-period is gradual. There is a marked shift in projectile point style but not in anything else. There is continuity at the Thunderbird. In North Carolina sites of this time are still concentrated around the Carolina Slate Belt. In South Carolina, they occur in essentially the same settings as the Paleoindian sites. It is, however, during the Middle and especially the late sub-phases (Kirk/Warren/Big Sandy Side Notched and Kirk Stemmed) that we begin to perceive shifts. In the Shenandoah Valley, away from the quarries, Warren Side Notched, Kirk Stemmed and Lecroy phase sites are often coterminous. You rarely ever see a Palmer or Paleoindian sub-period phase site associated with Lecroy or Morrow Mountain, except where a particular habitat survives the transition from the Late Pleistocene to Early Holocene as at the 50 site. In North Carolina, at late Early Archaic sub-period time, we have documented a shift from the Carolina Slate Belt to the inner Coastal Plain, apparently in association with the development of fluvial swamps. In the Richard B. Russell Reservoir in the upper Savannah River Piedmont, late Early Archaic sub-period phases represent the earliest components documented to date.

By the Lecroy phase of the Early Middle Archaic sub-period the shift is all but complete. New habitats have been created. The old ones have been severely altered. Forest closure probably has something to do with this but more important are the fluvial and other types of swamps which have been created in the Coastal Plain by the rise of sea level. In the Piedmont and Ridge and Valley, the spread of deciduous elements and strong seasonal variation in resources are probably most directly responsible for the completed change. Sites increase in considerable numbers in the shale areas of the Ridge and Valley. In Delaware, Dr. Jay Custer has recently informed me of a number of Middle Archaic points coming from near a swamp in Delaware. This swamp looks very much like Dismal Swamp and the Carolina Bays. Based on this model, it was both the opinion of myself and Dr. Custer that there should be considerable number of Early/Middle Archaic sites around this swamp, unless there was some time lag in sea level rise around Delaware Bay. The diagnostic artifacts were there. The Dismal Swamp is heavily exploited for the first time during the Early Middle Archaic. The populations increase markedly along the entire inner Coastal Plain from southern Maryland to South Carolina.

By 5,000 B.P., we are in the Mid-Holocene xerothermic. Sea level rise has slowed down considerably by this time. Forests are closed and at climax. Terrestrial options are reduced. The most extensive edges and most productive resource zones are along the streams and rivers and estuaries. Most of the fluvial and non-fluvial swamps are also closed. Population's focus on the streams, rivers and estuaries. As far as the coastline goes, it is no accident that from the Brazilian Coast to the Atlantic coast of North America the earliest securely dated shell midden sites date from around 5,000 B.P., Ah, you will ask, what about all the shell middens that are drowned on the Outer Continental Shelf. It is my opinion that they are few to non-existent on the Mid and South Atlantic Coasts. If they are present, the new sea level curve indicates they are all near shore and that we have an equal representation on non-submerged shorelines. Some support for this is given by the situation in eastern Brazil where the 7,000 and 5,000 B.P. shorelines (which are securely dated) do not have shell middens. These shorelines are further to the interior than later shorelines because of localized higher sea level stands. The 5,000-4,000 B.P. shorelines, however, do have shell middens.

This brief summary of the dynamics of the interaction between the prehistoric populations of the Middle Atlantic, and incidentally the South Atlantic, has necessarily been overly synthetic. Vagaries in the data, indeed the entire data base, as well as alternate interpretations have been glossed over. Many of these problems will be addressed while I am on sabbatical (1980-81) in a series of articles and a book or two. In the interval between my good intentions and the road to where ever, you have these ideas to mull over.

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DOWN TO THE RIVER IN BOATS: The Late Archaic/Transitional in the Middle James River Valley, Virginia

By

L. Daniel Mouer, Robin L. Ryder and Elizabeth G. Johnson

Virginia Commonwealth University Regional Preservation Office

A paper presented to the Mid-Atlantic Archeology Conference

Dover, Delaware

March 1980

Dear Middle Atlantic Archeologists:

This paper is a rough working paper which we hope to tighten, trim, expand and otherwise alter for publication in the near future. Please feel free to cite our discussion if you are so moved. We would appreciate it if direct quotes of the paper would not be used until it is in final form. We need your input, please. Any comments (preferably in words with more than four letters) are welcomed, and will be considered seriously. Your feedback is appreciated.

LDM, EGJ, & RR

Introduction

A familiarity with the prehistoric archeology in nearly any region within the Middle Atlantic province carries with it an understanding that something was going on during that part of the Late Archaic in which the variously named broadspear points were being manufactured. Exactly what this something was, and how it is explained, varies from observer to observer, and, perhaps, from region to region.

These various somethings, which appear to be going on in the broadspear periods can be referred to as a series of hypothesized shifts away from previous behaviours, frequently in the direction of subsequent behaviours. These shifts include apparent changes in settlement and subsistence patterns, changes in technology, changes in site sizes, densities and numbers, etc. So striking are a number of these shifts, that Witthoft (1953) created the Transitional Period. This Period includes the fishtail point users as well as the broadspear users, and is characterized by the presence of stone bowls. In Witthoft's view, the Transitional Period is seen as a short-lived, dramatic change from the preceding Archaic lifeways. Witthoft believes that use of stone bowls is a crucial element foreshadowing the development of Woodland cultures. This view is essentially concurred with by Ritchie (1969) and Dincause (1972).

In Virginia, the term "Transitional" is rarely used. Coe (1964) assigned the Halifax and Savannah River phases to the Late Archaic, which usage is generally followed. Furthermore, the Transitional, as understood to the North, involves a series of distinct manifestations which are rare or lacking altogether in Virginia. Susquehanna points are rarely described from Virginia sites, although they do exist. Some relatively "pure" Susquehanna components have been reported for the Potomac drainage (Gardner, et al,1969, Ayers 1972)

Perkiomen occurs sporadically, and usually as an occasional stray point. None-the-less, there are some relatively well-known Perkiomen components from areas such as the Shenandoah Valley (MacCord 1970 Stiaby 1974), the lower James (Muriel Farrington, Pers. Comm.), and the Dismal Swamp (McCary 1972).

True fishtails, similar to Orient or Dry Brook also occur sporadically. We have found Orient-like points on Elk Island in the James piedmont in campsites with Savannah River points and soapstone pot fragments. We know of no pure fishtail point components.

By way of contrast, Savannah River is almost certainly a long sequence, with a great deal of temporal and regional variability when compared with, say, Snook Kill, Koens-Crispen or other congeners found to the north. A term frequently encountered in the literature in Virginia is Savannah River Variant, a term used non-formally by Coe, and inhomogenously by Virginia archeologists.

It has been suggested (Wise 1975, Gardner 1975) that a true Transitional can be found in the steatite bowl to Marcey Creek to Woodland sequence of the Middle Atlantic. We will address some of the problems of a Transitional Period. While the Archaic and Woodland can be seen as Stages or Patterns, The Transitional must be viewed as a sequence which begins with Archaic and ends with Woodland.

Our main purpose is to present an overview of some of the presumed "shifts" of the Late Archaic or Transitional, along with some of the proferred explanations for those shifts. We will examine Virginia data, particularly from the James River basin, in order to document evidence which supports or refutes such shifts. We will reformulate some of the explanations available into slightly more explicit models, and will offer a

detailed model of our own, which draws heavily from ideas presented by others.

Our field work is confined to the outer piedmont and inner coastal plain of the James, the stretch of river centered on the fall line. We have undertaken extensive surveys of riverine, upland and small stream terrain in Henrico County, which is bordered by the James and Chickahominy, and which sits astride the fall line. We have also undertaken substantial survey and test excavation research in the James River valley proper from a point approximately 20 miles below the falls, through the outer piedmont to the mouth of the Rivanna.

The survey work has been more or less systematic, particularly within Henrico County. It includes random sampling designs and a research plan which will allow for the use of statistical models for describing and explaining the results. We are not yet at a point where we can present completed analysis, so much of our inference is intuitive at this point. We look forward to publishing an expanded and more rigorous edition of this paper in the near future.

We are grateful to Bill Boyer for making us confront our Archaic data. We have been up to our ears in potsherds for so long, that it has proven a refreshing change to deal with some of the more tangible aspects of hunters and gatherers again. We appreciate the support of the Virginia Historic Landmarks Commission, the Federal Heritage Conservation and Recreation Service, and Virginia Commonwealth University for funding our on-going work in the James basin. We are grateful to the County of Henrico and the Environmental Protection Agency for their funding and cooperation in the county survey.

The Late Archaic Shifts

The most obvious shift in the Late Archaic record is the introduction, at some point in the period, of new diagnostic projectiles often classed together as broadspears. This term will not be used here due to its functional connotation and formal restriction to broad points. As most writers agree to the derivation of these points from the Savannah River Archaic, we will simply refer to all of them as Savannah River Tradition points, In our area, these points include Savannah River and Small Savannah River variants, as well as a variety of derived forms. Rounded base variants are frequently classed as Morrow Mountain 1 (Coe 1964), although this is generally a mistake.

Many writers note that the Savannah River Tradition carries a predilection for specific lithic materials. These materials are frequently distinct from those used by the preceding Late Archaic groups (cf. Perlman, this conference). Those working in New York, Pennsylvania and New Jersey go so far as to name identical points differently based on the stone they're made from. We believe this begs the question of overlapping ranges, extende exploitation zones and possibly seasonal or functional variability. However our colleagues are the ones who have to keep the sea of names and their hyphenated convergent forms straight.

Besides the form and material of projectiles, the shifts which go along with them seem to include increased reliance on riverine locations for settlement in the Savannah River tradition. This has been pointed out by Salwen (1975) for the Hudson basin, Wilkins (1978: 33-34) for mountainous West Virginia, Kinsey (1972: 346) for the Upper Delaware, Turner (1976, 1978) for the Virginia coastal plain.

While there is little in the way of comparative study of upland

and riverine zones, the concensus certainly is that the Savannah River Tradition is basically riverine. This is not exclusively so, however. Wilkins (1978) notes a major mountain site in Western North Carolina which is primarily Savannah River. Likewise McClearen (personal communication) has located significant components in Rockbridge County, Virginia which are distant from any major stream. Some of the large inland Archaic base camps of Albemarle County reported by Holland appear to contain prodigious numbers of the large points.

By combining data from our sites with information culled from a review of Late Archaic components reported in the Archeological Society of Virginia Quarterly Bulletin (figures 1,2), we feel it is safe to say that Savannah River is predominately riverine. What is not so clear, however, is whether this represents a "shift" from the Halifax distribution, which suggests a riverine focus as well.

It is our feeling that these data are biased by not including sites from the piedmont uplands which are definitely non-riverine. From an informal study of local collections, we feel that Halifax is plentiful in these areas, while Savannah River is almost absent. By separating out the major components, our data for the Piedmont suggests that this trend is supported (figures 3,4).

Another posited shift in the late Archaic Savannah River Tradition is an apparent change in local demography. Frequently it is suggested that populations have grown or, at least, that the resource base has been stressed by demographic changes (Turner 1976, 1978). Occasionally the reader is simply given observations concerning the changes in the number, size or densities of sites. For example, Holland (1967: 100) notes population increase in the Shenandoah Valley

during the Late Archaic. Coe (1964) notes that the most intensive occupations of the Doershuck (p. 54-55) and Gaston (p. 19) sites were Savannah River.

It is never completely clear whether we are dealing with an actual increase in the numbers of sites per some unit area, or if we are merely seeing a restatement of the observation that riverine settlement reigns during this period. In other words, without some estimate of actual population density over analogous bits of landscape, increased site counts may simply reflect the combined interests of both Savannah River Folk and modern archeologists in river bottoms. In the case of Turner (1976), at least, we have an explicit account of his estimate of greater population in the Late Archaic.

We have discussed the situation with archeologists from James Madison University who have been working both on the South Fork of the Shenandoah in the Ridge and Valley Province, and around the headwaters of the James, in the Alleghenies. We agree that, from subjective impressions, it is difficult to tell whether we are dealing with actual increases in site numbers, or simply in increases within the river bottoms. Likewise, the apparent changes in artifact densities on sites and the apparent increases in site size could simply reflect recognized technological differences. Increases in the amount of debitage due to a large biface industry and increases in the amount of fire-cracked rock due to changes in hearth types may be misleading.

In our review of survey sites, combined with sites reported in the Archeology Society of Virginia Quarterly Bulletin since 1963, we found a dramatic increase in Savannah River over Halifax components (figure 5

It is clear that the number of Savannah River sites is

much higher than that of any other Archaic period within the alluvial bottoms. Our survey has not often taken us far off the river, but, when it has, the number of Guilford, Halifax and similar sites in the piedmont may likewise be greater than those with Savannah River components.

In the coastal plain, where deposition is generally light, riverine sites very often contain 10,000 years of deposits in 14 inches of plow zone. We have done considerably more survey in uplands and on smaller streams in the coastal plain than in the piedmont. We find that there is definitely a smaller percentage of Savannah River sites in these areas than is represented in river terrace sites. Because we have surface access to the entire sequence, we can state with some assurance that there is a distinct rise in the number of sites producing Savannah River Points over those containing other Archaic forms.

Partly due to changes in site location, and partly due to changing inventories, a shift in subsistence pattern has often been posited for the Savannah River Tradition . One interesting phenomenon which appears throughout the literature is the existence of substantial Savannah River deposits at either the terminal or the basal levels of stratified or dateable multicomponent sites. Likewise, we often see the addition or increase in some items in the inventory which suggest subsistence changes.

Kinsey (1972), for instance, has suggested that the Savannah River Tradition sites on the Upper Delaware represent a shift towards increased use of fish. While his interpretations are cautious, he points out some of the following as evidence: riverine settlements, broad points which may act as suitable toggling fish spears or harpoons, and large hearths which may serve as community drying structures, as might be expected with a concentrated exploitation of anadromous fish runs.

While axes are a part of the inventories of a number of Archaic manifestations throughout the Middle Atlantic, it has been suggested that axes become more common on Savannah River Tradition sites. We can say without hesitation, that the numbers of axes found on some Savannah River sites in the Middle James are truly astounding. On Elk Island, our main survey tract within the James Survey area, we have recovered many dozens of chipped axes from a small number of Savannah River sites. The same is true of choppers and chopping tools, scraping planes or other large tools apparently used for woodworking.

We have not found this to be necessarily true of coastal plain sites. Axes are found in some Savannah River sites east of the falls, but the impressive numbers aren't there. Many of the heavy tools are made on quartzites which can be found in local gravels, but many others are made on igneous rocks which might be imported from the Blue Ridge area. Until a survey of the gravels is undertaken we cannot be certain, but we will go out on a limb and suggest that heavy tools were of considerable importance, perhaps to the extent that substantial trade or travel was invested in acquiring appropriate materials.

We have seen scattered references to an increase in grinding stones in the Late Archaic or Transitional, but these are not overwhelming. We have found that some sites in the James River piedmont contain large numbers of hand grinding stones as well as mortars. Mortars appear to be prolific in large base camps (note figure 6).

One apparent shift which we have not seen reference to is the change from small pebble tool industries to a large cobble biface industry. Large bifaces form the basis for a number of coastal plain archaic industries, but by the Halifax period, the tool tradition is generally

one of small tools produced from quartz or small quartzite pebbles. In the piedmont, there is no large biface industry common in any period except the Savannah River. This, based on isolated evidence, might argue that Savannah River originated in a coastal plain tradition which intrudes into the piedmont, where bipolar and small pebble industries have reigned supreme. Interestingly enough, after the passing of the Savannah River tradition, the Woodland in the piedmont is once again characterized by the use of small tools, bipolar techniques and production from pebbles or nodules of quartz, jasper and chert. Nearly all Savannah River materials are on quartzite. One result of this shift is the increase in debitage density on some sites. The reduction of large bifaces results in large amounts of waste flakes.

As was pointed out by Witthoft, one of the more stiking shifts in the archeological record of the Late Archaic is the appearance of stone bowls and/or pottery. Stone bowls as cooking utensils, which they appear to be, indicate a possible change in cooking technology. Certainly the widespread trade or importation of the unwieldy bowls, as shown by Luchenbach, et al (1975), is indicative of a change in residential stability, transportation or both. We are not disposed to consider the likelihood that squaws, already burdened with the tasks of transporting infants and household belongings, were ready to strap thirty pound bowls on their backs with tumplines. Kinsey hypothesizes that the high level of stylistic similarity found throughout the range of Late Archaic and Transitional sites in the Upper Delaware region can be explained by high mobility of the groups themselves. We differ in favor of lower group mobility, greater concentration of population and higher interaction rates, partly due to improved transportation modes: hence the title of this paper.

Another shift, already mentioned, is the appearance of large, numerous hearth features in the Savannah River Tradition sites. The presence of large hearths has been noted on the Tidewater portion of the James (Reinhardt, 1979). A large platform hearth was recently excavated by Muriel Farrington (personal communication) near the confluence of the Appomattox and James River in the coastal plain.

Sites surveyed by VCU in the piedmont and upper coastal plain have been surface sites. In certain circumstances, due to heavy erosion or flood scouring, we have found hearths relatively intact. While hearth materials are present in nearly all Archaic sites, it does seem to hold that the Savannah River sites are characterized by a great abundance of hearthstones, leading us to the belief that large hearths were common in some sites. Note the large hearths which are centrally located in the GO 42 site Large hearth concentrations also occurred at PO 26 (figs. 6-10)

This pattern is certainly not univeral for Savannah River, however. Many smaller sites do not contain the abundance of fire-cracked rocks noted in some of the larger sites. Geier (personal communication) suggests that such large hearths are rare or absent from Savannah River sites in the headwaters of the James area. In fact, many of the attributes we have come to consider diagnostic of the large Savannah River basecamps of the piedmont (large hearths, abundant axes, stone bowls or bowls of Marcey Creek pottery) are rare or absent upstream, and are frequently less abundant in Tidewater. It has also been suggested that a seasonal pattern developed which was more stable than in previous periods. The evidence for such a pattern is hard to interpret. On the one hand, the presence of soapstone bowls, a possible dichotomy of micro-band/macro-band camps, and an abundance of heavy tools lends

weight to this inference. Some of the very large sites we have found, or seen reported in the literature, suggest either seasonal or central base camps. While we readily agree that numerous choice site locations might have been reoccupied many times over a period of several hundred years, we do not feel that there has been much evidence for residential stability until late in the Savannah River sequence. Some of our survey sites are highly suggestive of base camps, however. Archeologically, residential stability might be expected to show the following sorts of evidence, if frequently reoccupied:

1. Midden accumulation. While there are some shell middens or mounds dating to the Savannah River periods in the Tidewater of the James, these are not all that extensive. Oyster shells from only a few visits to a site by a family-sized group could accumulate an impressive midden in a short time.

2. Systematic storage. There are no storage pits known for Savannah River sites prior to the introduction of pottery late in the sequence. While anadromous fish might have been stored on hurdles, seed or root crops would probably have been stored in pits, as in later periods. There are some caches of lithic quarry blanks known from Savannah River sites, but these do not appear to be common.

3. Systematic trash disposal. There are likewise no trash pits for Savannah River sites until late in the sequence. Overbank trash deposits may have been used, but have not been reported.

4. Burials. It seems that the burial of ancestors was primitive man's easiest method of claiming a piece of the landscape. We have scant evidence for burials on Savannah River sites. Certainly, there are no cemetaries.

5. Substantial dwellings. Although an occasional postmold is reported from a Savannah River Tradition site, these are not sufficient to argue for any long-term dwellings.

While we do believe that evidence for large multi-band camps is mounting, we must conclude that the evidence for any real residential stability is absent in the Savannah River Tradition until the end of the sequence. This we will discuss further below.

We have reviewed some of the reported "shifts" of the Late Archaic and Transitional Periods. In general, these shifts in the James River Valley can only be applied to the Savannah River Tradition. Other Late Archaic complexes are either inadequately known, or, as in the Halifax phase, appear to follow the traditional riparian hunter/gatherer model of Archaic groups. That is, the sites tend to be small, with both upland and lowland occupations. There is no evidence of a focal economy.

In summary, the "shifts" of the Savannah River Tradition include:

1. The use of specific projectile point types.

2. A shift in lithic material preference, favoring tough materials over sharp materials.

3. A stone industry based on bifacial reduction of large cobbles. Tools are flakes struck from bifaces, and bifaces or biface fragments themselves. This may be a continuation of earlier traditions in the coastal plain, but it represents a distinct shift in the piedmont.

4. A significant increase in the numbers of large woodworking tools, especially in the piedmont floodplain sites.

5. The use of large hearths in the piedmont and coastal plain. Such hearths appear to be lacking further upstream.

6. A focus on riverine settlement and, presumably, riverine resources.

7. A likelihood of a pronounced fission-fusion cycle with a possible bimodal distribution of site sizes.

8. The widespead use of boats can be inferred.

9. There is a marked areal stylistic uniformity, in contrast with the more regional trends of other Archaic periods or cultures.

10. An increase in the use of grinding stones. This may be limited to the piedmont, however.

We will now turn our attention to some of the explanations which have been offered in the literature to explain these shifts.

Some, who shall remain graciously unnamed, have tried to evolve the Late Archaic/Transitional pattern through tracing various phylogenetic lines of development from Morrow mountain or Halifax points. While it can be observed, with interest, that there appears to be some possibility of long-lived, changing traditons of point manufacture, lithic utilization, etc., we are not comfortable with explanations which trace the evolution of arrowheads over periods of millenia. Trends in stylistic change are certainly grist for the archeologist's mill, but do not explain the phenomena of the periods in question.

Others have found some solace in diffusion hypotheses. We find nothing distasteful about diffusion problems. It is simply a fact that we cannot find a single, satisfactory explanation for the diffusion of the patterns in question. If diffusion as a cultural process is to explain the events of the transitional, then we require some good reasoning to understand why thousands of contented makers of small quartz points on hill tops would throw down their tools, march to their river bank and make broad points.

Migration or expansion from a Southern hearth into the river valleys of the North has been proferred as an explanation. These models and their

attendant hypotheses have some salient characteristics worth noting. Of course migration theories are also declassé at present, and this has meant that those which have been offered contain ecological postulates to make them more explanatory and more palatable.

Some of the points in favor of expansion models in this case are:

1. They predict the apparent uniformity of the Savannah River Tradition, including uniform variability through time

2. They help explain the rather rapid but none-the-less lagged spread of Transitional culture on a south to north trend. We have not seen anyone yet attempt to verify whether or not the radio carbon dates for initial broadspear manifestations do, indeed, form a south-north trend which is statistically defensible, but certainly the raw numbers are suggestive.

This apparent trend has been held to correspond with the development of modern-style estuaries, recent climates and modern forest composition. This has led to the conclusion that Savannah River Tradition folk were estuary harvesters who expanded as their niche expanded. Their techno-complex was either absorbed by indigenous populations through diffusion, or else these populations were replaced by more efficient ones through some selective process. One presumes that warfare, or other forms of direct competition were at work.

In our view the best statement of the expansion model comes from Kinsey (1972) and Turnbaugh (1975). Kinsey's explanation is basically environmental. Through sea-level rise and estuary development, the fish runs of the Atlantic Seaboard developed. The Broadspear Traditions, in Kinsey's terms, is seen as an adaptation to this bountiful new resource. Large hearths are seen as drying features; large

sites as social expansion due to high productivity. It has been suggested that broadspears are likely to make good fish spears. We concur in the plausibility of this argument in discussing Tidewater Savannah River sites, but fail to see how upstream shifts in settlement and technology are thereby explained.

Turnbaugh (1975) is even more explicit. The Transitional is seen as a "wavelike spread" of peoples with interim penetration to the Fall line of many major rivers, due to the movement of actual cultural groups (1975:54). This is seen as "a natural expansion to the very limits of the favorable environmental province"(ibid). He sees a preference for estuaries and broad river valleys. Turnbaugh also views broad points as possible fish spears.

He feels that the social unit was a family or band organization, with a restricted range, and that settlement size remained about the same throughout the spatial and temporal range. He likewise points out that the appearance of the complex appears to be abrupt and discontinuous, and he cites Ritchie (1971) and Dincause (1969) as arguing for the coexistence of broadspear-using groups with more traditional local Late Archaic groups. Again, we find the whole scheme plausible, but impotent to explain interior riverine patterns without further expansion of the model.

For the most part, then, those models(to use the term in its broad sense) which attempt to explain the Transitional events can be summarized as follows:

1. Simple historical diffusion. Things changed because people learned a better way to live from other people. While diffusion is a valid cultural process, we find it unsavory in this case unless expanded with some adaptation value.

2. Diffusion of an adaptive techno complex in light of technological efficiency and/or changing environments. We find an expanded diffusion model easier to accept, but insufficient to explain a. the rapidity of spread, b. the very broad homogeniety of the tradition and c. the possible persistence of local technologies and traditions alongside the new.

3. In-place evolution of a new pattern as a response to demographic stress. Those conditions could result from population growth and resulting stress leading to intensification of subsistence patterns and a contraction of the social/settlement system into riverine habitat. This would help explain the fact that there are shifts far inland from the focus of the most effective environmental changes. This model suffers from an inability to explain stylistic uniformity, and a failure to demonstrate stress conditions in the Late Archaic.

4. In-place evolution as a result of "optimum adjustment to a generous environment" (Caldwell 1964). This is analogous to Braidwood's "Settling in" model of the mesolithic Near East. The Archaic is seen here as a series of incremental upward adjustments in efficiency culminating in diverse, regionally specialized groups intensively exploiting their terrain in large, relatively sedentary, groups.

We feel that the uniformity of the early phases of the tradition argues against Caldwell's regional specialization.

5. Migration of actual cultural groups into an environment to which they are pre-adapted. While many of the earlier objectives dissapear with a migration model, we are left with a problem similar to that of the Indo-European history students. How did some fatherland send out such a huge number of successful colonists while not suffering any

apparent depopulation itself?

6. Expansion of daughter groups with an essentially riverine adaptation into a previously unoccupied or under exploited niche. This very likeable model has suffered from being attached to environmental change notions. We will discuss it in greater depth, below.

The Kinsey/Turnbaugh model

We can synthesize an expansion model for the Savannah River Tradition, which we will refer to as the Kinsey/Turnbaugh model. The salient points are as follows:

1. From a heartland, supposedly the estuaries of the southern coastal plain, a population of riverine/estuarine hunter/gatherers expanded northward.

2. This expansion was a response to the progressive development of modern estuarine conditions and forest composition due to changing climate and net eustatic sea level rise.

3. Shellfish utilization had been a major subsistence factor in the southern heartland, but gave way to fishing, supplemented by hunting and gathering in the north.

4. Social groups were small bands with circumscribed territories, probably a drainage basin.

5. Settlement systems consisted of temporary camps moved to take advantage of periodic resource availabilities within the zoned, riverine environment. This might entail, for instance, seasonal movements between prime fishing spots, shellfish beds and deciduous uplands.

6. It is suggested that indigenous Late Archaic groups coexisted alongside the Savannah River Tradition groups in some places.

7. Expansion was triggered by both environmental and technological changes, the latter including improvements in fishing technology.

8. Sites become more numerous through time, suggesting a growth in population.

9. The tradition was a short-lived, nearly explosive phenomenon.

We believe that this scenario sums up some of the events of the Savannah River expansion quite well, but as a model, it has drawbacks. For instance, Turnbaugh's notion that only some groups penetrated as far as the fall line is at variance with the archeological record. Within the Roanoke, James and Potomac drainages, it seems clear that many groups penetrated hundreds of miles beyond the fall line, and their presence in the headwaters is nearly as impressive as it is in the estuaries.

While we feel that the scenario is fundamentally correct, we do not feel that it is adequate as explanation. In particular, the model suffers the following shortcomings:

1. It lacks generality. While describing possible historical events, there is no attempt to explain those events in terms of general behaviour. The correlation between environmental and cultural change is simply a correlation, unless the processes of cultural response are made explicit.

2. The scenario is fundamentally tied to environmental change, and is therefore deterministic. As Braidwood (1960) noted, environment has changed often, and in cycles. There are no automatic cultural responses to environmental stimuli. Noting that fish runs developed is clearly insufficient to explain the expansion of fishing culture.

3. The processes of expansion are left unstated. There is nothing in the scenario to predict the direction taken during the expansion process. There is no attempt to explain the range of habitats which

came to be settled by broadspear users, or how the social groups and technologies differentiated into regional groups. An examination of such processes might explain how and when the fall line was "penetrated," and what determined the patterns of subsistence and settlement in the piedmont and mountain areas.

4. Homogeneity of the Tradition is not adequately addressed. While a notion of "explosive" expansion might explain stylistic similarities in the early phases, the apparent similarity of events in the different late regional variants (e.g. increased use of stone bowls, increased sedentism, adoption of ceramics, etc.) cannot be explained thereby. Processes of convergence, as well as diversification require study. The Kinsey/Turnbaugh model stops short. The ultimate trajectory and fate of the expansion process are left dangling. A more general model may serve to predict the outcomes of expansion.

The Chesapeake Drainage in Virginia

As we are attempting to deal with events of the period within the James River drainage, it might be useful to describe the environmental structure of the basin. The habitats available for colonization differ somewhat from drainages to the north. In many ways, the Roanoke, James and Potomac share structural elements which contrast with the Delaware, Susquehanna and Hudson. In particular, the former drainages share an elogated coastal plain section with a marked inner coastal zone, and an even more attenuated piedmont, with well-developed floodplains.

The James in Tidewater is markedly zonal, with a broad, expansive estuarine development, an extensive stretch of flatwater bordered by tidal saline and freshwater swamps, and an inland meander belt with well-developed palisades and backwater swamps. What Binford (1964)

referred to as the salt-freshwater transition zone on the James is an extensive area reaching from slightly below the confluence of the Chicahominy upstream to the mouth of the Appomattox.

In the Virginia coastal plain the minor rivers such as the Chickahominy, York and Rappahannock do not appear to be so minor. They each have well-developed estuaries, and the distances between streams is small. Habitats along rivers, therefore, are rather compressed.

Upon crossing the Fall Line, which on the James is at Richmond, the minor streams do become minor. The upper Rappahannock, and Rapidan, remain somewhat navigable through the piedmont, but floodplain development is small compared with the James. The Chickahominy and York/Pamunkey/Mattaponi systems have no real piedmont sections to speak of. The distance between major drainages in the piedmont are large, and the available territories include vast acreages of monotonously homogenous piedmont uplands.

East-west zonation, which is so marked in Tidewater, is almost nil in the James piedmont section. We can speak of an outer and inner piedmont, however, with the latter fringing the Blue Ridge and including considerably more forest variation with increased verticle zonation. Bedrock changes are slightly more complex in the inner piedmont as well, leading to a possible increase in the patchiness of forest habitats.

We may model the environmental structures of the southern portions of the Chesapeake Bay/Carolina Sounds drainages, by contrasting certain elements thought to play crucial roles in subsistence and settlement systems. An extensive treatment of resource distribution and availability can be found in Binford's (1964) dissertation, with considerable expansion by Turner (1976). We will deal with gross structure in order to predict optimal patterns of settlement.

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Upon crossing the Fall Line, water on the James is at minimum, the water ceases to become minor. The upper Rappahannock and Rapidan reaches essential navigable through the piedmont, but floodplain development is small compared with the James. The Chickahominy and York/Pamunkey/Mattaponi systems have no real piedmont sections to speak of. The distances between major drainages in the piedmont are large, and the available environs include vast acreages of monotonously homogeneous piedmont upland.

Fast-moving connection, which is so marked in Tidewater, is almost nil in the James piedmont system. We can speak of an outer and inner piedmont, however, with the latter fringing the Blue Ridge and involving considerably more foot-to-water relation with increase vertical zonation. Because changes are slightly more complex in the inner piedmont as well, leading to a possible increase in the percentage of forest habitats.

We may model the environmental structures of the southern portions of the Chesapeake Bay drainage, by contrasting vertical gradients changes to play crucial roles in substructure and macrohabitat systems. An excellent treatment of resource distribution and availability can be found in Whittaker (1975) discussion, which considerably expanded by Turner (1978). We will need such structure in order to predict spatial patterns of earthworms.

Figure 11 is an abstraction of the area in question. The major divisions correspond with physiographic provinces. The estuaries are situated in a broad coastal plain. The rivers tend to meander and form palisades as they pass the fall line, only to broaden into slow moving tidal streams skirted by swamp and marsh. Approximately halfway between the falls and the mouths of the rivers is what Binford called the salt-freshwater transition zone, a zone of high fish productivity and diversity. The outer coastal plain is characterized by vast poquosons or salt marshes. Here are found the prodigious oyster beds.

The inner coastal plain has large expanses of freshwater oak-gum swamp, small streams where anadromous fish spawn, and extensive upland forests. In fact, it is in this latter attribute that the inner coastal plain can best be contrasted with the outer. Distances between rivers decrease rapidly from the Fall line east, leading to compact territories for riverine groups. Even at the fall line, however, it is typically no more than a few hours walk to the heads of tributaries in the interfluvial zone.

Coastal plain environments can be summarized as follows: the floodplain is drowned for the most part, meaning that there is a lack of fertile alluvial bottoms suitable for grasses and similar plants. There is marked zonation between uplands and river, and between the river mouths and the falls. Diversity is high. Territories are compressed and closely packed. Productivity of shellfish, anadromous fish and the flora and fauna of marshes and swamps is very high. Forest resources are somewhat limited, but easily available from riverine settlements. These latter resources are not so restricted in the fall line zone.

The piedmont offers a stark contrast with the coastal plain. As a maturely dissected peneplain, the piedmont is characterized by very homogenous uplands only rarely broken by a large, navigable stream with a well-developed floodplain. Distance between major rivers is very great. Productivity of forest products is moderately high, but cannot compare with the sere communities below the falls. The greatest resource of the piedmont is probably the alluvial floodplain. In places, the floodplain of major streams is greater than a half mile across. With little management input, the floodplains can become very productive, especially of seed grasses, legumes and grain substitutes. Such management techniques include burning and clearing. Anadromous fish would cross the fall line in large numbers before the building of dams (Wharton 1973:69), and these could be easily caught in the shallow piedmont streams with weirs. Such weirs were once common on the Potomac and James above the falls, and some can still be seen. The piedmont can be summarized as follows: The major resource for hunter/gatherers is probably the floodplain, with upland resources such as nuts, deer and small game nearly as important in the subsistence system of most hunter/gatherer groups. Deciduous forest upland resources are available in very large zones of forest between the major river valleys. Overall diversity is low, but productivity of certain resources such as nuts, can be quite high. Both productivity and diversity increase in the vicinity of major streams. The floodplain yields to management practices, and a small amount of labor input could return considerable amounts of floodplain resources. This contrasts with the coastal plain where management input probably adds little in the way of productivity.

While social spaces can be highly compressed in the coastal plain,

the piedmont is characterized by large interfluvial distances and very little patchiness in the environment. Some concentrations of territory could be expected near stream confluences, or other areas where the floodplain is exceptionally broad.

There is a zone which we can refer to as an inner piedmont which has higher diversity and increased seasonality due to its proximity to the mountains. Holland (1978:41) has suggested that, throughout the Archaic, inner piedmont settlement systems included seasonal transhumance up and down the Blue Ridge slopes.

For the present we have ignored the Great Valley, and we will speak of a mountainous zone to the west. This zone houses the headwaters to the Chesapeake drainage. While there are ample floodplains on major streams in this mountainous region, these tend to be shallow and rocky, and limited in the length of their growing seasons. Anadromous fish probably did not penetrate this far inland in great numbers, although they were present. The mountainous zone is one of moderate diversity, due to verticle zonation and complex bedrock formations. Productivity is probably low compared with areas to the east.

These landscapes would be used differently by groups with differing technologies and social needs. In general, however, hunter/gatherer adaptations in the Chesapeake drainage can be dichotomized as either principally riparian or riverine. These are not mutually exclusive categories, but simply models of subsistence strategies which carry different expected outcomes for social organization, settlement, technology and interaction.

Riparian and Riverine Adaptations

A riparian adaptation is one which is diffuse, in Cleland's terms (1966) or broad-spectrum, to borrow a term from Flannery (1965). Of course the term implies a forested habitat. The basic pattern of Archaic culture in the Mid-Atlantic can be termed riparian. There was undoubtedly an exploitation of the littorals and river valleys, as water typically creates the hydro-successional communities which provide bounty and diversity sought by hunter-gatherer groups. However, we can postulate from archeological evidence, that these habitats did not develop their full potentials until late in Archaic times. If the potential for intensive riverine or estuarine adaptations did exist, and was exploited, the evidence is now buried under the waters of the continental shelf (Brennan 1974).

Riverine adaptations can be seen as focal, in Fitting's sense, involving the intensive exploitation of a more narrow range of habitats. While we have numerous examples of riparian hunter-gatherers from the ethnographic literature, we have few riverine groups to draw analogies from. The littorals and river valleys were quickly occupied throughout the world as neolithic-like peoples and technologies spread.

A more specialized form of riverine adaptation could be called estuarine. Estuarine groups would rely on the diversity and richness of outer coasts and drowned river mouths. The use of the littoral is well-documented through ethnographic sources, but rarely for groups whose subsistence is limited to hunting and gathering. Where we have such evidence, as in The Andaman Island or among Eskimos and Aleuts, there is a strong reliance on boats and other technology for exploiting the natural zonation of the littoral.

Archeological evidence must be relied upon for comparing estuarine or littoral harvesters in the more temperate zones. In various world areas, such as coastal Peru (Lanning 1967), Southeast Asia and China (Gorman 1971) and Mesolithic Europe (Tringham 1971) there is evidence that littoral harvesters typically followed coastal zones, and exploited inland, up-river areas, in what was probably a seasonal round.

We may expect, then, that littoral hunter/gatherers in the Middle Atlantic were fairly mobile and expansive, they exploited an area at least as far inland as the salt-freshwater transition, or the fall line. We may go even further and postulate that littoral harvesters in the James, and analogous river valleys, would have had little reason to penetrate beyond the fall line. The resources of the piedmont basically form a sub-set of those available in the coastal plain, with the possible exception of certain non-essential lithics.

If upland resources were sought to complement the riverine/littoral economy, there may have been some restrictions in the outer coastal plain due to the compactness of the habitats and short interfluvial distances. This problem disappears in the inner coastal plain and fall line zone, however, where ample uplands exist for the harvesting of deer, chestnuts, or similar resources.

In contrasting the societies of riparian versus riverine hunter/gatherers, we feel that the former would be more autonomous at the level of the local group, due to the homogeneity of the forest environment. Likewise, packing of riparian groups must be at a lower level, and interaction would be restricted. Good examples exist in the Tasaday of Mindanoa (Fernandez 1972), the Mbuti Pygmies (Turnbull 1965 and

the Semang of Malaysia (Schebesta 1952).

In comparison, riverine and littoral hunter/gatherers may be expected to have higher interaction rates, through the need to more effectively exploit the heterogeneity of their habitats. Trade would be more highly developed, and both trade and mating nets may be rather elongated throughout the riverine or littoral zone. While individuals or task groups would be highly mobile, residence zones would become more stable with increasing density. Such density may be expected in the littoral proper, while inland riverine groups have only a small advantage over riparian groups in terms of habitat diversity. Without the clear zonation of the estuaries, it is doubtful that interior riverine groups would develop high levels of sedentism and integration without some technological jumps (e.g. horticulture).

Examples of estuarine hunter/gatherer groups include the Aleuts, Northwest Coast Indians and Ainu. We feel that the Chesapeake Bay coastal plain afforded the conditions for relative residential stability and integration, and that its expression was reached in the Early Woodland Stage. This was accomplished by streamlining the settlement system and collapsing it into the most centralized and easily exploited zones.

Inland, we feel that riverine groups would have had to intensify their efforts through technology in order to achieve stability. We will argue, therefore, that horticulture was practiced earlier in the piedmont, where it was always to have greater economic importance, than in Tidewater. Likewise, we might expect other evidence for an attempt to increase the stability and productivity of the riverine zone through technological adaptation. In areas where the riverine habitats become marginal as foci of economic activity, we would expect a retention of, or return to a pattern more like the riparian adaptations of the Archaic. This might well

be expected in the more minor stream valleys, or in the headwaters of the great rivers, where floodplains are not well developed.

In proposing a model for the expansion and development of the Savannah River Tradition in the Middle Atlantic, we feel that social components must be considered. Turnbull (1968) has stressed the importance of flexibility in hunter/gatherer group size, organization and composition. Assuming this importance to have been true in Archaic times, we can assume that there is a minimal interaction density between individuals which is required for a healthy, low risk adaptation. This interaction density is probably maintained through mating and kin nets, and through other forms of affiliation, such as formalized trade.

In a uniform plain, where all resources are evenly distributed, we may expect a Christaller geometry to arise (Smith 1976) with settlement and interaction densities distributed in a hexagonal net, or triangular lattice. We feel that such a model approximates the theoretical interactions of individuals and groups within a uniform forested environment. On the other hand, a linear environment, such as a coast or river basin requires considerable extension and intensified interaction in order to maintain similar interaction densities for individuals in any given locus. Furthermore, the increased patchiness of the littoral environmental may require higher interaction densities in order to assure that high quality information concerning resource availability flows along the network.

We can model societies of idealized riparian and riverine groups on these assumptions. The former would likely include largely endogamous groups at the macroband or multiband level. Local groups would be nearly autonomous. The increased need for interaction densities in the riverine groups would lead to a larger, regional endogamous group. Mating and

social nets could be extensive and complex. Additional linkages between local groups, such as trading nets, would further improve information flow.

Expansion of population among riparian groups would be confined to the margins of the environment. While we feel that nearly all Archaic societies did expand along river basins to some extent, it is fair to say that riparian groups could most easily expand in a radiant fashion. In contrast to this, expansion of riverine groups would be linear, along major conduits, such as coast and river.

Expansion of hunter/gatherers in a situation in which the fundamental niche of the group is expanding, can be likened to ecological succession. Vandemeer (1973) has outline a useful theoretical approach to the problem of movement of species into habitats in succession. He models succession as a Markov process. That is the movement of groups or individuals from habitat A to habitat B is a directed stochastic event which can be expressed as a matrix of transition probabilities.

While most biotic species are highly environmentally sensitive, we assume that human cultures are adaptive. None-the-less, we also expect that decisions to change habitat attempt to minimize risk and effort by moving to optimal habitats. An optimal habitat can be defined as a habitat in which the realized niche of a group most clearly approximates the fundamental niche of that group (Vandemeer 1973).

In archeological terms, we are simply asserting that the preferred habitat for colonization is one which is most similar to the habitat of the parent group, and which is most likely to maintain social nets which existed in the parent group. There are undoubtedly other factors, such as the minimization of movement costs, which enter into a colonizing decision, but we will ignore these for the present. At any rate, it

can be argued that the attempt to minimize social costs will usually lead to colonization of the closest habitat which, in resource terms, is optimal.

Given the above assumptions, we can construct hypothetical decision trees in which we rank the resource similarities and the proximities of available habitats, and use these to generate transition probabilities for a Markov chain. In our example, we will simply note general classes of habitat similarities and will assume that error between our model and the real-world can be subsumed under the stochastic elements of the process. This is no doubt an oversimplication.

Before attempting to model the expansion of the Savannah River Tradition, we should note two important points. We have not yet determined the actual parentage of the tradition, and we have not considered the effects of indigenous groups residing in the habitats to be colonized. We should also note that our model cannot be based simply on an analogy to succession, since we know that technology and society are both considerably more adaptable than the subsistence behaviour of most species.

Perhaps we should liken the model more to the specific case of succession known as adaptive radiation. Considering expansion as a radiation, we can expect that the endpoints of the expansion will differ from the beginning, and will likewise differ from each other in the direction of greater specialization. None-the-less, all endpoints must evolve from logical connections to the parent "culture" of the radiation. As is generally the case in phylogemy, certain key attributes of the cultures which evolve from the radiation will be shared by all the members of the group, and the parent culture as well.

The parent group must have been riverine. Its technology had to include substantial equipment and structure for the exploitation of the riverine environment. What's more, due to the expansion along the coast, we will postulate that the parent group was riverine/estuarine in type. We further concur with Turnbaugh in assuming that the homeland of the parent group was in the southern Atlantic coastal zone, in as much as a radiation to an expanding niche would be expected to follow the direction of that expansion. Environmental evidence suggests a south-north trend in the development of the Middle Atlantic estuaries.

As the parent group is assumed to be estuarine/riverine, we further suggest that it was generalized within this niche. That is, the technological equipment for exploiting the entire range of riverine and estuarine resources was at hand. This follows from the notion that generalization, or opportunism, is the most efficient response to a patchy environment (Pianka 1974:206-207). This technology would have consisted of boats, fishing gear of various sorts, an intimate knowledge of riverine plant life, knowledge and capacity to store fish and shellfish, etc.

We agree that this description of the parent group of the Savannah River Tradition is sketchy at best. It certainly may pertain to the Savannah River Archaic itself, but of this we can't be certain. The technology, trade, ceremonialism and subsistence/settlement patterns of the Savannah River Archaic, as represented at Bilbo or Stallings Island, suggests the sort of society we believe parented the Tradition.

It is believed that groups using small quartz points, and occupying both river and uplands of the piedmont and coastal plain were extant at the time of the expansion. The best known, and most likely candidate

for these groups are those who made the Halifax projectiles. Their sites are numerous, particularly in the piedmont. With the available data, it is not possible to distinguish the patterns of the Halifax period from those of the Morrow Mountain or Guilford periods which precede it.

Like Guilford, Halifax appears to be more of a piedmont phenomenon. Numerous sites containing Halifax points are found in the coastal plain however, especially just below the falls. We assume that numerous groups, with similar societies, made these points. In our research area, we believe that concentrations of Halifax groups could be found in the vicinity of the fall line, where they could exploit a major environmental edge.

Savannah River folks entering the James River valley would have had to contend with competition of some sort or another from Halifax groups. We cannot pretend to imagine what shape this competition took. We can note, however, that the establishment of Savannah River in the river valley in the coastal plain must have meant the end of Halifax in that area. Simple competitive exclusion would rule out coexistence in that area.

Within the piedmont, however, it seems possible that a specialized riverine and a generalized riparian adaptation could coexist. A more detailed analysis of the niches possible is needed, and beyond the scope of this work. We feel, however, that decisions to move into the piedmont would have had to involve concerns about competition from remaining Halifax groups. In the mountainous areas, there seems to be little in the way of Halifax present. We presume that other similar Late Archaic groups inhabited that region when Savannah River arrived. Given the generally low productivity

of that environment, we doubt that more than one Late Archaic group could have successfully exploited it. In fact, we believe that the riverine adaptation of the Savannah River Tradition would have been marginal, at best.

The widespread presence of the Tradition in the headwaters suggests that Savannah River groups had substantially readapted to a more riparian way of life. This would certainly call for the extirpation of other groups. This will be treated further, below.

Savannah River in the James River Basin: A Hypothetical Scenario

Based on the foregoing model assumptions, we see the entry into the basin as the result of an expansion/radition, from the south. We feel that the optimal niche would have consisted of the juxtaposed habitats of the salt-freshwater transition zone of the James. The entering groups are expected to be fully formed social groups, with unbroken social ties to parent groups immediately to the south, probably in the Roanoke/Carolina Sounds region.

The next optimal niche habitats were probably available in similar locations on the York, Rappahannock and Potomac. We would expect special purpose campsites, such as shell mound sites, to exist in a continuum up the Chesapeake coast, and in the mouths of these streams. These sites will have strata which date to the earliest phase of the Tradition. The initial, and primary site loci would be near the mouths of major tributaries, adjacent to swamps and marshes. Any element in a seasonal round which included anadromous fish, shellfish, nuts, deer, small game, waterfowl, marsh grasses and starchy tubers could be easily accessed within a single days journey by boat. The society probably consisted of numerous small groups living near to each other, and moving in such

small groups to various spots throughout the annual cycle. Larger macroband encampments might be expected during spring fish runs, and perhaps during autumn hunts. Again, this suggests that not only would population concentrations be found near the stream confluences, but the larger sites would also be found there.

Auxilliary postulates:

1. Densest settlement was in the salt-freshwater transition zone during the early phases.

2. Earliest Savannah River dates will come from the coastal plain.

3. Large macroband encampments are located at the mouths of streams, or other spots suitable for large-scale fishing. Large hearths or other indication of fishing will be found at such spots.

4. Specialized activity sites away from this central area would show evidence for small, family sized groups, or even smaller task groups. These would include shellfish collecting, hunting and quarrying sites.

5. Stylistic patterns during this period will be very homogenous.

6. No piedmont resources (eg. soapstone) will be present.

The second phase of settlement would have followed the first very quickly. In this phase we would see the settlement of second optimal niches. These niches would also be riverine and coastal. Perhaps the outer coast would have been settled more permanently at this time. Certainly the fall line zone would be settled. Except for a decrease in diversity due to the lack of saltwater species, the fall line or inner coastal plain zone is still well suited to riverine adaptation.

Large tidal marshes, good fishing locations, and even greater upland resources are available in this zone. Migratory waterfowl and small game are nearly as plentiful at the head of tidewater as further

downstream.

Auxilliary Postulates:

1. Dates for settling second optimal habitats will probably be very close to those of the first settlement.

2. Stylistic similarity throughout coastal plain at this time would still be high.

3. Fall line resources and outer coastal resources begin to circulate up and down river.

4. Major concentrations of population will be found near major stream confluences, adjacent to swamps. Large macroband camps will be found up smaller streams, or at mouths of smaller streams, and will be indicated by evidence of fishing.

Discussion

Reinhart (1979) has noticed the placement of Savannah River sites in the tidal James to correspond with the above descriptions. Large and plentiful hearths, possibly for fish-drying, were noted at the Sassafras Springs site (ibid.).

Muriel Farrington (pers. comm.) uncovered a large hearth in a sizeable Savannah River site at White Bank Park in Hopewell. Major components are also known from Moysonec (McCary, 1976) and the Hatch Site (Gregory, pers. comm.) within the transition zone, all adjacent to confluences and swamps.

Given the numbers of Savannah River sites in Tidewater which contain no soapstone, we can infer that a great many of these were occupied prior to the settlement of the piedmont, where soapstone is found.

The next major phase in the expansion of Savannah River would have

been a difficult one. It required that groups move into sub-optimal niches across the fall line. It is possible that an interim phase of filling suitable habitats in minor streams preceded this phase. We feel that the jump across the fall line was probably several generations, at least, after the initial settlement of the coastal plain.

Selection of the most suitable piedmont habitat type was easy. The river contains anadromous fish and the uplands don't. The river allows social nets to remain uninterrupted through boat transport. The most suitable location would have been a difficult choice. It seems likely that settlment of the piedmont came only after a lengthy period of sporadic forays. During these exploratory visits, groups would have become familiarized with the high productivity of fire and flood succession growth on the floodplains.

At any rate, suitable spots would have been far enough above the fall line to allow relatively easy foraging both up and downstream by boat. This would have meant an almost certain disruption of social networks across the falls. We postulate that trading networks would have been immediately established. It is at this time that piedmont resources might begin to appear in the coastal plain. Piedmont soapstone is common on sites to the east.

As resources are more or less continuously distributed along the river in the piedmont, settlement would have been considerably different from that of the coastal plain. Relatively autonomous band groups could more efficiently exploit larger territories in the piedmont. None-the-less, we feel that the riverine adaptation and the needs of minimizing risk in a colonizing situation would have promoted the existence of a macro-band or multiband fusion cycle.

This cycle might have continued to focus on the fish runs, although communal up-country hunts are also possible. The complex bedrock geology of the piedmont would have led to the use of diverse local lithic resources. This, combined with a decrease in interaction between groups, would have led to stylistic divergences in the piedmont.

Multiband encampments in the neighborhood of geological transitions might indicate a variety of lithic materials and stylistic sets in smaller clusters within the sites. Once the readaptation to the piedmont was completed, it is likely that groups settled into rather restricted territories based on areas of expansive floodplain and river confluences. The former assured a greater resource base, and the latter promoted fishing efficiency and communication with sister groups.

Auxilliary Postulates:

1. Stylistic divergence with adoption of locally available lithics should be common.

2. The microband/multiband cycle should continue, except with high stylistic variation in large encampments. Such encampments will probably continue to show community activities, such as fish preparation.

3. Evidence for readaptation should exist. In particular, new technology for dealing with the floodplain habitat should arise.

4. The flow of exotic materials both within the piedmont, and across the fall line should increase. Soapstone may make its appearance at this time.

5. Trade patterns should reflect regional social networks, rather than simply an exchange of necessary resources. It is likely that "luxury" goods would have been traded along specific lines, as compared with necessities across general boundaries or territories.

Discussion: Piedmont Savannah River sites show increased diversity in point styles and lithics. Lithic types form clusters on large encampments, such as Go 42. Go 42 also shows a multiband structure with possible community activity areas.

The soapstone trade cycle develops after the piedmont is settled. Luchenbach, Allen and Holland (1976) have demonstrated that clear lines of trade of soapstone bowls existed. While piedmont sites seem to contain soapstone from the closest quarries, coastal plain sites contain materials obtained by trade from specific locations, within apparent regional trading nets (figure 12).

Axes and large chopping tools become common on piedmont sites, much more than in the coastal plain. In addition, mortars, pestles and other implements which might be interpreted as indications of a technological change to floodplain resources utilization is indicated. Without the root crops of the swamps, there was an apparent change in focus to the use of seed plants.

As saturation of the piedmont major river valleys occurred, it became necessary for daughter groups to make new decisions once more. The smaller stream valleys of the piedmont remained open, unless they had become the focus of settlement of the Halifax groups, or their derivatives. Yet another option was to move further upstream .

The James and Potomac have large riverine headwaters. The Potomac systems includes the Shenandoah and the Great Valley, while the James includes the Jackson and other mountainous river systems with broad floodplain valleys. These latter floodplains are frequently covered with shallow soils, but they are none-the-less productive in terms of useful resources. We believe that these major headwater streams would

Downstream flatboat Savannah River sites show increased diversity in point styles and blades. Little cross face chipping on large ceremonies, such as Co 42. Co 42 also shows a multiband assemblage with ponderite ceremonial axe-type areas.

The assemblage trade cycle develops after the pinebrook in section, lushpoboch, Allen and Holland (1970) have demonstrated that clear lines of trade or exchange bowin existed. While pinebrook sites seem to contain assemblages from the closest quarries, centralpiain series contain materials obtained by trade from specific locations, within distance regions trading as (figure 12).

Data and based excavating logic assemblages chosen on pinebrook sites, such bowl lies in the central plain. In addition, bowlines, pestles and other implements which might be interpreted as indications of a technological change to floodplain resources utilization is indicated. Without the tool stage of the assemblage, there was no important change in focus to the use of wood plants.

In association of the pinebrook major river valleys occurred. It became necessary for hunting groups to make new relationships once more. The earlier stream valleys of the primary terrestrial zone, unless they had become the focus of settlement of the Ballins groups, or their derivatives. Yet another option was to move further upstream.

The Ancestral Potomac have large riverine assemblages. The Potomac expanse includes the Shenandoah and the Great Valley, while the Ancestral includes the Susquehanna and other northeastern river systems with broad floodplain valleys. These larger floodplains are frequently covered with alluvial soils; but they are nonetheless productive in terms of useful resources. As I have the, these major bedsbeat streams would

have been settled first, followed by the smaller streams.

Anadromous fish do not penetrate the headwaters regions in great quantities, and it is likely that substantial technological and social adjustments had to be made. We feel that Savannah River, while remaining basically riverine, would have taken on much the character of a riparian system in this region. In that sense, it would not have been substantially different from other local Archaic groups.

Navigation on the mountain streams is considerably more difficult than in the piedmont or tidewater. Social nets would have been trimmed substantially, and long-distance trade or mating cycles would have become difficult to maintain. Substantial specialization within drainages or sub-regions is likely. Soapstone and other piedmont goods probably did not make it into the mountains in any great quantities.

Auxilliary postulates:

1. Structurally, Savannah River sites in this area will differ from earlier Archaic sites only within the largest river valleys.

2. Dates from this region will reflect the latest occupations of Savannah River.

3. Substantial inland and upland settlements, compared with the piedmont and coastal plain are to be expected. The fusion cycle, if maintained, would probably center on communal upland hunting base camps, rather than on large fishing camps.

4. Due to the necessary readaptations, similarities and trade within the mountainous zone will be higher than those across the zone to the east.

Discussion: Upland sites with substantial Savannah River components are reported in Rockbridge Co. (McClearen, personal communication) and in Albemarle County in the inner piedmont/Blue Ridge area (Holland 1967).

We do not know of equivalent sites to the east, and these may be large seasonal base camps, as Holland suggests. The Boone, N.C. site reported by Wilkins (1978 p. 19) may fit this category as well.

Soapstone has been reported from a few sites in the mountain zone, but it is certainly rare. We suspect that where found, it will prove to come from some of the westernmost quarries, such as those in Bedford County.

We will speak of the ensuing phases of development just with respect to the piedmont and coastal plain. It seems likely that the intensive use of seed plants, and the restricted territoriality of the piedmont groups would lead almost naturally to even greater intensification of floodplain productivity through increased burning and clearing, and perhaps the manipulation of plants. With sufficient clearing, it is likely that the fertile bottom lands are capable of producing a large standing crop of useful plants, with sufficient seasonal diversity, to maintain nearly sedentary groups.

The coastal plain, with all its natural diversity and high productivity is not as likely to yield to intensification efforts. Following the general thesis of Boserup (1965), we feel that hunter/gatherer intensification of the riverine niche in the piedmont led to the existence of groups whose lifeways more nearly approach our concept of the Woodland.

Interestingly, the earliest pottery in the Mid-atlantic is a piedmont phenomenon. Dates of 950 +/-95 B.C. on Marcey Creek at the Monocacy Site, just above the falls of the Potomac, may well represent some of the earliest ceramics in the East, north of the Savannah River basin. We have recently received a date of 890 B.C. +/-155 (UGA 3347) on Elk Island 1 pottery, a transitional type between Marcey Creek and our widespread Elk Island phase ceramics.

It has been noted more times than necessary, that there are direct resemblances between Marcey Creek and soapstone bowls. What's more, the pottery is generally associated with the small Savannah River variant points. At the Marcey Creek site, the lower stratum contained large Savannah River points, and no pottery, while the upper level contained both pottery, and the small variant points.

At the Stoneman West site, we have found Elk Island 1 pottery and a Savannah River variant in a large pit which produced the date mentioned above. Marcey Creek is frequently associated with midden accumulations and pits. This is the first phase in the James and Potomac drainages to show high levels of residential stability.

What's more, the sites, such as Marcey Creek, Seldon Island and Stoneman West are frequently quite large, suggesting a village occupation. The pottery at Stoneman West was in a very large pit which clearly intruded into a somewhat deeper Marcey Creek level. It is tempered with large quantities of river sand, is very friable and fragile, and is manufactured in ways similar to Marcey Creek.

The pottery is hand built on a flat base and ground or scraped after reaching the leather-dry state. Lugs were present. Some sherds of very similar pottery from the midden show cord-marking, and we believe that coiling and maleating on a hand built base soon followed total handbuilding of pottery.

Within perhaps three hundred years, the full-fledged Elk Island phase was in blossom. This is the characteristic Early Woodland of the James River piedmont. Pottery is coiled and maleated with cord or net on either a conical or flat base. The body is tempered with large amounts of sand or detrital grit. Vessels are very thin-walled and usually quite

large. They are extremely friable and fairly fragile, and could only have served as storage vessels in pits. Large pits containing broken Elk Island pottery are known from several sites. Gorgets were manufactured prolifically, and a large array of small quartz stemmed and notched points were used. Considerable circulation of exotic lithics seems to have taken place as well.

In the coastal plain, we still have little information. Gardner has dealt with this period somewhat, for the Potomac. Popes Creek and similar wares are fairly abundant in the salt-freshwater transition zone of the James and, especially, in the inner coastal plain. Reinhardt (1979) feels that early woodland disappears from the areas further downstream although Popes Creek formed a lower stratum at the Croaker Landing site (Clark, pers. comm.). No exceptionally large sites are known, and there has not been sufficient study to determine the settlement or subsistence patterns.

Recent test excavations by Perlman (personal communication) at VCU have revealed some interesting, stratified early and middle Woodland living floors just below the falls of the James at the Maury Street site. These include flat-bottomed pots with net-marked exteriors. He has also excavated an Acokeek hearth in a pit which intersects a Marcey Creek/Ware Plain pit in the inner coastal plain on the Chickahominy River.

We have referred to the Ware Plain vessel as Marcey Creek, because it is! We believe that the use of temper as a diagnostic for Marcey Creek, with its unique construction, lugs and bases, is unnecessary. We will continue to refer to all such pottery as Marcey Creek, whatever it is tempered with. In fact, our Elk Island I pottery is so like Marcey Creek, that it could be included in the category. However,

it is larger, thinner, and in temper and firing more closely resembles the later Elk Island ware.

Westwood Winfree (1972) excavated a site containing pits with Marcey Creek vessels on the south bank of the James in Powhatan County. At this site, too, the pots were associated with large pits and with variants of the Savannah River point.

Our study of the distribution of Marcey Creek pottery from a total of 120 Late Archaic components revealed that it is truly a phenomenon of the piedmont, as suggested by McNett (1974). The earliest dates on coastal plain ceramics are three to four hundred years later (Painter, 1977). We believe that the advent of the Woodland in the Middle Atlantic, as elsewhere in eastern North America, was the result of an attempt by riverine adapted groups to intensify their subsistence base by managing floodplain resources. See figures 12 and 13 for a comparison of soapstone and Marcey creek distributions.

It is also clear to us that this represents a considerable divergence from the Archaic patterns which precede it, even though it is derived from those patterns. Statements, such as those by Spencer and Jennings (1977), which imply that the Woodland is little more than the Archaic with pottery added, are ridiculous.

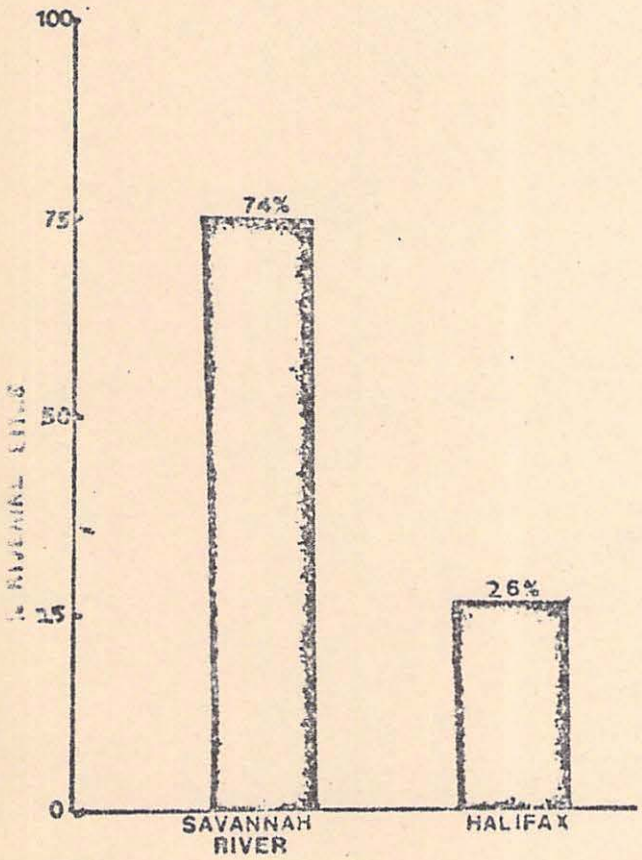
The adaptive radiation of the Savannah River Tradition resulted in the intensive exploitation of the riverine habitats of the Middle Atlantic States. Some of these habitats, such as those of the coastal plain, required little change from previous lifeways, and were capable of supporting a stable and substantial population of hunters and gatherers. Other habitats, particularly those of the piedmont floodplain, required technological and social changes which ultimately led to the Woodland pattern.

We have not followed our model extensively. Time and space do not allow it. We hope that our slight expansion of the efforts of others, noteably Fred Kinsey and William Turnbaugh, have offered some insights to those working in other areas. We hope to explore further the implications of our model, and we hope others will help us tighten it, refine it, and if need be, to shoot it down in favor of something better.

PIEDMONT FALL LINE AND COASTAL PLAIN:
MAJOR AND MINOR COMPONENTS

(N = 120)

	SAVANNAH RIVER	HALIFAX	
RIVERINE	74	26	100
NON RIVERINE	11	9	20
	85	35	120



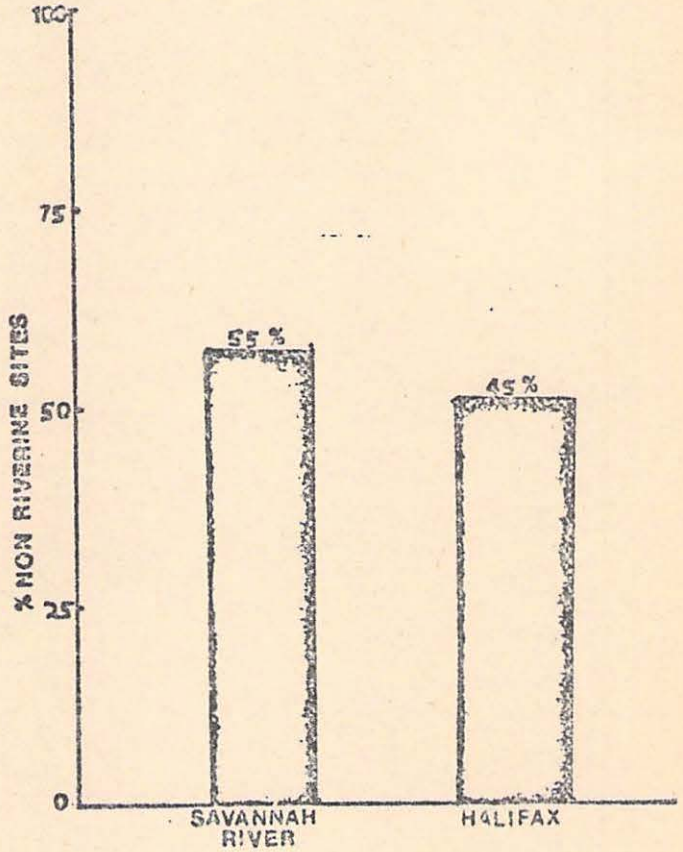
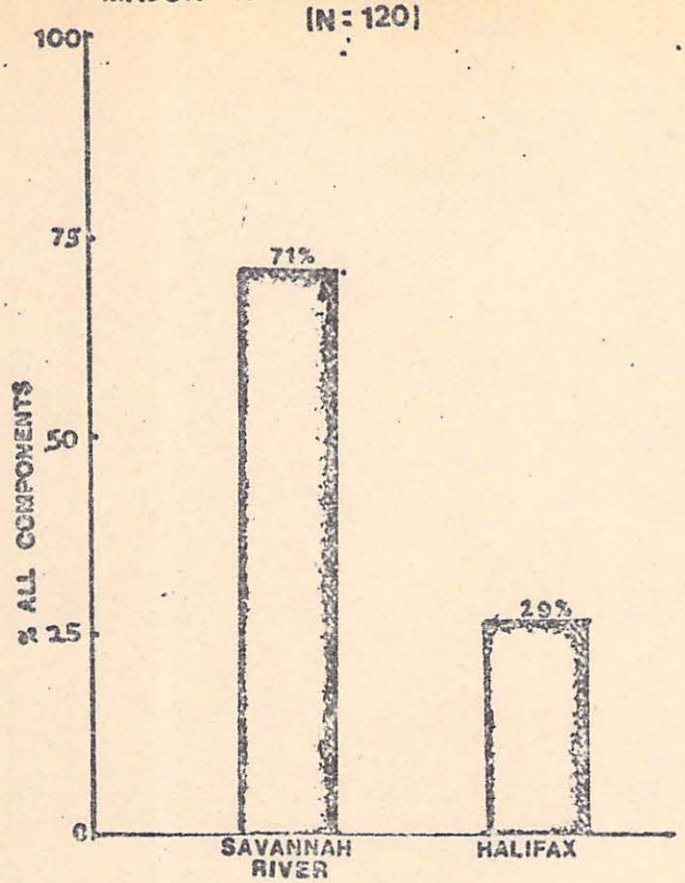
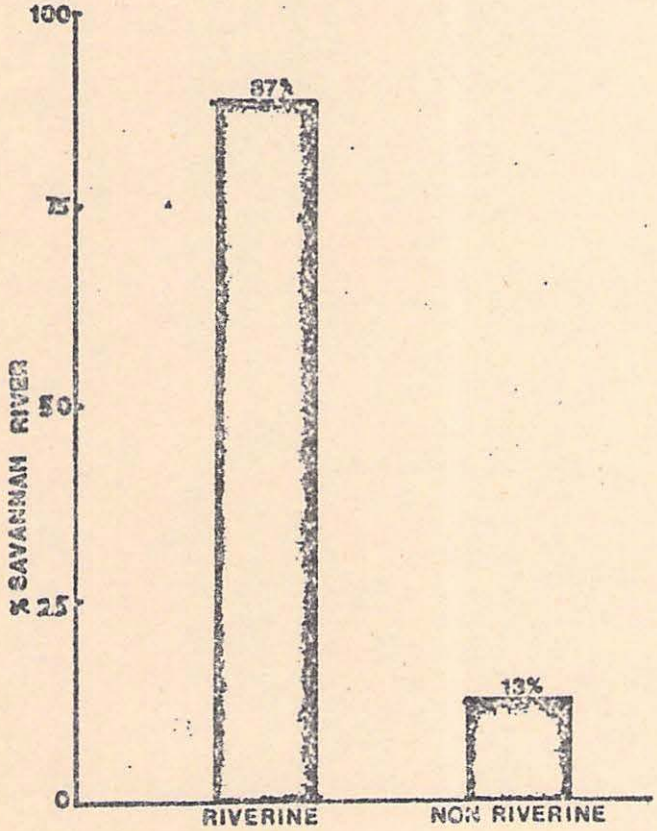


Fig. 1

PIEDMONT, FALL LINE AND COASTAL PLAIN:
MAJOR AND MINOR COMPONENTS
(N = 120)





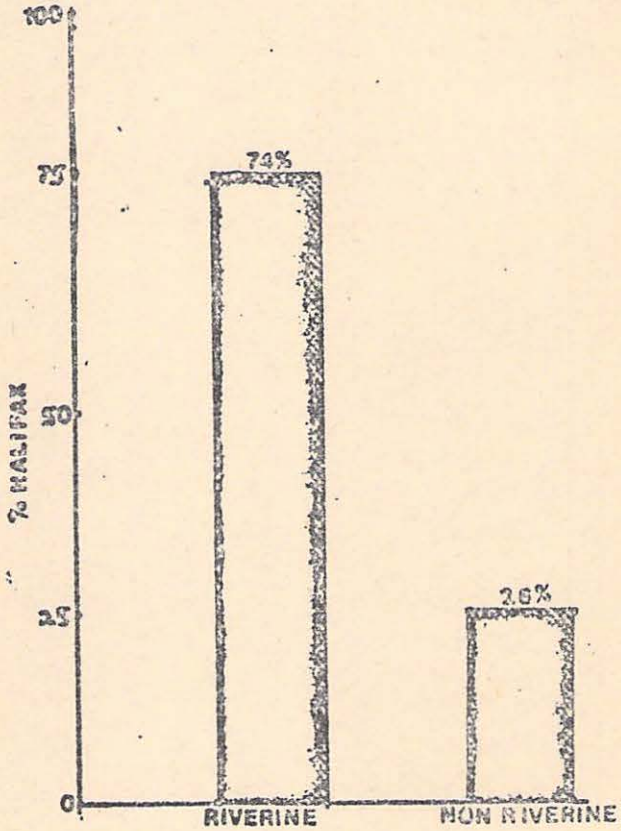
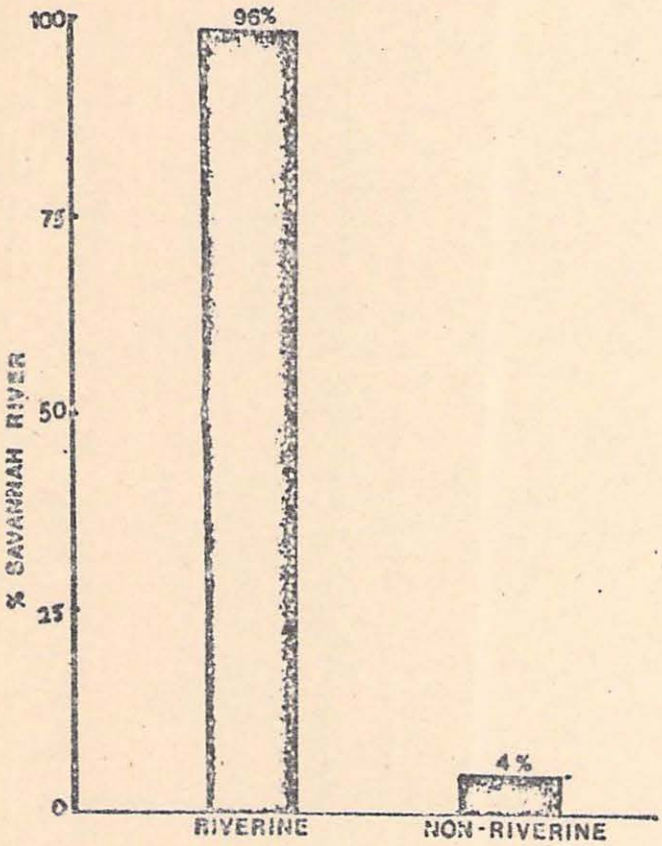


Fig. 2

PIEDMONT: MAJOR COMPONENTS



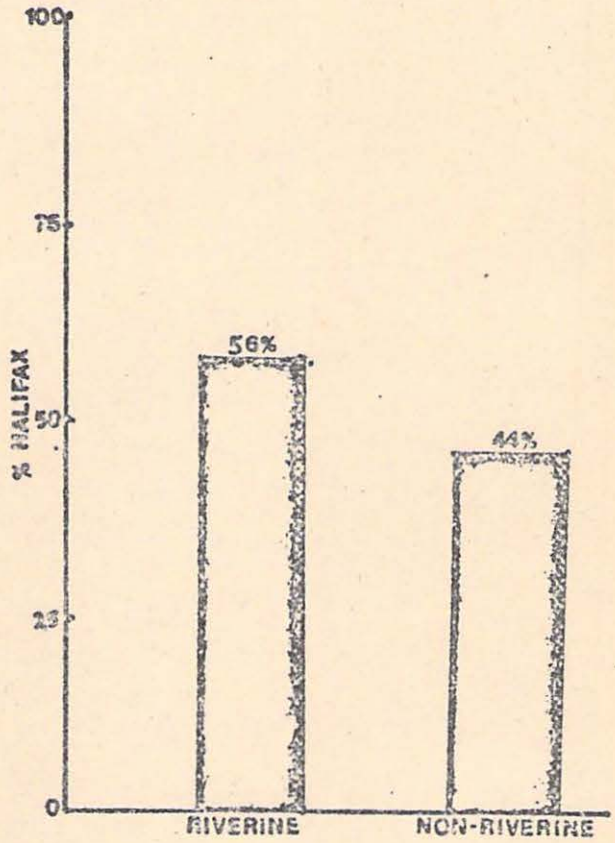
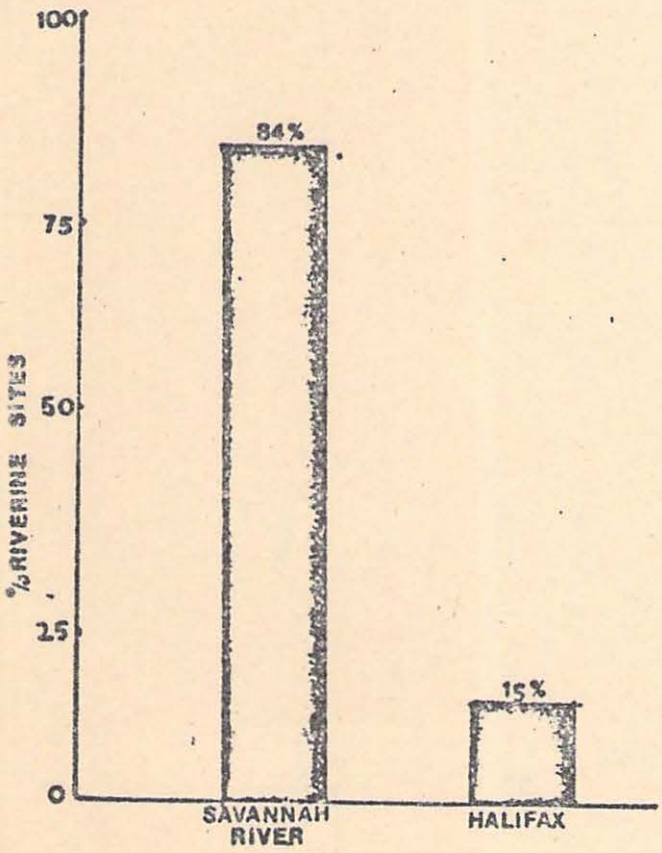


Fig. 3

PIEDMONT: MAJOR COMPONENTS
(N: 37)

	SAVANNAH RIVER	HALIFAX	
RIVERINE	27	5	32
NON RIVERINE	1	4	5
	28	9	37



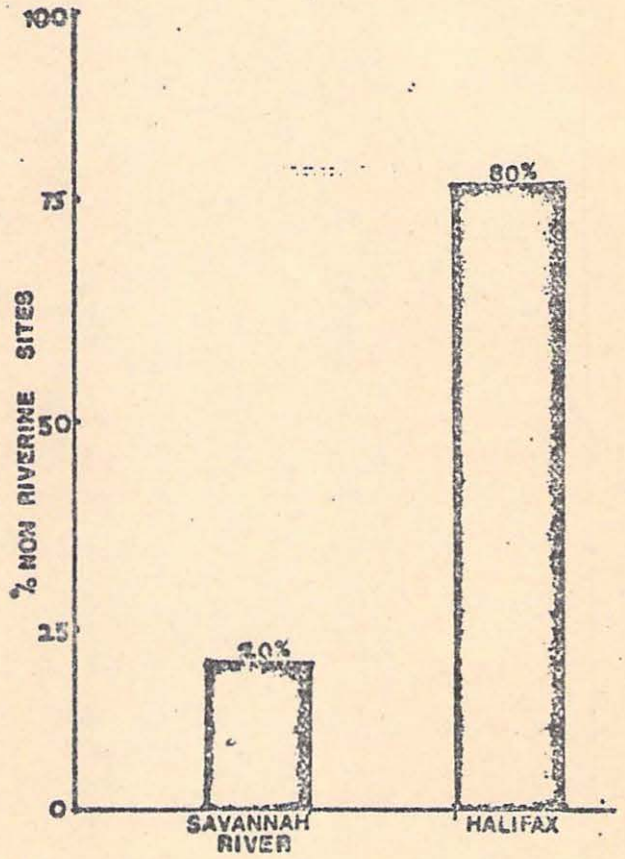
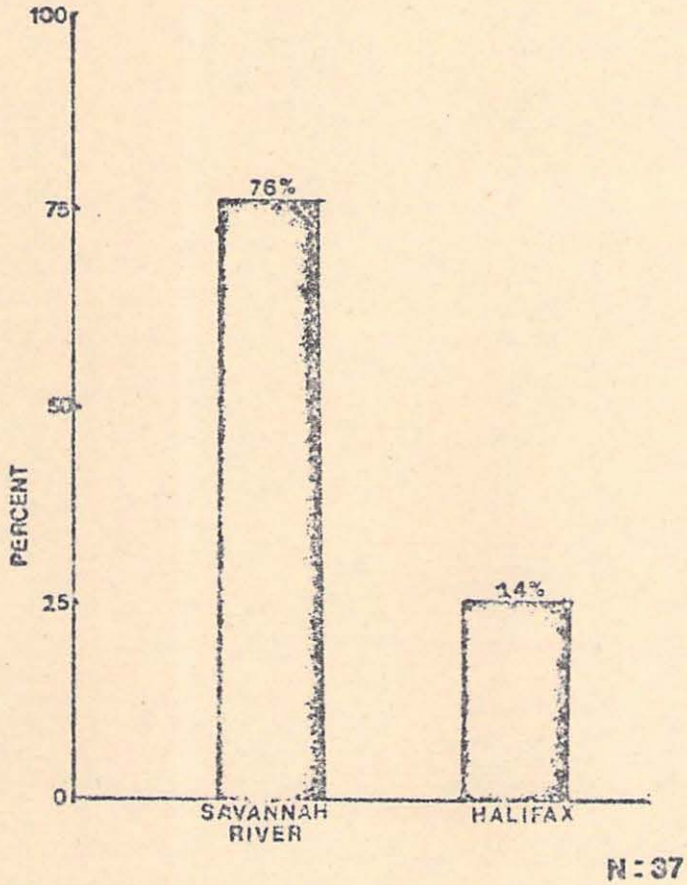


Fig. 4

PIEDMONT: MAJOR COMPONENTS



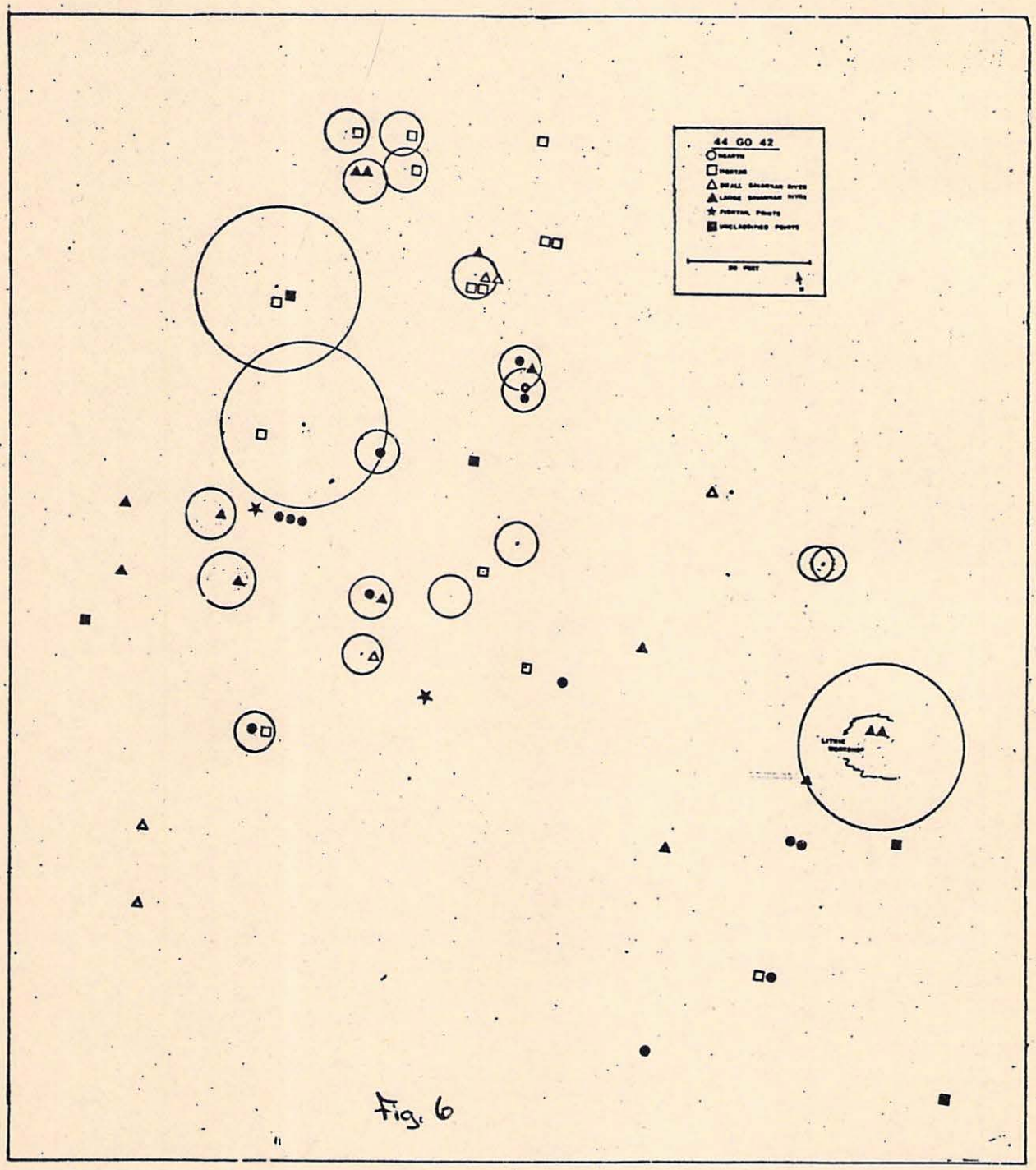


Fig. 6

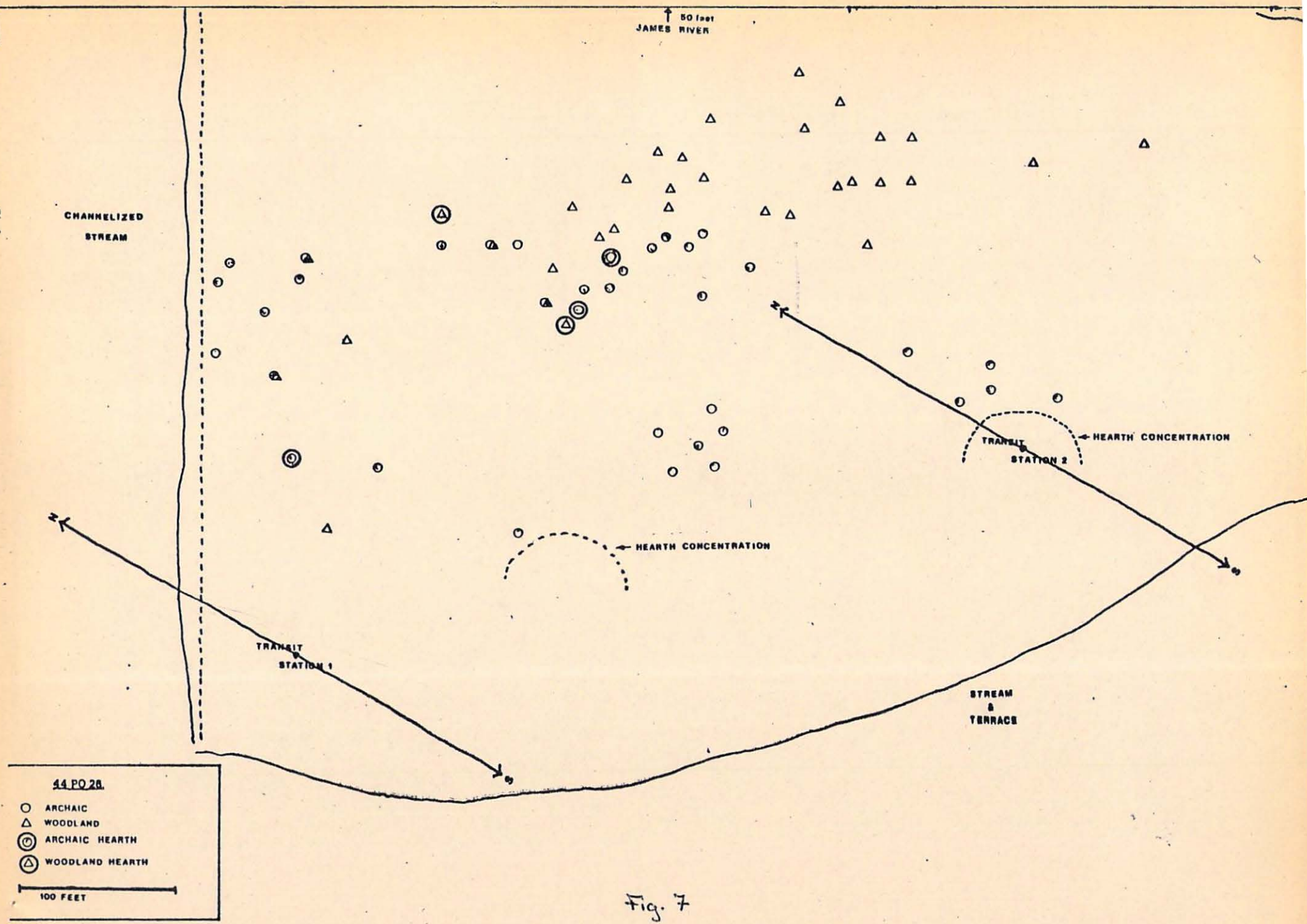

50 feet
JAMES RIVER
CHANNELIZED STREAM
HEARTH CONCENTRATION
TRANSIT STATION 2
HEARTH CONCENTRATION
TRANSIT STATION 1
STREAM & TERRACE
44 PO 28
ARCHAIC
WOODLAND
ARCHAIC HEARTH
WOODLAND HEARTH
100 FEET

Fig. 7

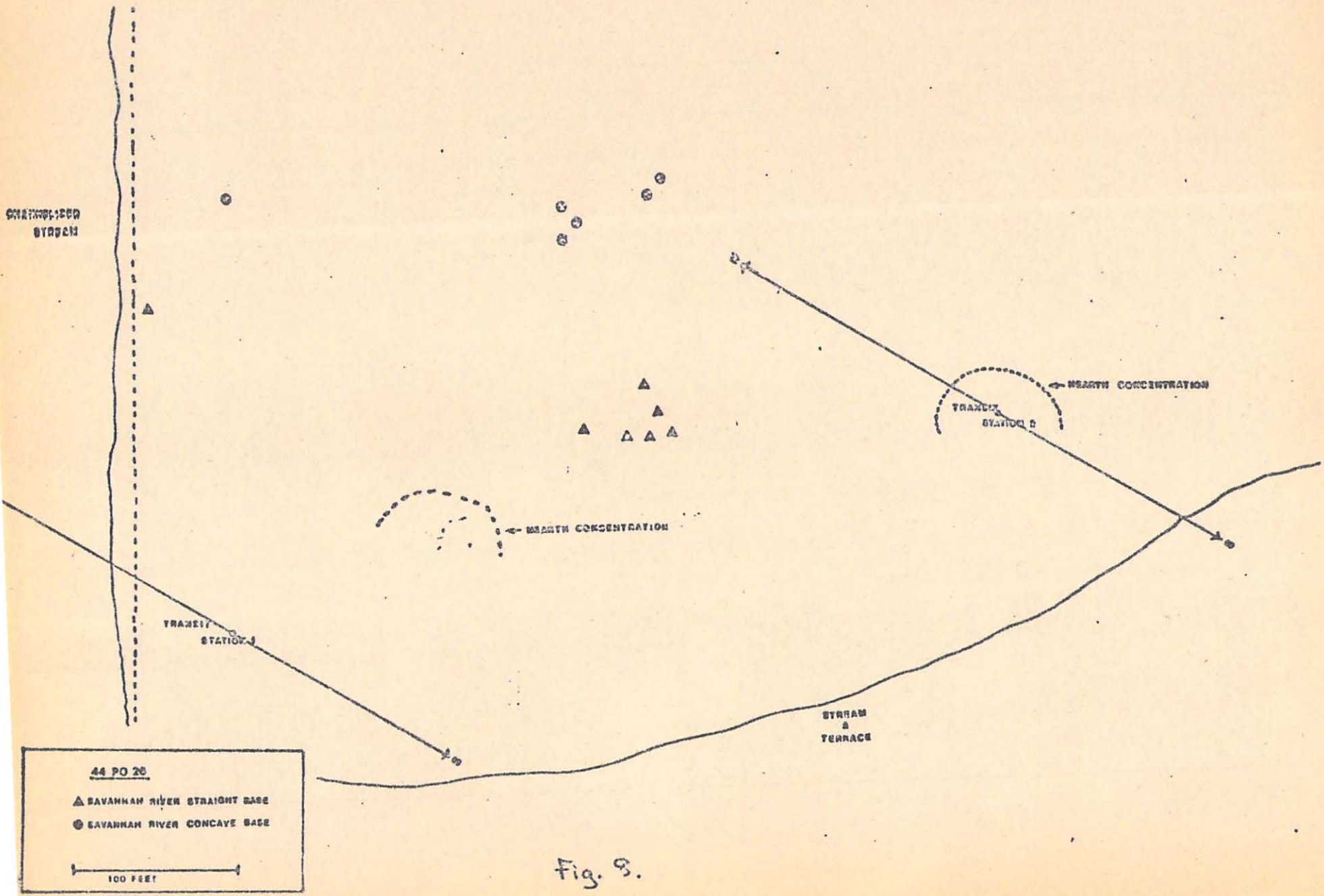

STRAIGHTENED STREAM
HEARTH CONCENTRATION
TRANSECT STATION 5
HEARTH CONCENTRATION
TRANSECT STATION 4
STREAM & TERRACE
44 PO 20
SAVANNAH RIVER STRAIGHT BASE
SAVANNAH RIVER CONCAVE BASE
100 FEET

Fig. 9.

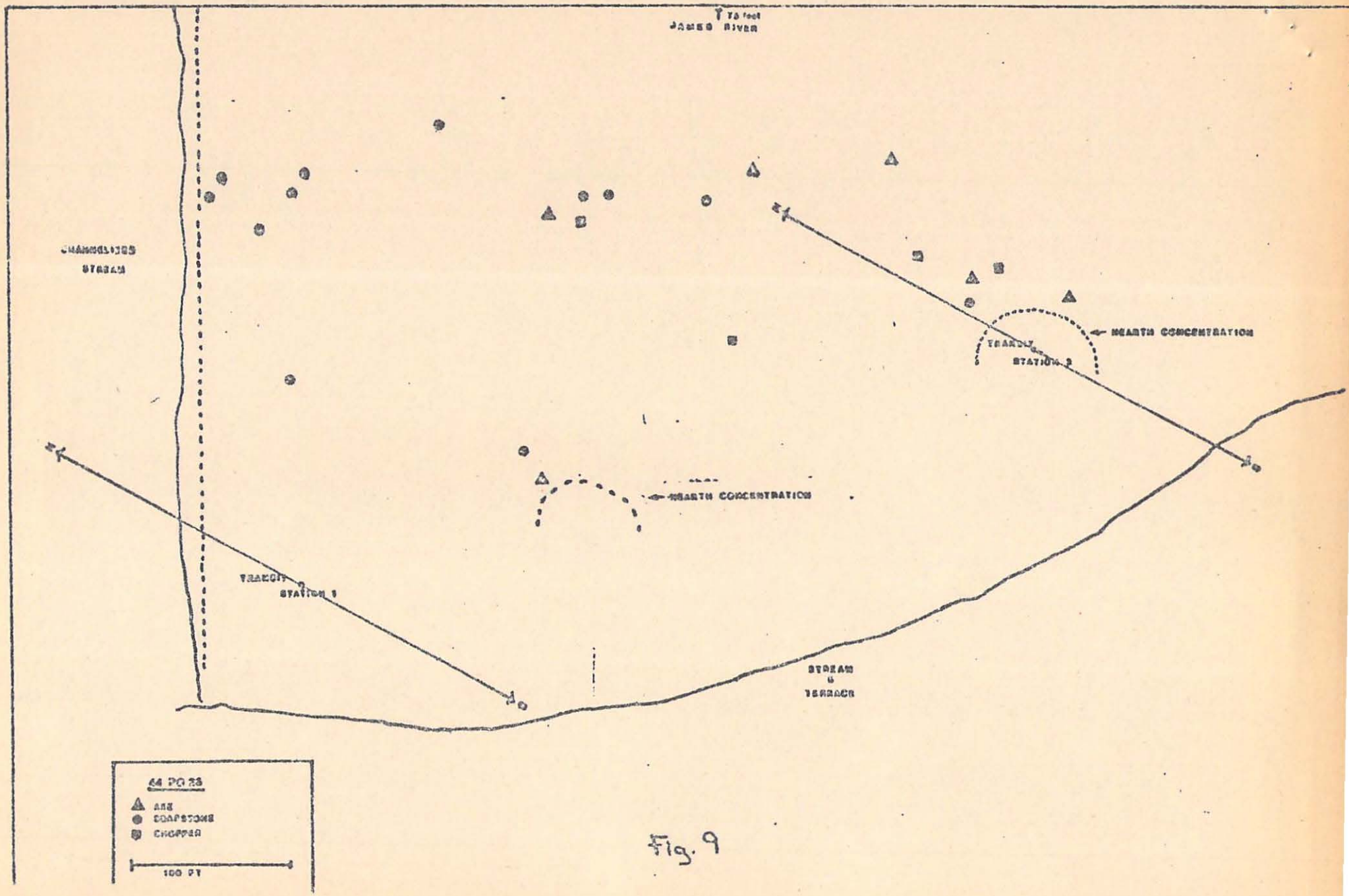

JAMES RIVER
STREAM
HEARTH CONCENTRATION
TRANSIT
STATION 2
HEARTH CONCENTRATION
TRANSIT
STATION 1
STREAM
TERRACE
44 PO 23
AXE
COBBLESTONE
CHOPPER
100 FT

Fig. 9

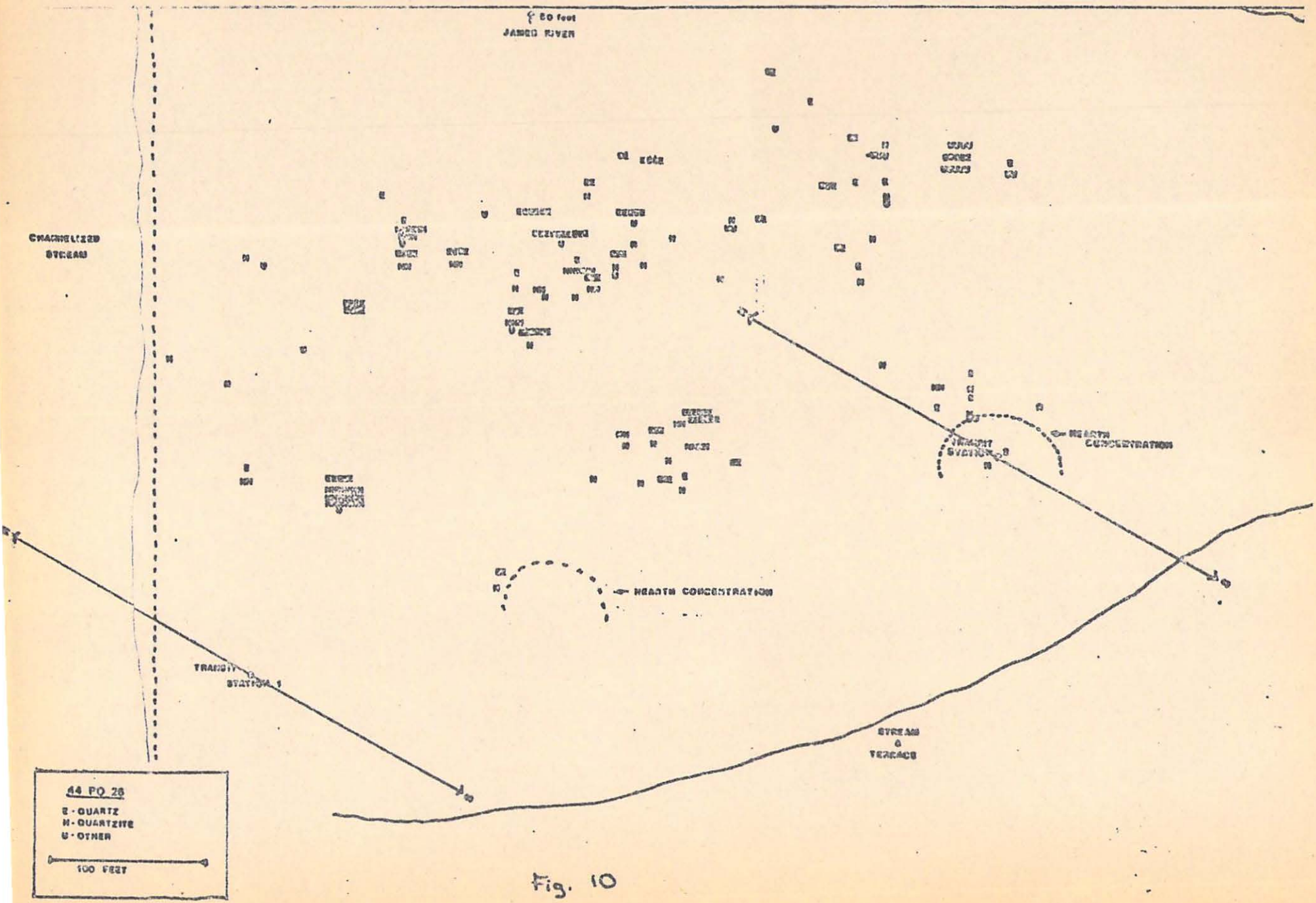

50 feet
JAMES RIVER
CHANNELIZED STREAM
HEARTH CONCENTRATION
TRANSIT STATION
HEARTH CONCENTRATION
TRANSIT STATION 1
STREAM & TERRACE
44 PO 26
Q - QUARTZ
H - QUARTZITE
O - OTHER
100 FEET

Fig. 10


PIEDMONT
INNER
OUTER
INNER
FLOODPLAIN
MOUNTINOUS RESOUR
FRESH MARSH
SALT MARSH
OYSTER BEDS

DISTRIBUTION OF SITES WITH SOAPSTONE BOWLS

	COASTAL PLAIN	FALL LINE	OUTER PIEDMONT	
+	8	4	12	24
-	18	9	8	35
	26	12	2	59

$\chi^2 = 4.78$ df = 2 $p < .10$

	COASTAL PLAIN FALL LINE	OUTER PIEDMONT	
+	12	12	24
-	27	8	35
	39	20	59

$\chi^2 = 5.9$ df = 1 $p < .02$

Fig. 12

fig

DISTRIBUTION OF MARCEY CREEK WARE

	COASTAL PLAIN	FALL LINE	OUTER PIEDMONT	
+	1 (WARE PLAIN)	7	6	14
-	25	6	14	45
	26	13	20	59

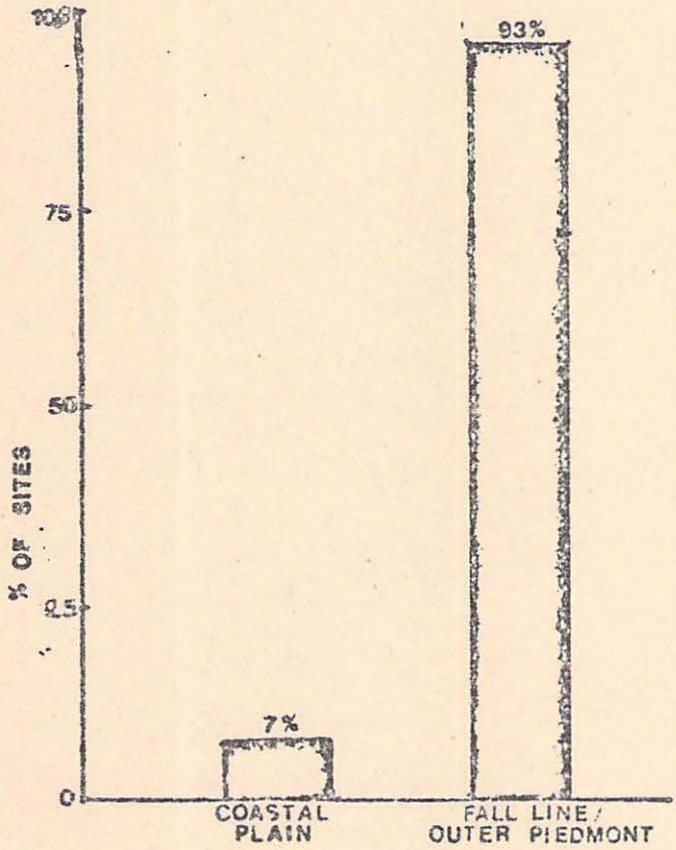


Fig. 13

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